

# The Graduate School

*Programs and Policies*

2003 – 2004

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The University reserves the right to change its admission, registration, and graduation requirements as necessary. The course offerings and requirements of the University of Notre Dame are continually under examination and revisions are expected. This *Bulletin of Information* is not a contract; it merely presents the offerings and requirements in effect at the time of publication and in no way guarantees that the offerings and requirements will remain the same. Every effort will be made to provide advance information of any changes.

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The University of Notre Dame does not discriminate on the basis of race, color, national or ethnic origin, sex, disability, veteran status, or age in the administration of any of its educational programs, admissions policies, scholarship and loan programs, athletic and other school-administered programs, or in employment.

***The Spirit of Inclusion at Notre Dame***

“Strangers and sojourners no longer. . .”  
(Ephesians 2:19)

The University of Notre Dame strives for a spirit of inclusion among the members of this community for distinct reasons articulated in our Christian tradition. We prize the uniqueness of all persons as God’s creatures. We welcome all people, regardless of color, gender, religion, ethnicity, sexual orientation, social or economic class, and nationality, for example, precisely because of Christ’s calling to treat others as we desire to be treated. We value gay and lesbian members of this community as we value all members of this community. We condemn harassment of any kind, and University policies proscribe it. We consciously create an environment of mutual respect, hospitality, and warmth in which none are strangers and all may flourish.

One of the essential tests of social justice within any Christian community is its abiding spirit of inclusion. Scriptural accounts of Jesus provide a constant witness of this inclusiveness. Jesus sought out and welcomed all people into the Kingdom of God—the gentile as well as the Jew, women as well as men, the poor as well as the wealthy, the slave as well as the free, the infirm as well as the healthy. The social teachings of the Catholic Church promote a society founded on justice and love, in

which all persons possess inherent dignity as children of God. The individual and collective experiences of Christians have also provided strong warrants for the inclusion of all persons of good will in their communal living. Christians have found their life together enriched by the different qualities of their many members, and they have sought to increase this richness by welcoming others who bring additional gifts, talents, and backgrounds to the community.

The spirit of inclusion at Notre Dame flows from our character as a community of scholarship, teaching, learning, and service founded upon Jesus Christ. As the Word through whom all things were made, Christ is the source of the order of all creation and of the moral law which is written in our hearts. As the incarnate Word, Christ taught the law of love of God and sent the Holy Spirit that we might live lives of love and receive the gift of eternal life. For Notre Dame, Christ is the law by which all other laws are to be judged. As a Catholic institution of higher learning, in the governance of our common life we look to the teaching of Christ, which is proclaimed in Sacred Scripture and tradition, authoritatively interpreted by church teaching, articulated in normative understandings of the human person, and continually deepened by the wisdom born of inquiry and experience. The rich heritage of the Catholic faith informs and transforms our search for truth and our understanding of contemporary challenges in higher education.

*This statement was adopted by the officers of the University on August 27, 1997, in conjunction with an Open Letter to the Notre Dame Community.*

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# The Graduate School

As a Catholic research university, the University of Notre Dame offers first-rate academic training in an environment that addresses questions of value and meaning. We are committed to making quality the hallmark of the Graduate School. Our intent is to allow faculty to invest in the lives of gifted graduate students, equipping them to pass on a vision of inquiry, scholarship, teaching, and service.

Over the past two decades, Notre Dame has made dramatic advances in building a distinguished faculty. Ongoing investment in facilities also invigorates the University's graduate programs. For more than a decade major construction projects have added new campus buildings to provide classrooms, faculty offices, and research facilities in the sciences, engineering, humanities, and social sciences.

Notre Dame has a pivotal role to play as a Catholic center of learning, a place that welcomes the intellectual ferment of a university while encouraging its faculty—in a variety of disciplines and from diverse perspectives—to address ultimate questions, religious foundations, and ethical dilemmas.

## *History*

Located north of the city of South Bend, Indiana, the University of Notre Dame, a Holy Cross institution, was founded in 1842 by the Rev. Edward F. Sorin, a priest of the Congregation of Holy Cross. In 1844 it was chartered by a special act of the legislature of the State of Indiana. Combining the style

of the French “college” and the seminary in which Father Sorin and his associates were educated, Notre Dame began as both a secondary school and a four-year college offering the baccalaureate degree in the liberal arts. It soon adapted to the style and structure of the typical 19th-century American university, introducing a science curriculum in 1865, the first American Catholic law school in 1869, an engineering college in 1873, a graduate program in 1918, and a college of business in 1921. The University was first accredited by the North Central Association in 1913.

## *Administration*

From 1918 to the present, the University's Graduate School has developed into four divisions—humanities, social sciences, science, and engineering—and the School of Architecture, and includes 30 departments and programs offering master's and/or Ph.D. degrees in most of the major humanistic, scientific, and engineering disciplines.

Administered originally by a graduate committee of faculty members, the Graduate School was organized formally in 1944 with a graduate dean and graduate council. In 1971, the newly created position of vice president for advanced studies underlined the University's intense focus on building quality in the graduate programs. Since 1990, the Graduate School has been administered by a vice president for graduate studies and research, assisted by several associate and assistant deans and the graduate council.

The University's total student population of more than 10,000 includes nearly 1,700 graduate students and 1,000 professional students. Approximately 800 graduate and professional degrees are awarded annually.

## *Catholic Character*

Father Edward Malloy, Notre Dame's president since 1987, has used these words to describe the University's Catholic character:

“From its founding in 1842 until the present Notre Dame has self-consciously and proudly proclaimed itself to be a Catholic university. In one sense, this distinguishes it from other colleges and universities which are secular or nondenominational in origin and/or present institutional identity. This reference to Catholicity builds on a historical connection to the Roman Catholic Church and its cultivation of the great transcendental values of truth, beauty, and goodness. It presupposes that a life given over to learning and scholarship can be a valid route to God.

“In another sense, Notre Dame's Catholic character is a call to be a welcoming place, a kind of extended family where individuals from all backgrounds and of every faith can both feel at home and be prized for the special contribution that they make. It is a call to cultivate a spirit of honest and open exchange, always in a valuing context.”

## Officers of Administration

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### *In the University*

Rev. Edward A. Malloy, C.S.C., Ph.D.  
*President of the University*

Nathan O. Hatch, Ph.D.  
*Provost*

Carol A. Mooney, J.D.  
*Vice President and Associate Provost*

Rev. John I. Jenkins, C.S.C., D.Phil.  
*Vice President and Associate Provost*

John F. Affleck-Graves, Ph.D.  
*Vice President and Associate Provost*

Rev. Mark L. Poorman, C.S.C., Ph.D.  
*Vice President for Student Affairs*

Jeffrey C. Kantor, Ph.D.  
*Vice President for Graduate Studies  
and Research*

Louis M. Nanni, M.A.  
*Vice President for University Relations*

Carol Colby Kaesebier, J.D.  
*Vice President and General Counsel*

James J. Lyphout, M.B.A.  
*Vice President for Business Operations*

Scott C. Malpass, M.B.A.  
*Vice President for Finance and Chief  
Investment Officer*

### *In the Graduate School*

Jeffrey C. Kantor, Ph.D.  
*Vice President for Graduate Studies and  
Research and Dean of the Graduate School*

Anthony K. Hyder, Ph.D.  
*Associate Vice President for Graduate Studies  
and Research*

Donald B. Pope-Davis, Ph.D.  
*Associate Vice President for Graduate Studies  
and Associate Dean of the Graduate School*

Howard T. Hanson, M.S.  
*Assistant Vice President for Research and  
Director, Office of Research*

Terrence J. Akai, Ph.D.  
*Associate Dean of the Graduate School*

Andrew B. Deliyannides, Ph.D.  
*Manager of Technical Support for the  
Graduate School*

Peter Diffley, Ph.D.  
*Associate Dean of the Graduate School*

Michael T. Edwards, M.S.A.  
*Associate Director for Research Development*

Terri Hall, B.A.  
*Assistant Director, Sponsored Programs,  
Office of Research*

Richard A. Hilliard, Ph.D.  
*Director of Research Compliance*

Pamela A. Krauser, M.B.A.  
*Director, Electronic Research Administration,  
Office of Research*

Karen M. Pace, B.S.  
*Associate Director, Sponsored Programs,  
Office of Research*

James H. Powell, Ph.D.  
*Associate Dean of the Graduate School and  
Director of the Summer Session*

Ellen D. Rogers, M.B.A.  
*Director, Sponsored Programs,  
Office of Research*

Barbara M. Turpin, Ph.D.  
*Associate Dean of the Graduate School*

Diane R. Wilson, M.S.A.  
*Assistant Dean of the Graduate School*

## The Graduate Council

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Following is the Graduate Council membership for the 2003-2004 academic year.

### *Ex Officio Members*

Jeffrey C. Kantor, Ph.D.  
*Vice President for Graduate Studies and  
Research, Dean of the Graduate School*

Anthony K. Hyder, Ph.D.  
*Associate Vice President for Graduate Studies  
and Research*

Donald B. Pope-Davis, Ph.D.  
*Associate Vice President for Graduate Studies  
and Associate Dean of the Graduate School*

Frank P. Incropera, Ph.D.  
*Matthew H. McCloskey Dean of Engineering  
and H. Clifford and Evelyn A. Brosey  
Professor of Engineering (Mechanical)*

Joseph Marino, Ph.D.  
*William K. Warren Dean of the College of  
Science and Professor of Chemistry*

Mark W. Roche, Ph.D.  
*I. A. O'Shaughnessy Dean of the College of  
Arts and Letters and the Rev. Edmund P.  
Joyce, C.S.C., Professor of German  
Language and Literature*

Carolyn Woo, Ph.D.  
*Martin J. Gillen Dean of the Mendoza  
College of Business and the Raymond  
and Milann Siegfried Professor of  
Entrepreneurial Studies*

Jennifer A. Younger, Ph.D.  
*Director of University Libraries*

Peter Diffley, Ph.D.  
*Associate Dean of the Graduate School*

James H. Powell, Ph.D.  
*Associate Dean of the Graduate School  
and Director of the Summer Session*

Barbara M. Turpin, Ph.D.  
*Associate Dean of the Graduate School*

### *Elected Members*

Ani Aprahamian, Ph.D.  
*Chair and Professor of Physics*

Doris L. Bergen, Ph.D.  
*Associate Professor of History*

Peter C. Burns, Ph.D.  
*Chair and the Henry J. Massman Jr.  
Associate Professor of Civil Engineering  
and Geological Sciences*

Hope Hollocher, Ph.D.  
*Clare Boothe Luce Associate Professor of  
Biological Sciences*

Lionel Jensen, Ph.D.  
*Chair and Associate Professor of East Asian  
Languages and Literatures*

Edward J. Maginn, Ph.D.  
*Associate Professor of Chemical and  
Biomolecular Engineering*

Richard G. Sheehan, Ph.D.  
*Professor of Finance and Business Economics*

Rabbi Michael A. Signer, Ph.D.  
*Abrams Professor of Jewish Thought and  
Culture, Department of Theology*

Joseph P. Wawrykow, Ph.D.  
*Director of Graduate Studies and Associate  
Professor of Theology*

Paul J. Weithman, Ph.D.  
*Chair and Professor of Philosophy*

**Appointed Members**

Five appointed members will be announced.

**Graduate Student Representatives**

Martiqua Post (Aerospace and Mechanical Engineering)

*President of the Graduate Student Union*

Meg Garnett (History)

*Co-Vice President of the Graduate Student Union*

**Graduate Student Government**

Through a council of elected officers, chairs and secretaries, appointed officers, and representatives from the departments of its constituent colleges, the Graduate Student Union (GSU) provides a variety of services and represents its membership on various University councils and committees. In particular, it subsidizes graduate student travel to present original research, promotes excellence in graduate education, looks for the highest quality of life for graduate students, and maintains a liaison with the administration regarding health care issues. The GSU publishes the newsletter, provides listserv updates, conducts a graduate orientation program, and sponsors teaching and professionalization workshops, in addition to providing various social, cultural, and intellectual activities. The GSU is the graduate students' official liaison with the University administration and the Office of Student Activities.

The Graduate Student Union finances its operations and Conference Presentation Grant (formerly known as the Robert Gordon Travel Grant) through a yearly, mandatory activity fee assessed on all graduate students through the Office of Student Accounts. The Graduate Student Union maintains offices in the LaFortune Student Center at the mezzanine location; send any e-mail inquiries to [dfrahn@nd.edu](mailto:dfrahn@nd.edu). Telephone: (574) 631-6963 Web: <http://www.gsu.nd.edu>

**Graduate Degrees Granted**

**Master of Architecture**

**Master of Architectural Design and Urbanism**

**Master of Arts in the following fields:**

Art History, Design, and Studio Art  
Early Christian Studies  
Economics  
English  
French and Francophone Studies  
German Language and Literature  
History

History and Philosophy of Science  
Iberian and Latin American Studies  
Italian Studies  
Literature  
Music  
Peace Studies  
Philosophy  
Political Science  
Psychology  
Sociology  
Theology

**Master of Divinity**

**Master of Education (only for students in the Alliance for Catholic Education program)**

**Master of Engineering (only with J.D.)**

**Master of Engineering in Mechanical Engineering**

**Master of Fine Arts in the following fields:**

Creative Writing  
Design  
Studio Art

**Master of Medieval Studies**

**Master of Music**

**Master of Science in Aerospace Engineering**

**Master of Science in Applied Mathematics**

**Master of Science in Bioengineering**

**Master of Science in Chemical Engineering**

**Master of Science in Civil Engineering**

**Master of Science in Computer Science and Engineering**

**Master of Science in Electrical Engineering**

**Master of Science in Environmental Engineering**

**Master of Science in Mechanical Engineering**

**Master of Science in the following fields:**

Biochemistry  
Biological Sciences  
Biophysics  
Chemistry  
Geological Sciences  
Mathematics  
Physics

**Master of Theological Studies**

**Doctor of Philosophy in the following fields:**

Aerospace and Mechanical Engineering  
Biochemistry  
Biological Sciences  
Biophysics  
Chemical and Biomolecular Engineering  
Chemistry  
Civil Engineering and Geological Sciences  
Computer Science and Engineering  
Economics  
Electrical Engineering  
English  
History  
History and Philosophy of Science  
Literature  
Mathematics

Medieval Studies  
Philosophy  
Physics  
Political Science  
Psychology  
Sociology  
Theology

**Areas and Fields of Study**

The University of Notre Dame offers graduate programs leading to master's and/or doctoral degrees in the following areas and fields of study:

**Aerospace and Mechanical Engineering**

Aerospace Sciences  
Advanced Aerospace Vehicle Concepts  
Aeroacoustics  
Aero-optics  
Aerospace Structural Design  
Aerospace Systems Design  
Flow Physics and Control  
High-Lift Aerodynamics  
Low Reynolds-Number Aerodynamics  
Low Speed Aerodynamics  
Particle Dynamics  
Transonic, Supersonic, Hypersonic Flows  
Vortex Aerodynamics  
Biomechanics and Biomaterials  
Biocompatibility  
Biological Material Characterization  
Computational Modeling of Biomechanical Systems  
Design and Manufacture of Next-Generation Orthopedic Devices  
Design, Synthesis, and Characterization of Novel Biomaterials  
Human Body Kinematics  
Surgical Simulation  
Tribology  
Mechanical Systems and Design  
Computer Aided Design and Manufacturing  
Design for Manufacturing  
Design Optimization  
Dynamic and Control Systems  
Mechanism and Machine Theory  
Robotics  
Tribology  
Solid Mechanics and Materials  
Composite Materials  
Environmental Assisted Cracking  
Fatigue  
Fluid/Structure Interaction  
Fracture Mechanics  
Manufacturing Processes  
Mechanics of Porous Media  
Plasticity  
Structural Stability  
Thermal and Fluid Sciences

- Boundary Layer Phenomena
- Chaos in Fluid Systems
- Computational Fluid Mechanics
- Detonation Theory
- Droplet Sprays
- Fire Research
- Fluid/Structure Interaction
- Flow Control
- Hydrodynamic Stability
- Hydronics
- Industrial Energy Conservation
- Microfluid Mechanics
- Molecular Dynamics
- Multiphase and Buoyant Flows
- Reacting Flows
- Solidification of Liquid Metals
- Turbulent Flows
- Architecture\***
  - Architectural Design
  - Classical Theory in Architecture and Urbanism
  - History and Theory
  - Urban Theory and Design
- Art, Art History, and Design**
  - Studio Art+
    - Ceramics
    - Painting
    - Photography
    - Printmaking
    - Sculpture
  - Art History\*
    - American
    - Ancient
    - Contemporary
    - Medieval
    - Modern European
    - Renaissance and Baroque
  - Design+
    - Graphic Design
    - Industrial Design
- Biological Sciences**
  - Animal Behavior
  - Aquatic Biology
  - Biochemistry
  - Biogeochemistry
  - Biotechnology
  - Cancer Biology
  - Cell and Molecular Biology
  - Developmental Biology
  - Ecology
  - Ecosystem Ecology
  - Endocrinology
  - Environmental Biology
  - Environmental Microbiology
  - Evolutionary Biology
  - Genetics and Bioinformatics
  - Genomics
  - Medical Entomology and Vector Biology
  - Microbial Pathogenesis
  - Neurobiology
  - Nutritional Sciences
- Parasitology and Infectious Diseases
- Physiology
- Plant Science
- Population Biology
- Chemical and Biomolecular Engineering**
  - Applied Mathematics
  - Biological Materials
  - Bioseparations
  - Catalysis and Surface Science
  - Ceramic Materials
  - Chemical Reaction Engineering
  - Combustion Synthesis of Materials
  - Drug Delivery Systems
  - Ecological Modeling
  - Environmentally Conscious Design
  - Fuel Cells
  - Gas-Liquid Flows
  - Ionic Liquids
  - Materials Science
  - Microfluidic Devices
  - Molecular Modeling and Simulation
  - Molecular Theory of Transport
  - Nanostructured Materials
  - Parallel Computing
  - Phase Equilibria
  - Pollution Prevention
  - Polymer Rheology
  - Process Dynamics and Control
  - Process Optimization and Design
  - Process Simulation
  - Statistical Mechanics
  - Superconducting Materials
  - Supercritical Fluids
  - Suspension Rheology
  - Transport in Porous Media
- Chemistry and Biochemistry**
  - Biochemistry
  - Bio-inorganic Chemistry
  - Bio-organic Chemistry
  - Inorganic Chemistry
  - Materials Chemistry
  - Molecular Biology
  - Organic Chemistry
  - Organometallic Chemistry
  - Physical Chemistry and Radiation Sciences
  - Theoretical and Computational Chemistry
- Civil Engineering and Geological Sciences**
  - Aquatic Chemistry
  - Bioengineering
  - Biological Treatment of Hazardous Waste
  - Dynamics of Offshore Structures
  - Earthquake Engineering
  - Environmental Engineering
  - Environmental Mineralogy
  - Finite Element Modeling
  - Geotechnical Engineering
  - Groundwater Hydrology
  - High and Low Temperature Geochemistry
  - Mantle Petrology
  - Materials Characterization
  - Multiphase Flows
- Natural and Man-made Hazard Reduction
- Paleontology
- Structural Mechanics and Design
- Structural Reliability
- Wind Engineering
- Classics**
  - Early Christian Studies
  - Latin Literature
  - Greek Literature
- Computer Science and Engineering**
  - Algorithms and Theory of Computations
  - Artificial Intelligence and Behavior-based Robotics
  - Computationally Demanding Applications
  - Computer Architecture in Emergent Technologies
  - Computer Systems Design
  - Computer Vision and Pattern Recognition
  - E-technologies
  - Systems and Networks
- Economics**
  - Development and International Economics
  - Economic Theory, Economic Thought, and Methodology
  - Institutions (labor, financial, industrial, and public)
- Electrical Engineering**
  - Communication Systems
  - Control Systems
  - Nanoelectronics
  - Optoelectronics
  - Semiconductor Materials and Devices
  - Signal and Image Processing
  - Solid-State Integrated Circuits
- English**
  - Old and Middle English
  - Renaissance
  - Restoration and 18th Century
  - Romantic and Victorian
  - Modern British
  - Early American (to 1865)
  - Middle American (from the Civil War to 1930)
  - Post 1930 American Literature
  - African American
  - Latino/a Studies
  - Irish Studies
  - Drama
  - Novel
  - Poetry
  - Prose Fiction
  - Literary Theory
  - Creative Writing++
- German Language and Literature\***  
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  - The Medieval Period
  - Reformation and Humanism
  - German Classical Literature
  - Goethe and His Age
  - 19th-century Drama and Prose



Contemporary German Prose  
 Modern Lyric Poetry  
 Aesthetics and Ethics  
 Philosophy and Literature  
 Drama and the Theory of Drama  
 Intellectual History

### History

Medieval History  
 Modern European History  
 United States History

### History and Philosophy of Science

History of the Philosophy of Science  
 Analytic Philosophy of Science and Epistemology  
 History and Philosophy of Biology 1700 to 1980  
 Philosophy of Contemporary Physics  
 History of Astronomy and Physics  
 Medieval Natural Philosophy and Medicine  
 History and Philosophy of Economics  
 Philosophy of Mind and Neuroscience  
 Social History of Medicine and Technology  
 History and Philosophy of Mathematics  
 Intellectual History of Science 1600 to 1950  
 Scientific Revolution Studies  
 Science and Literature

### Literature

Classics  
 East Asian Studies  
 French  
 German  
 Irish Studies  
 Italian  
 Spanish (Iberian and Latin American)  
*(Literatures can be studied in various combinations)*

### Mathematics

Algebra  
 Algebraic Geometry  
 Applied Mathematics  
 Complex Analysis  
 Differential Geometry  
 Logic  
 Partial Differential Equations  
 Topology

### Medieval Studies

Medieval Art  
 Medieval History  
 Medieval Literatures  
 Medieval Music  
 Medieval Philosophy  
 Medieval Theology

### Music\*

Music Theory  
 Musicology  
 Performance and Literature

### Peace Studies\*

The Role of International Norms and Institutions in Peacemaking  
 The Impact of Religious, Philosophical, and Cultural Influences on Peace  
 The Dynamics of Inter-Group Conflict and Conflict Transformation  
 The Promotion of Social, Economic, and Environmental Justice

### Philosophy

Ancient Philosophy  
 Contemporary European Philosophy  
 Epistemology  
 Ethics  
 Logic  
 Medieval Philosophy  
 Metaphysics  
 Modern Philosophy  
 Philosophy of Language  
 Philosophy of Mathematics  
 Philosophy of Mind  
 Philosophy of Religion  
 Philosophy of Science  
 Political Philosophy

### Physics

Astrophysics  
 Atomic Physics  
 Condensed Matter Physics  
 Elementary Particle Physics  
 Nuclear Physics  
 Statistical Physics/Biophysics  
 Theoretical Physics

### Political Science

American Government and Politics (including public law)  
 Comparative Politics  
 International Relations  
 Political Theory

### Psychology

Cognitive Psychology  
 Counseling Psychology  
 Developmental Psychology  
 Quantitative Psychology

### Romance Languages and Literatures\*

*(See Literature for Ph.D. program)*  
 Comparative Literatures  
 French and Francophone Studies—Middle Ages, Renaissance, 17th-century Classical, 18th-century Enlightenment, 19th Century, 20th Century  
 Italian Studies—Italian Literature: Medieval, Renaissance, Modern; Art History; Architectural History; Film Studies; Translation; History; Philosophy; Music  
 Iberian and Latin American Studies—Medieval, Golden Age, Colonial Spanish-American, Modern Spanish Peninsular, Modern Spanish-American Periods; Gender Studies

### Sociology

Comparative/Historical Sociology  
 Cultural Sociology  
 Development  
 Education  
 Family  
 Political Sociology  
 Quantitative Methodology  
 Religion  
 Social Psychology  
 Social Stratification  
 Theory

### Theology

Biblical Studies\*  
 Christianity and Judaism in Antiquity—Hebrew Bible and Judaica, New Testament and Early Church  
 Early Christian Studies\*  
 History of Christianity—Early Church, Medieval Studies, Reformation Studies, Modern Studies  
 Liturgical Studies  
 Moral Theology/Christian Ethics  
 Systematic Theology  
 Professional Studies\*  
 (Master of Divinity Program)  
 Theological Studies\*

\* *Master's programs only*

+ *Master's program and M.F.A. in studio art and design*

++ *M.F.A. in creative writing*

## Academic Regulations

*Please note:*

*The following information represents the minimum standards established by the Graduate School. Individual departments may require higher standards. Students are expected to be fully cognizant of their department's requirements.*

*No exceptions to the following policies and procedures will be valid without the formal written approval of the Graduate School.*

## Admission to the Graduate School

Admission to the Graduate School is highly competitive. An applicant for admission to the Graduate School must hold a bachelor's degree or its equivalent from an accredited American college or university or from a foreign institution of acceptable standing. Applicants are admitted on the presumption that they will hold the bachelor's degree by the time of graduate matriculation. If at that time they do not hold a bachelor's degree, the Graduate School admission is void. The applicant should have earned at least a B average

in his or her undergraduate major courses and should meet the level of academic achievement that implies a developed ability for advanced study and independent scholarship.

An applicant may seek admission in either degree or nondegree status. A degree applicant may seek admission to either a master's or doctoral program. Only degree students may be candidates for a degree at Notre Dame.

It should be understood that admission to a graduate degree program is not equivalent to admission to candidacy for the degree. (See "Admission to Candidacy," under master's and Ph.D. degree requirements.)

It should also be understood that admission to the master's program does not automatically mean admission to the doctoral program upon completion of the master's program. A separate decision is required for continuation in the doctoral program.

#### **Application Requirements**

An applicant for admission to a degree program is required to submit:

1. one completed "Application for Admission and Financial Aid" form or an online application
2. one completed "Statistical Information and Application Fee" form (paper application) or Signature Page (online application)
3. the application fee
4. two (2) copies of the Statement of Intent
5. three (3) letters of recommendation and a second copy of each
6. a waiver of access form for each letter of recommendation with original signatures in ink
7. two (2) official transcripts from each postsecondary institution attended. International applicants must send both an original language and an official (i.e. notarized) English translation of each transcript.
8. official Graduate Record examination (GRE) General Test scores (students may temporarily submit two (2) unofficial photocopies)
9. official GRE Subject Test scores if required by the department (students may temporarily submit two (2) unofficial photocopies)
10. official scores of the Test of English as a Foreign Language (TOEFL) from all nonnative speakers of English (students may temporarily submit two (2) unofficial photocopies)

11. two (2) copies of a curriculum vitae/ resumé (recommended)

Students seeking admission to more than one department, but who plan to enroll in only one, must submit separate applications for each department. Only one application fee is necessary.

Beyond these Graduate School admission requirements for all graduate departments and programs, particular programs may require personal interviews and/or submission of special materials such as writing samples or portfolios. Consult the specific department in this regard and submit one (1) copy of each required item.

The Graduate Record Examination (GRE) is offered several times each year at sites in the United States and abroad. The annual schedules and other information about the GRE can be obtained online at <http://www.gre.org> or from Educational Testing Service (ETS), Graduate Record Examination, Box 6000, Princeton NJ 08541-6000, USA. If you need to call about the GRE, telephone the Educational Testing Service at (609) 771-7670.

The Test of English as a Foreign Language (TOEFL) is offered several times each year at sites in the United States and abroad. Foreign students, except those noted above, must submit TOEFL scores as part of their application to demonstrate a sufficient command of English to meet the requirements of their field. If not available locally, the annual schedules and other information about the TOEFL can be obtained online at <http://www.toefl.org> or from Educational Testing Service (ETS), TOEFL, Box 6151, Princeton NJ 08541-6151, USA. If you need to call about the TOEFL, telephone the Educational Testing Service at (609) 771-7100.

#### **Admission to Multiple Degree Programs**

An applicant who seeks admission to more than one master's degree program in the Graduate School in order to earn two degrees, or an applicant who seeks admission to a degree program in the Graduate School concurrently with a degree program in another school in the University (i.e., Law School or Mendoza College of Business) must submit a separate and complete application for each program. The applicant must also be accepted by each of the cooperating departments. The Graduate School will consider only applicants whose past academic performance indicates the potential for success in each of the programs. In consultation with the appropriate

advisers from each unit, the applicant will select a plan of study acceptable to all units. The Graduate School must approve the written plan of study before the student may begin the program. No more than nine credit hours of classes may be counted toward both degrees.

#### **Admission to Joint Degree Programs**

It is possible for a student to pursue a program of study combining two programs and leading to a joint degree. An applicant who seeks to earn a joint degree, either master's or Ph.D., must submit a separate and complete application to each program and be accepted by both. The relevant departments must agree upon a plan of study defining what will constitute the joint degree program, and the approved written plan must be on file with the Graduate School before the student may begin the program.

The application fee must accompany the application. This fee is nonrefundable. The fee is \$50 for all applications submitted after December 1 for admission to the following fall semester. For applications submitted by December 1 for admission to the following fall semester, the application fee is \$35. Fees must be paid by check or money order.

Unless otherwise specified, the application deadline is February 1 for admission and financial aid for the fall semester, and November 1 for the spring semester, though some departments have earlier deadlines. Only a few departments offer spring admission; therefore, applicants who wish to begin in the spring are advised to consult the department.

#### **Nondegree Applicants**

An applicant for admission to a nondegree program is required to submit one completed Graduate School application and two official transcripts from each postsecondary institution attended. (When possible, transcripts should be sent directly to the Graduate School by the institution.) Particular departments may require personal statements detailing the applicant's graduate plans and expectations.

A nondegree applicant may seek admission as a departmental nondegree student or as an unclassified, visiting, or auditing student in the Graduate School.

A departmental nondegree student is one who has been admitted to a department but does not seek an advanced degree from the University. An applicant with degree intent who

lacks one or more admission requirements may be admitted temporarily to nondegree status at the discretion of the department and with the approval of the associate dean for graduate admissions. The student may register for one to 12 credit hours in any graduate courses for which he or she meets the course prerequisites. However, no student initially admitted to nondegree status will be admitted to degree status until all admission requirements have been satisfied. No more than 12 credit hours earned by a student while in a nondegree status may be counted toward a degree program. Admission as a departmental nondegree student does not guarantee later admission as a degree-seeking student.

An unclassified student is one who is admitted to the Graduate School in a nondegree status, but who is not a member of a particular department. Such a student may, with the approval of the Graduate School, take courses in any graduate department, subject to approval by the department. This category is usually open to nondegree students who wish to take courses in more than one department or students who have completed their degree programs, but wish to continue in the University in graduate student status. No more than 12 credit hours earned by a student while in a nondegree status may be counted toward a degree program. Admission as an unclassified nondegree student does not guarantee later admission as a degree-seeking student.

A visiting student is normally a degree student in another university who enrolls for credit in selected courses at Notre Dame. Unless otherwise arranged by the home university and Notre Dame, the visiting student is considered a nondegree student at Notre Dame and follows the same application and enrollment procedures as a nondegree student.

An auditor is a nondegree student who meets the course prerequisites but receives no academic credit. With the permission of the instructor and the department chair, a degree student also may audit courses. Audited courses may be recorded on a student's permanent record only if the student requests the instructor to record it at the beginning of the semester and if he or she attends the course throughout the entire semester. A recorded audit is graded V. Incomplete audits are not recorded. The audit grade of V cannot be changed to a credit grade.

In the academic year, full-time graduate students may audit courses without charge. Part-

time graduate students who audit courses will be charged the normal audit fee of one-half the current credit hour fee.

In the summer session, there is no free audited course. Any course taken or audited in the summer session will be charged the full price.

#### *Acceptance*

Official acceptance to the Graduate School in the academic year is granted only by the associate dean. Applicants will be informed officially of the results of their application by a letter from the associate dean for graduate admissions. Applicants who intend to accept offers of admission are required to confirm their acceptance by returning the appropriately completed form that is supplied with an offer of admission.

A student whose degree program begins or continues in the summer must complete a summer session course selection form.

### **Enrollment in the University**

Once admitted, all degree and nondegree graduate students must enroll each semester at the times and locations announced by the University Registrar.

Any admitted student who fails to enroll for one semester or more must apply for readmission upon return. (See "Continuous Enrollment," below.)

#### *Full-time and Part-time Status*

A full-time student is one who is working full time toward his or her degree objective. The student's department is responsible for determining who is a full-time student, and who is otherwise a part-time student.

A nondegree student, however, must register for at least nine credit hours per semester, or six in the summer session, to claim full-time status.

All degree-seeking students are expected to maintain full-time status and to devote full time to graduate study. No degree student may hold a job, on or off campus, without the express permission of his or her department and the Graduate School.

#### *Academic Good Standing*

Continuation in a graduate degree program or in nondegree status, admission to degree candidacy, and graduation require maintenance of at least a 3.0 (B) cumulative grade point average (G.P.A.). A student may be dismissed from the department or program if

the G.P.A. in any one semester is below 2.5 or if the G.P.A. is below 3.0 for two consecutive semesters. Some departments require higher averages for enrollment and support continuance.

An adequate G.P.A. is only one factor taken into consideration in determining a student's qualifications for an advanced degree. Degree students should be aware of their department's performance criteria. The department and the Graduate School annually evaluate each graduate student's overall performance on the basis of these criteria.

A student must be in academic good standing to be eligible for new or continued financial support.

#### *Continuous Enrollment*

All students must enroll each semester in the academic year and register for at least one credit hour per semester to maintain student status. Continuous enrollment is met normally by both enrollment in the University and registration in a graduate-level course relevant to the student's program. A student who is concurrently pursuing degrees in the Graduate School and in another school in the University meets the continuous enrollment requirement by registering for a course in either program. Any exception to this rule, including a leave of absence, must be approved by the Graduate School. (See "Leave of Absence," below.) Degree students who have completed the course work requirement for their degree must register for at least one credit hour per semester, including the final semester or summer session in which they receive their degree. These students may be considered full-time students whether or not they are in residence. Students not in residence and taking one credit hour pursuant to continuous enrollment requirements are charged a special registration fee.

A student who fails to enroll and register for one semester or more must apply for readmission upon return.

Continuing students (i.e., degree-seeking students who are eligible to continue their studies in the fall semester) may have access to University facilities and services from May through August without enrolling and registering for academic credit in the summer session.

#### *Leave of Absence*

For exceptional reasons and on the recommendation of the department, a student in good academic standing may request a leave

of absence for a maximum of two consecutive semesters. A request for a leave of absence must be made before the semester in which the leave is taken, and all leaves of absence must be approved by the Graduate School. If, for some urgent reason, a student is allowed to leave the University after the beginning of the semester, the withdrawal procedure below must be followed. If at the end of the leave of absence period the student does not return, the student is considered terminated. Application for readmission is required if the student wishes to return.

### *Withdrawal from the Program*

To withdraw from the University before the end of the semester, a student must inform the department and the Graduate School as well as complete the notice of withdrawal in the Office of the Registrar, 105 Main Building. For information on refunds, refer to "Tuition and Expenses."

Upon approval of the withdrawal, the University enters a grade of W for each course in which the student was registered. If a student drops out of the University without following the procedure described above, a grade of F is recorded for each course.

The credit for any course or examination will be forfeited if the student interrupts his or her program of study for five years or more.

The University reserves the right to require the withdrawal of any student when academic performance, health status, or general conduct may be judged clearly detrimental to the best interests of either the student or the University community.

In the case of a medical leave of absence, clearance from the University Health Center is required prior to readmission.

## **Registration and Courses**

### *Maximal Registration*

During each semester of the academic year, a graduate student should not register for more than 12 credit hours of graduate courses, i.e., the 500-, 600- and 700-level courses. In the summer session, a graduate student should not register for more than 10 credit hours.

### *Course Numbers*

Courses numbered 500 through 599 are first-level graduate courses into which qualified advanced undergraduates may be admitted with the permission of the instructor and the approval of the chair. Courses numbered 600 and above are advanced graduate courses

open only to those who have completed the undergraduate and graduate prerequisites.

The advanced undergraduate courses numbered 400 through 499 may, with the approval of the department chair and the Graduate School, be taken to satisfy up to 10 hours of graduate credit requirements. Departments may place additional constraints on the use of 400-level courses to meet their degree requirements.

No graduate credit is allowed for courses below the 400 level.

### *Changes in Student Class Schedule*

A student may add courses only during the first seven class days of the semester. A student may add courses after this time only on recommendation of the department and with approval of the Graduate School.

A student may drop courses during the first seven class days of the semester. To drop a course after this period and up to the midsemester point (see the Graduate School calendar for the exact date), a student must have the approval of the chair of the department offering the course, of his or her adviser, and of the Graduate School; however, no tuition adjustment will be made after the seventh class day of the semester. A course may be dropped after the midsemester point only in cases of serious physical or mental illness. Courses dropped after this date will be posted on the student's permanent record with the grade of W.

A course taken for credit can be changed to an audit course after the midsemester point only in cases of serious physical or mental illness.

### *Graduate Grades*

Listed below are graduate grades and the corresponding number of quality points per credit hour.

A	4
A-	3.667
B+	3.333
B	3
B-	2.667
C+	2.333
C	2
F	0
I	0 (Until Incomplete is removed)
NR	Not reported
S	0 Satisfactory
U	0 Unsatisfactory
V	0 Auditor (graduate students only)
W	0 Discontinued with permission

Quality point values are used to compute the student's G.P.A. The G.P.A. is the ratio of accumulated earned quality points to the accumulated earned semester credit hours. G.P.A. computation takes into account only those grades earned in Notre Dame graduate courses by students with graduate status at Notre Dame. For courses taken in a department or college in the University but outside the Graduate School, or taken outside the University, the grade will not be included in the G.P.A. computation.

The grades of C- and D are not awarded in the Graduate School.

A student receives the temporary grade of I when, for acceptable reasons, he or she has not completed the requirements for a 500- or higher-level graduate course within the semester or summer session. No grade of I can be given for courses below the 500 level or to graduating students in the final semester or final summer session of a terminal degree program.

The student then must complete the course work for a grade prior to the beginning of the final examination period of the next semester in which the student is enrolled. If a student receives an I for a summer session course, he or she must complete the course work for a grade before the final examination period begins for the next semester or summer session (whichever comes first) in which the student is enrolled.

The University temporarily computes this grade as the equivalent of an F in calculating the G.P.A. When the student fulfills the above requirements, the I is replaced by the new grade. Should the student not complete the course work as required, the I remains on the academic record and is computed in the G.P.A. as equivalent to an F.

The department and the Graduate School will review a student who receives more than one I in a semester or an I in two or more consecutive semesters, to determine his or her eligibility for continued support and enrollment.

The grades of S and U are used in courses without semester credit hours, as well as in research courses, departmental seminars, colloquia, workshops, directed studies, field education, and skills courses. These courses, if given the grade of S, do figure in a student's earned semester credit-hour total but do not figure in the computation of the G.P.A. A

grade of U will not count toward the student's earned semester credit-hour total, nor will it figure in the computation of the G.P.A.

The grade of V has neither quality-point nor credit-hour value. It is the only grade available to the registered auditor who requests at the beginning of the semester that it be made part of his or her permanent record and who attends the course throughout the entire semester. The grade of V cannot be changed to a credit-earning grade.

The grade of W is given for a course that a student is allowed to drop after the midsemester point.

### *Examinations*

Unexcused absence from a scheduled final examination results in an F. An absence excused in advance results in an I (incomplete).

### *Grade Reports*

Beginning with final grades for the fall 2003 semester, the Office of the Registrar will no longer mail a paper copy of grades unless a copy is requested. Grade information is available to students on IrishLink (a secure Web-based service). The Printed Grade Report Request form is available from the Office of the Registrar Web site at <http://www.nd.edu/~ndreg>.

### *Transfer Credits*

A department may accept course work completed at another accredited university toward meeting its degree requirements. A student may transfer credits earned at another accredited university only if: (1) the student is in degree status at Notre Dame; (2) the courses taken are graduate courses appropriate to the Notre Dame graduate program and the student had graduate student status when he or she took these courses; (3) the courses were completed within a five-year period prior to admission to a graduate degree program at Notre Dame or while enrolled in a graduate degree program at Notre Dame; (4) grades of B (3.0 on 4.0 scale) or better were achieved; and (5) the transfer is recommended by the department chair and approved by the Graduate School.

These five requirements also apply to the transfer of credits earned in another program at Notre Dame.

The University considers a request for credit transfer only after a student has completed one semester in a Notre Dame graduate program and before the semester in

which the graduate degree is conferred. The university of origin must submit two transcripts directly to the Notre Dame Graduate School. Credits not earned on the semester system, such as trimester and quarter-hour credits, will be transferred on a pro rata basis.

A student transferring from an unfinished master's program may not transfer more than six semester credit hours into either a Notre Dame master's or Ph.D. program.

If the student has completed a master's or Ph.D. program, he or she may transfer up to nine semester credit hours to a Notre Dame master's program and up to 24 semester-credit hours to a Notre Dame Ph.D. program.

Occasionally, a student may need to do dissertation research at another institution. Normally, the student would register for the appropriate number of credit hours of research at Notre Dame. If the student does not enroll at Notre Dame and expects to count research hours earned elsewhere toward the Notre Dame degree, the student must have the approval of the department and the Graduate School in advance. The University requires similar prior approval for formal courses taken elsewhere and applied to the degree program. Twenty-four credit hours, including research credit hours, is the maximum acceptable for transfer into a Notre Dame doctoral program.

No grades of transferred courses are included in the student's G.P.A.

## **Academic Integrity**

Integrity in scholarship and research is an essential characteristic of our academic life and social structure in the University. Any activity that compromises the pursuit of truth and the advancement of knowledge besmirches the intellectual effort and may undermine confidence in the academic enterprise. A commitment to honesty is expected in all academic endeavors, and this should be continuously emphasized to students, research assistants, associates, and colleagues by mentors and academic leaders.

The procedures for ensuring academic integrity in the Graduate School are distinct from those in the Undergraduate Code of Honor.

Violations of academic integrity may occur in classroom work and related academic functions or in research/scholarship endeavors. Classroom-type misconduct includes the

use of information obtained from another student's paper during an examination, plagiarism, submission of work written by someone else, falsification of data, etc. Violation of integrity in research/scholarship is deliberate fabrication, falsification, or plagiarism in proposing, performing, or reporting research or other deliberate misrepresentation in proposing, conducting, reporting, or reviewing research. Misconduct does not include errors of judgment, errors in recording, selection, or analysis of data, differences in opinions involving interpretation, or conduct unrelated to the research process. Misconduct includes practices that materially and adversely affect the integrity of scholarship and research.

Any person who has reason to believe that a violation of this policy has occurred shall discuss it on a confidential basis with the department chair or director of the appropriate institute. If a perceived conflict of interest exists between the chair/director and the accused, the next highest academic officer shall be notified of the charge. The chair/director shall evaluate the allegation promptly. If it is determined that there is no substantial basis for the charge, then the matter may be dismissed with the fact of dismissal being made known to the complainant and to the accused if he or she is aware of the accusation. A written summary of charges, findings, and actions shall be forwarded to the vice president for graduate studies and research as a matter of documentation. Otherwise, the chair will select an impartial panel consisting of three members, one of whom may be a graduate student, to investigate the matter. The chair will inform the accused of the charges. The panel will determine initially whether to proceed directly to a hearing to further investigate the case, or to dismiss the charges. If the panel decides to proceed directly to a hearing, the hearing will be held within 10 days of the original notification. If the panel decides that further investigation is necessary, it shall immediately notify the chair. If it decides that a hearing is not warranted, all information gathered for this investigation will be destroyed. The utmost care will be taken to minimize any negative consequence to the accused.

The accused party must be given the opportunity to respond to any and all allegations and supporting evidence at the hearing. The response will be made to the appointed panel. The panel will make a final judgment, recommend appropriate disciplinary action, and report to the chair in writing. The report will include all of the pertinent documenta-

tion and will be presented within 30 days after meeting with the accused. Copies of the report are to be made available to the accused, the chair, and the vice president. If a violation is judged to have occurred, this might be grounds for dismissal from the University; research/scholarship violations might be reported to the sponsor of the research effort (e.g., NSF, NIH, Lilly Foundation, etc.), if appropriate.

If the student chooses to appeal, he or she must address the appeal in writing to the vice president for graduate studies and research within 10 days. The student has the right to appear before the vice president or his or her delegate. The vice president may decide to appoint an ad hoc committee to handle this appeal, if deemed necessary.

Violations of academic integrity by individuals who are not students are governed by different rules; students who are working on externally sponsored programs may also be covered by sponsor-mandated rules. Contact Dr. Richard A. Hilliard, director of research compliance, (574) 631-5386, for further information.

### **Academic Counselor**

The vice president for graduate studies and research has appointed an academic counselor in the Graduate School to be available to graduate students who want to confidentially discuss problems they are having in their programs. The counselor can help a student decide how to resolve the problem. The Graduate School's academic counselor is Dr. Barbara M. Turpin, associate dean.

### **Grievance and Appeal Procedures**

Students follow the grievance and appeal procedures of the department in which they are studying. Where department procedures are not clear, students contact the department chair and/or the director of graduate studies. Appeals beyond the department are made directly to the vice president for graduate studies and research/dean of the Graduate School. Students may seek advice from the associate dean of the Graduate School who serves as academic counselor before beginning a formal process within the department or an appeal to the vice president/dean.

### **Requirements for the Master's Degree**

*In addition to the following Graduate School requirements, individual departments may have higher standards. Students are expected to know their departmental requirements.*

#### **Credit Hours**

The number of semester credit hours of course work for the master's degree is specified by the student's department. Students in a research program must also complete the research requirements of the department. (See also "Transfer Credits," above.)

#### **Residency**

The minimum residency requirement for the master's degree is registration in full-time status for one semester during the academic year or for one summer session.

#### **Foreign Language Requirement**

The Graduate School does not require foreign language reading proficiency for the master's degree. However, some departments do have this requirement. Students should consult their departments concerning this requirement.

#### **Degree Eligibility**

Failure to complete all requirements for the master's degree within five years results in forfeiture of degree eligibility.

A master's program that is pursued during the summer and the academic year must also be completed within five years.

A student attending summer session only must complete all requirements within seven years.

#### **Thesis Directors**

Each student is assigned an adviser from the time of enrollment. This may initially be the director of graduate studies, but an individual adviser or thesis director will be chosen as soon as practicable, following the department's policies.

Advisers and thesis directors are normally chosen from the teaching and research faculty of the student's department. There also may be one codirector chosen from the faculty outside (or within) the student's department. In exceptional cases, a department may choose a thesis director from the Notre Dame teaching and research faculty outside the student's department. Arrangements for extra-

departmental directors or codirectors must be consistent with departmental policies and must be approved by the Graduate School.

#### **Master's Examination**

By the end of the term following completion of the course work required by the department, the degree candidate must have taken an oral and/or written master's examination demonstrating mastery in his or her field. Failure in either one or both parts of the examination results in automatic forfeiture of degree eligibility, unless the department recommends a retake. If a retake is recommended, it must be completed by the end of the following semester. The Graduate School allows only one retake of the master's examination.

Some departments have an equivalent requirement in lieu of the master's examination. Students are advised to be cognizant of their respective departmental requirements with regard to the master's examination or its substitute.

A doctoral student may receive the master's degree without taking the master's examination on the recommendation of the department and completion of (a) the course work required by the department for the master's degree and (b) all written parts of the doctoral candidacy or Ph.D. qualifying examination. Departments may have additional criteria or may choose not to offer a master's degree in this manner; students should consult the departmental guidelines.

#### **Admission to Candidacy**

To qualify for admission to candidacy, a student must be in a master's degree program. He or she must have been enrolled in the program without interruption and must maintain a minimum cumulative G.P.A. of 3.0 in approved course work. A student who seeks admission to candidacy in a research master's program must also demonstrate research capability and receive departmental approval of his or her thesis proposal.

Admission to candidacy is a prerequisite to receiving any graduate degree. *It is the student's responsibility to apply for admission by submitting the appropriate form to the Graduate School office through the department chair. The applicable deadline is published in the Graduate School calendar.*

**Thesis Requirement**

The thesis is the distinctive requirement of the research master's program. With the approval of his or her adviser, the student proposes a thesis topic for departmental approval. The approved topic is researched and the results presented under the supervision of a thesis director.

The thesis director indicates final approval of the thesis and its readiness for the readers by signing the thesis. The candidate then delivers the number of signed copies of the completed thesis required by the department to the department chair. These copies are distributed to the two official readers appointed by the department. Readers are appointed from among the regular teaching and research faculty of the student's department. The appointment of a reader from outside the student's department must have the Graduate School's prior approval. The thesis director may not be one of the official readers. Each reader must unconditionally approve the thesis and the department should promptly report the results to the Graduate School.

**Submitting the Thesis**

The format of the thesis should follow the guidelines published in the Graduate School's *Guide for Formatting and Submitting Dissertations and Theses*, available at the Graduate School office and on the Graduate School Web site at <http://www.nd.edu/~gradsch/>.

When the thesis is given to the readers, the candidate should also give a complete copy to the Graduate School office for a preliminary review of the format. This copy may be submitted electronically as a PDF or delivered as a printed document.

After the readers approve the thesis and any necessary changes have been made, the candidate must then present the final version of the thesis to the Graduate School for final approval and submission on or before the date specified in the Graduate School calendar. Candidates should be cognizant of deadlines for graduation established by the Graduate School and the department.

To submit the thesis electronically, the candidate must upload one complete PDF copy to the Hesburgh Library's Electronic Dissertation and Thesis database, and provide one signed title page and any other necessary forms to the Graduate School.

To submit printed copies of the thesis, the candidate must present two clean copies, each

signed by the thesis director. The candidate pays the binding costs for the two official copies required by the Graduate School and for any additional copies required by the department or for personal use.

Candidates must check with their departments for any additions to the Graduate School requirements.

Should a candidate and adviser decide to microfilm a thesis, information concerning the ProQuest Information and Learning Master's Publishing Program may be obtained from the Graduate School office.

**Requirements for the Doctor of Philosophy Degree**

The goal of the University in its Ph.D. programs is to develop productive scholarship and professional competence in its students. In addition to a broad acquaintance with the historical and contemporary state of learning, the University encourages its students and faculty to make contributions to the advancement of their respective fields.

In addition to the following Graduate School requirements, individual departments may require higher standards. Students are expected to know their department's requirements.

**Credit Hours**

The number of semester credit hours of formal courses, directed studies, and research is specified by the student's department. (See also, "Transfer Credits," above.)

**Residency**

The minimum residency requirement for the Ph.D. degree is full-time status for four consecutive semesters (may include the summer session).

**Foreign Language Requirement**

This requirement varies from department to department, in both the choice of language and the degree of proficiency required. Students should consult their department concerning this requirement.

**Award of Master's Degree to Doctoral Students**

A doctoral student may receive the master's degree without taking the master's examination on the recommendation of the department and completion of: (a) the course work required by the department for the master's degree and (b) all written parts of the doctoral candidacy or Ph.D. qualifying examination.

Departments may have additional criteria, or may choose not to offer a master's degree in this manner; students should consult the departmental guidelines.

**Degree Eligibility**

The student must fulfill all doctoral requirements, including the dissertation and its defense, within eight years from the time of matriculation. Failure to complete any of the Graduate School or departmental requirements within the prescribed period results in forfeiture of degree eligibility.

**Advisers and Dissertation Directors**

Each student is assigned an adviser from the time of enrollment. This may initially be the director of Graduate Studies, but an individual adviser or dissertation director will be chosen as soon as practicable, following the department's policies.

Advisers and dissertation directors are normally chosen from the teaching-and-research faculty of the student's department. There also may be one codirector chosen from the faculty outside (or within) the student's department. In exceptional cases, a department may choose a dissertation director from the Notre Dame teaching and research faculty outside the student's department. Arrangements for extra-departmental directors or codirectors must be consistent with departmental policies and must be approved by the Graduate School.

**Candidacy Examination**

The candidacy examination consists of two parts: a written component and an oral component. The written part of the examination normally precedes the oral part. It is designed, scheduled, and administered by the department. The oral part of the examination is normally taken after the completion of the course work requirement, but no later than one calendar year prior to defense of the dissertation. The oral part, among other things, tests the student's readiness for advanced research in the more specialized area(s) of his or her field. In total, the examination should be comprehensive. Successful passage indicates that, in the judgment of the faculty, the student has an adequate knowledge of the basic literature, problems, and methods of his or her field.

A board of at least four voting members nominated by the department and appointed by the Graduate School administers the oral part of the examination. Normally, this board has the same membership as the student's

dissertation committee. Board members are chosen from the teaching and research faculty of the student's department. The Graduate School should be consulted before the department or the student invites a faculty member outside the student's department to be a board member.

A faculty member appointed by the Graduate School from a department other than the student's department chairs the examination board. This chair represents the Graduate School and does not vote. After completion of the examination, the chair calls for a discussion followed by a vote of the examiners. On a board of four, three votes are required to pass. If a department chooses to have five members, four votes are required to pass. The chair should, before the examination begins, ask the student's adviser to confirm departmental regulations for conduct of the examination and voting procedures. The chair sends a written report of the overall quality of the oral examination and the results of the voting immediately to the Graduate School.

In case of failure in either or both parts of the doctoral candidacy examination, the department chair, on the recommendation of a majority of the examiners, may authorize a retake of the examination if this is permitted by departmental regulations. An authorization for retake must be approved by the Graduate School. A second failure results in forfeiture of degree eligibility and is recorded on the student's permanent record.

#### *Admission to Candidacy*

Admission to candidacy is a prerequisite to receiving any graduate degree. To qualify for admission to doctoral candidacy, a student must:

1. be in a doctoral program;
2. have been continuously enrolled in the program without withdrawal;
3. complete the departmental course work requirement with a cumulative average of 3.0 or better;
4. pass the written and oral parts of the doctoral candidacy examination.

*It is the responsibility of the student to apply for candidacy admission by submitting the appropriate form to the Graduate School office through the department chair.* Consult the Graduate School calendar for the appropriate deadline.

#### *The Dissertation*

In continuing consultation with the dissertation director, the candidate explores research areas in his or her field to formulate a dissertation proposal. The methods of approval of the dissertation proposal are determined by the individual departments.

The department chair or director of graduate studies will appoint a dissertation committee consisting of the dissertation director and three readers. Normally, the committee is drawn from the membership of the student's oral candidacy board. The Graduate School must be consulted before the department invites a committee member from outside the teaching and research faculty of the candidate's department.

The candidate delivers typed copies of the finished dissertation, signed by the director, to the department chair for distribution to the three readers.

At the same time, the candidate should also give a complete copy to the Graduate School, where it will be reviewed for compliance with the Graduate School style manual. (See "Submitting the Dissertation" below.)

Readers normally have two to four weeks to read the dissertation, decide whether it is ready to be defended, and so indicate on the appropriate form to the Graduate School. Reader approval of the dissertation for defense does not imply reader agreement or support; it implies reader acknowledgment that the dissertation is an academically sound and defensible scholarly product. Only a dissertation that has been unanimously approved for defense by the three readers may be defended.

Even though the dissertation has been approved for defense, revisions may be required. If defects in the dissertation come to light at the defense, the candidate may be asked to revise the dissertation before it is accepted by the Graduate School and the degree is conferred. In that case, it will be the responsibility of the dissertation director, or such person as the committee may appoint, to report to the Graduate School that such revisions have been completed satisfactorily.

#### *Defense of the Dissertation*

In defending the dissertation, the doctoral candidate supports its claims, procedures, and results. The defense is the traditional

instrument that enables the candidate to explore with the dissertation committee the dissertation's substantive and methodological force. In this way, the candidate and the committee confirm the candidate's scholarly grasp of the chosen research area.

The format of the defense is determined by the department with the Graduate School's approval. The defense is chaired by a faculty member who is appointed by the Graduate School from a department other than the candidate's department. This chair represents the Graduate School and does not vote. After the examination is completed, the chair calls for a discussion followed by a vote of the dissertation committee. At least three votes out of four will be required to pass a candidate. The chair sends a written report of the overall quality of the defense and the voting results immediately to the Graduate School.

In case of failure of the defense, on the recommendation of a majority of the examiners, another opportunity to defend may be authorized if this is permitted by departmental regulations. An authorization for a second defense must be approved by the Graduate School. A second failure results in forfeiture of degree eligibility and is recorded on the candidate's permanent record.

#### *Submitting the Dissertation*

To receive the degree at the next commencement, the doctoral candidate who has successfully defended his or her dissertation must submit it to the Graduate School on or before the deadline published in the Graduate School calendar. Candidates should be cognizant of deadlines for graduation established by the Graduate School and the department.

To be accepted by the Graduate School, the dissertation should be prepared according to the formatting guidelines published in the Graduate School's *Guide for Formatting and Submitting Dissertations and Theses*, even if the candidate has previously published the substance of the dissertation in scholarly journals. The guide is available at the Graduate School office and on the Graduate School Web site at <http://www.nd.edu/~gradsch/>.

When the dissertation is given to the readers, the candidate should also give a complete copy to the Graduate School, where it will be reviewed for compliance with



the style manual. This copy may be submitted electronically as a PDF or delivered as a printed document.

After successfully defending the dissertation and making any necessary changes, the candidate must present the document to the Graduate School for final approval and submission.

The student may submit the dissertation electronically by uploading one complete PDF copy to the Hesburgh Library's Electronic Dissertation and Thesis database, and providing one signed title page and any other necessary forms to the Graduate School.

Alternatively, the candidate may present two clean, printed copies of the dissertation, each signed by the dissertation director. The candidate pays the binding costs for the two official copies required by the Graduate School and for any additional copies required by the department or for personal use.

The Graduate Council requires that all doctoral dissertations be microfilmed by ProQuest Information and Learning. Microfilming costs are also paid at the Graduate School office, which handles this publication requirement for the candidate.

### **One-of-a Kind (OAK) Ph.D. Program**

It is possible at Notre Dame for an exceptional student to pursue a Ph.D. program with a particular faculty member in a department that does not offer the doctoral degree. Admission to such a program is rare and is reserved only for the most exceptional students.

The One-of-a-Kind (OAK) Ph.D. is conferred in the field of study agreed to by the student, the mentor, the chair of the home department, the dean of the college, the dean of the Graduate School, and the final dissertation committee. The name given to the field of study may not overlap with a field already covered by an existing Ph.D. program at the University without approval from that department's chair.

#### *Program of Study*

As with other Ph.D. programs, an OAK program includes course work, exam preparation culminating in a qualifying examination, and research culminating in a dissertation.

Courses within the home department usually include an additional directed studies component. An OAK student also gains experience as a teaching apprentice in at least one advanced undergraduate class or as an independent instructor.

Primary responsibility for advising rests with the designated faculty adviser, who is responsible for organizing a program of study and the appropriate examination and dissertation committees. The dissertation committee will include at least two members from Ph.D.-granting departments in neighboring fields at Notre Dame.

#### *Admission*

Admission requires a master's degree and is based on an evaluation of the following:

- undergraduate and graduate G.P.A.
- GRE scores
- letters of recommendation
- appropriate language skills
- a detailed statement of purpose
- a well-defined program of study
- compatibility of intentions with potential mentors and resources at Notre Dame
- compatibility of intentions with the research profile and academic record of the faculty mentor
- the likelihood of eventual placement in the field

Admission standards are exceptionally high, and a prospective OAK student must be approved, in turn, by the department chair in consultation with his/her colleagues; the college dean in consultation with a college OAK advisory committee; and the dean of the Graduate School in consultation with a Graduate School OAK advisory committee.

## **Financial Information**

### **Tuition and Expenses**

Please note: The following tuition, fees, housing, and living costs are for the academic year 2003–2004. Prospective applicants and students are urged to find out the exact costs at the time of application or registration.

#### *Tuition*

For the full-time graduate student, the tuition for the academic year 2003–2004 is \$27,070. Tuition for the part-time student is \$1,504 per semester credit hour.

In the academic year, the normal charge for an audited course is one-half the current credit-hour fee. However, a full-time graduate student may audit a course, or courses, without charge. The Graduate School determines the definition of full-time.

In the summer session, there is no free audited course. Any course taken or audited in the summer session will be charged the full price.

*Library and Athletic Facilities.* In addition to the cost of instruction, tuition charges cover the use of the library and athletic facilities other than the golf course and the ice rink, on which a nominal fee is assessed.

#### *Fees*

- Nonrefundable application fee: \$50 (\$35 if submitted by December 1 for admission to the following fall semester)
- Technology Fee: \$250\*
- Health Center Access Fee: \$100\*\*
- Graduate Student Activity Fee: \$55

\* The technology fee provides partial funding for the University's enterprise-wide technology infrastructure, which provides all students access to the Internet, e-mail, course ware, campus clusters, ResNet, and a wide array of the latest software. This fee provides for the growth in student services, such as course and degree requirements, Web Registration, and value-added Internet-related capabilities. The \$250 fee will be assessed at \$125 per semester.

\*\* The health center access fee provides students access to all services at the University Health Center and University Counseling Center, including 24-hour medical care and counseling/mental health assistance, and alcohol and drug education programs, as well as health education and wellness programs. This fee provides partial funding to address increasing student health and wellness needs, along with funding to maintain health facilities. The \$100 fee will be assessed at \$50 per semester.

#### *Financial Arrangements*

Tuition and fees, as well as any required deposits, are payable in advance at the beginning of each semester. Please note that Notre Dame does not accept credit cards for payment of tuition and fees. Tuition and/or fees not covered by scholarship are the responsibility of the student.

A student may not register for a new semester or receive transcripts, certificates, diploma,

or any information regarding his or her academic record until all prior accounts have been settled in full.

#### **Withdrawal Regulation**

Any graduate, law, MBA,\* or undergraduate student who at any time within the school year wishes to withdraw from the University should contact the Office of the Registrar. To avoid failure in all classes for the semester and in order to receive any financial adjustment, the withdrawing student must obtain the appropriate clearance from the dean of his or her college and from the assistant vice president for residence life.

On the first day of classes, a full tuition credit will be made. Following the first day of classes, the tuition fee is subject to a prorated adjustment/credit if the student: (1) withdraws voluntarily for any reason on or before the last day for course discontinuance at the University; or (2) is suspended, dismissed, or involuntarily withdrawn by the University, for any reason, on or before the last day for course discontinuance at the University; or (3) is later obliged to withdraw because of protracted illness; or (4) withdraws involuntarily at any time because of military service, provided no credit is received for the classes from which the student is forced to withdraw.

Upon return of the student forced to withdraw for military service, the University will allow him or her credit for that portion of tuition charged for the semester in which he or she withdrew and did not receive academic credit.

Room and board charges will be adjusted/credited on a prorated basis throughout the entire semester.

Students receiving University and/or Federal Title IV financial assistance who withdraw from the University within the first sixty percent (60%) of the semester are not entitled to the use or benefit of University and/or Federal Title IV funds beyond their withdrawal date. Such funds shall be returned promptly to the entity that issued them, on a pro rata basis, and will be reflected on the student's University account.

This withdrawal regulation may change subject to federal regulations. Examples of the application of the tuition credit calculation are available from the Office of Student Accounts upon request.

*\* Executive MBA students are subject to a different Withdrawal Regulation and Tuition Credit Calculation, both of which may be obtained from the Executive MBA Program.*

#### **Housing and Residence Life**

Phone: (574) 631-5878

Web: <http://orlh.nd.edu>

University housing for both married and single students is available on or adjacent to the campus.

Accommodations for students with families are available in University Village, a complex of 100 two-bedroom apartments with washer/dryer, renting for \$375 per month, excluding electricity and phone. The Cripe Street Apartments, 24 one-bedroom units, are available from \$465 per month, excluding electricity and phone. A \$300 deposit is required.

Accommodations for approximately 140 full-time, degree-seeking single graduate men and women are available in the 36-unit O'Hara-Grace Graduate Residence adjacent to the campus. Each apartment has a kitchen, one-and-one-half baths, living, and bedroom accommodations for four students. Many general and departmental activities are held in Wilson Commons, a center for graduate students located next to the townhouses. The student must take out an individual nine-month contract for \$2,780, plus \$680 for utilities. The Fischer Graduate Housing apartment complex offers apartments with a kitchen, one full bath, and living and bedroom accommodations for two single students. The student must take out an individual nine-month contract for \$3,585, plus \$585 for utilities. A deposit of \$300 is required for either of these graduate housing options. Housing charges are due and payable by the semester; however, payroll deductions may be set up for any student receiving a stipend. This is handled at the Office of Student Accounts, 100 Main Building, (574) 631-7113.

Rates for off-campus apartments and houses range from \$300 to \$1,500 per month. Listings of available off-campus accommodations may be obtained directly from the Office of Residence Life and Housing Web site.

#### **Accident and Sickness Insurance**

Phone: (574) 631-6114

Web: <http://www.nd.edu/~uhs>

Notre Dame requires all international and degree-seeking graduate students to have health insurance coverage.

At the beginning of each academic year, the opportunity is provided to show proof of personal health insurance coverage. In the event such proof is not presented, the student will be automatically enrolled in the University-sponsored plan, and the charge for the premium will be placed on the student's account. The last date a graduate or international student may be waived from the University Student Insurance Plan is September 10, 2003.

Information regarding the University-sponsored plan is mailed to the student's home address in July. Additional information is available in University Health Services by contacting the Office of Insurance and Accounts at (574) 631-6114.

The cost of the premium for the 2003–2004 academic year (effective August 15, 2003, to August 15, 2004) is (depending on the plan):

#### *Option 1*

Student	\$ 767
Spouse	\$3,634
One Child	\$1,406
All Children	\$2,601
Spouse and All Children	\$5,529

#### *Option 2*

Spouse	\$2,105
All Children	\$1,159
Spouse and All Children	\$2,873

The Office of Student Accounts will offer students receiving a stipend from the University the option of paying the premium through deductions from the academic year salary checks.

#### **Worker's Compensation Insurance**

Students injured while performing assigned duties in University laboratories are covered by worker's compensation insurance as if they were Notre Dame employees. During a period of temporary inability to perform duties as a result of such injuries, workers compensation provides for continuation of 66.6% (to state limits) of usual income after seven days have passed. Income beyond the limits set by workers compensation is subject to the discretion of department chairs where support is from funds allocated by the Graduate School. Income beyond workers compensation is subject to the discretion of principal

investigators and the guidelines of external sponsors where support is from funds provided by research grants.

#### **Travel Accident Insurance**

Students injured while traveling to conferences or on other University business which has been approved by the student's department chair are covered by Notre Dame travel accident insurance. Compensation in set amounts is available for death or loss of arms or legs. Medical expenses in excess of other insurance are paid up to a maximum dollar amount.

#### **University Travel Policy**

Reimbursement for students traveling to conferences or on other University business is contingent on the availability of resources and the source of funding. Support from a department budget is subject to University travel policy; support from a research grant is subject to funding guidelines for the grant; support from the Graduate Student Union is subject to the travel guidelines in place in any given year.

### **Financial Support**

Exact amounts for the following aid will vary with the type of support and the department. Exact figures can be obtained from the particular department. Initiation and continuation of financial support depends on the student's maintaining good academic standing. Initiation and continuation of the following support programs require no specific application to either the department or the Graduate School.

#### **Application**

First-time applicants who indicate a need for financial support on the application for admission will be considered by the departmental admissions committee.

To ensure consideration for support, a first-time applicant must submit a completed application, including letters of recommendation, transcripts, and Graduate Record Examination scores (both general and Subject Test if the latter is required by the department), by February 1 preceding the fall for which the applicant seeks admission. Any international applicant must also submit a score from the Test of English as a Foreign Language (TOEFL).

Only full-time, degree-seeking students in residence at the University are eligible for support. Recipients of financial support

such as assistantships or fellowships usually may not accept additional appointments. Rare exceptions are made only on the recommendation of the respective department.

#### **Council of Graduate Schools Policy on Accepted Offers of Admission**

In accordance with a resolution passed by the Council of Graduate Schools in the United States, the following policy is in effect:

*By accepting an offer of financial aid (such as a graduate scholarship, fellowship, traineeship, or assistantship) for the next academic year, the enrolled or prospective graduate student completes an agreement that both the student and graduate school expect to honor. When a student accepts an offer before April 15 and subsequently desires to withdraw, the student must submit a written resignation for the appointment at any time through April 15. However, an acceptance given or left in force after April 15 commits the student not to accept another offer without first obtaining a written release from the institution to which a commitment has been made. Similarly, an offer made by an institution after April 15 is conditional on presentation by the student of a written release from any previously accepted offer. It is further agreed by the institutions and organizations subscribing to this resolution that a copy of the resolution should accompany every scholarship, fellowship, traineeship, and assistantship offer.*

#### **Categories of Support**

The University offers three types of support: fellowships, assistantships, and tuition scholarships. Students may receive one type of support or a combination of types.

#### **Fellowships**

Fellowships provide a tuition scholarship and a stipend for full-time study by students admitted to doctoral programs. The department provides tuition and stipend support for the student in good standing once the fellowship expires.

Applicants for admission are automatically considered by their academic department for all of the following University, endowed, and contributed fellowships.

#### **University Fellowships**

The Graduate School awards 12-month, four-year *Presidential Fellowships* to highly qualified first-time applicants, who may be nominated for the awards by departmental

admissions committees. Teaching assistance may be required in the second and third years of the fellowship.

*The Clare Boothe Luce Fellowships* for women and the *Arthur J. Schmitt Presidential Fellowships* are four-year fellowships awarded to graduate students entering a program in science or engineering. Luce and Schmitt Fellowships require U.S. citizenship.

#### **First- and Dissertation-Year Fellowships**

Several departments offer one-year fellowships for full-time graduate studies and research toward the doctoral degree.

In addition to the fellowships named above, talented students from underrepresented groups, including African Americans, Asian Americans, Hispanics, and Native Americans, also may be nominated for a variety of two-year fellowships, among them the *Coca Cola Company*, *McGuire*, *Liberal Arts*, and *University Endowed Fellowships*. U.S. citizenship is required. For the McGuire Fellowships, provided by the contributions of Mr. and Mrs. Thomas M. McGuire, special consideration is given to African American students studying for a master's degree. Highly qualified African American, Asian American, Native American, and Hispanic students accepted to any program in the humanities or social sciences are eligible for University Endowed Fellowships.

#### **Contributed and Endowed Fellowships**

Several fellowships funded by private contributions and income from endowments are awarded annually by individual academic departments.

*Abrams Fellowship*, begun in 1994, funds a graduate student in the humanities or social sciences.

*The Michael J. Birck Fellowship in Electrical Engineering*, established in 1982 by Michael J. Birck of Lisle, Illinois, provides assistance to graduate students in the field of telecommunications.

*The Bond-Montedonico Graduate Fellowships in Architecture*, begun in 1985, assist graduate students in architecture.

*The Wendell F. Bueche Fellowships* support graduate students in engineering.

*The Joseph Z. Burgee and Joseph Z. Burgee Jr. Memorial Fellowship*, initiated by John H. Burgee in 1984, provides a stipend for an exceptional graduate student in the master's program in the School of Architecture.

*The Joseph and Virginia Corasaniti Fellowship*, begun in 1988 by Martin G. Knott, provides a stipend to a graduate student in architecture. Special consideration is given to female applicants of Italian descent.

*The Donald K. Dorini Fellowships* provide 12-month stipends to graduate students in mechanical engineering who are studying hydronics.

*The Fitzpatrick Fellowship*, endowed by Edward B. Fitzpatrick in 1987, supports the studies of a graduate student in engineering.

*The Raymond Jones Fellowship* supports graduate students in philosophy.

*The Walter W. and Margaret C. Jones Fellowship* supports students in engineering.

*The Roy and Joan Laughlin Fellowship* is unrestricted in its support of graduate students at Notre Dame since 1989.

*The Rev. J. David Max Memorial Fund*, since 1978, has supported clerics who are studying liturgy in the Department of Theology.

*The McCloskey Fellowships*, endowed by Thomas D. McCloskey, fund graduate students in the Kroc Institute for International Peace Studies.

*The Bayer Predoctoral and Postdoctoral Fellowships*, contributed by Klaus H. Risse, chief executive officer of Bayer Inc., fund researchers in the Center for Environmental Science and Technology.

*The Navari Fellowship*, endowed by Rudolf M. Navari, M.D., supports a graduate student in biological sciences.

*The Nolen Fellowship*, endowed by James A. Nolen III in 1983, provides stipends for graduate students in architecture.

*The Warner-Lambert Fellowships* support graduate students in the College of Science.

*The George M. Wolf Graduate Fellowships*, installed in 1989, support graduate students in the Department of Chemistry and Biochemistry.

*The Bernard and Helen Voll Fellowship* funds graduate students who are studying ethics.

#### *Fellowship Consortia*

The University is an active institutional member of the following fellowship programs:

*The National Consortium for Graduate Degrees for Minorities in Engineering and Science (GEM)*, the central office of which is located at the University of Notre Dame, offers financial aid and paid summer internships to assist minority students in obtaining a master's degree in engineering.

*The National Physical Science Consortium* provides multi-year fellowships to graduate students in physics, chemistry, and engineering.

*The Latin American Scholarship Program of American Universities (LASPAU)* offers scholarships for U.S. graduate study to promising Latin American and Caribbean students and faculty.

#### *Non-University Fellowships*

Graduate students have been quite successful in earning National Science Foundation, Mellon, Fulbright, and other highly competitive extramural awards. An online, searchable database is available to access many graduate and postdoctoral fellowships and grants.

Fellowship programs in the departments of biological sciences and psychology are supported by the National Institutes of Health and in the departments of biological sciences and chemical engineering by the Department of Education.

#### *Assistantships*

##### *Graduate Assistantships*

Graduate assistantships are available for qualified students in all doctoral programs.

##### *Research Assistantships*

Research assistantships provide support to qualified recipients under research programs sponsored by government, industry, or private agencies.

##### *Tuition Scholarships*

The University offers full or partial tuition scholarships to students qualifying on the basis of merit.

*International Tuition Scholarships*. Established by the University in 1985, these tuition scholarships are available to eligible international students for graduate study.

*The Army ROTC Two-year Program*  
Phone: (574) 631-6986 or 631-4656,  
(800) UND-ARMY  
Web: <http://www.nd.edu/~army/>

Graduate students who have two years of education remaining may apply for the two-year contract program in the Army ROTC program. Graduate students are also eligible for scholarship benefits in some cases.

Administered by the Department of Military Science of the University of Notre Dame, this program requires successful completion of the two-year undergraduate ROTC basic course or the equivalent six-week summer camp at Fort Knox, Kentucky. The Army pays for travel to and from summer camp and the student is paid while at camp. Advanced placement may also be awarded to qualifying veterans. This is then followed by two years of advanced course ROTC. While participating in the program a student will receive a personal expense allowance. Upon completion, the student is awarded a commission in the United States Army and serves from three months to four years of active duty according to the needs of the service and the student's desires. Options also are available for commissioned service in the Army Reserve or the Army National Guard requiring minimal service on active duty. Application for entrance into the program should be made to the Military Science Department.

## **Employment and Loans**

### *Office of Financial Aid*

Telephone: (574) 631-6436

Fax: (574) 631-6899

E-mail: [finaid@nd.edu](mailto:finaid@nd.edu)

Web: <http://financialaid.nd.edu>

In addition to the student support programs described above, students may apply for federal financial aid opportunities, which include student loans and campus employment. The Office of Financial Aid, located in 115 Main Building, administers all loan and employment eligibility. Please note that while the Office of Financial Aid administers employment opportunities, graduate student employment is also subject to approval by the Graduate School.

In order to be eligible for federal student assistance, a student must be a U.S. citizen, permanent resident, or eligible noncitizen. In general, students must be classified as degree seeking to participate in the federal aid programs and be enrolled at least half-time.

The Free Application for Federal Student Aid (FAFSA) is the *annual* application that must be completed and forwarded to the processing center, listing Notre Dame (Federal School Code 001840) in the appropriate section. Priority processing consideration will occur for those applicants submitting the FAFSA by February 28 for the following fall semester. Applicants should be prepared to submit a signed photocopy of their federal income tax returns and W-2 forms directly to the Financial Aid Office upon request.

#### *Standards of Progress*

Recipients of federal financial aid must comply with the standards of progress set by their respective departments for their particular programs of study. When failure to maintain progress results in the possible loss of federal aid eligibility, the Office of Financial Aid will notify students in writing. Appeals indicating any mitigating circumstances must be made in writing to the associate director of financial aid.

#### *Federal Stafford Loan*

The terms of the need-based **Subsidized** Federal Stafford Loan Program require that the student borrower repay, with interest, this source of financial assistance. This program is referred to as “subsidized” because of the interest subsidy being paid by the federal government to the lender while the student is enrolled in school as well as during the six-month grace period following enrollment.

The terms of the non-need-based **Unsubsidized** Federal Stafford Loan Program require that the borrower repay, with interest, this source of financial assistance. This program is referred to as “unsubsidized” because the federal government is not paying the in-school interest to the lender while the student is enrolled in school. Interest on Unsubsidized Stafford Loans begins to accrue after disbursement of the loan funds; however, the student may choose to have the payment of the interest deferred during enrollment and later capitalized (added to the principal) at the time repayment begins.

The following is a list of additional terms of the Subsidized and Unsubsidized Stafford Loan, subject to revision by federal law: three percent origination fee and up to one percent insurance fee; variable interest rate during repayment not to exceed 8.25 percent; repayment begins six months after the student ceases to be enrolled in school on at least a half-time basis and generally extends over a 10-year period; annual subsidized borrowing

limit is \$8,500; annual unsubsidized borrowing limit is \$18,500 minus subsidized eligibility; aggregate subsidized/unsubsidized borrowing limit is \$138,500.

The amount a student may borrow from the Stafford Loan Program may be limited by other financial assistance received by the student. Financial assistance includes, but is not limited to, the following: fellowships, assistantships, University scholarships, tuition remissions, all types of grants, residence hall appointments, campus employment, and any loan received under the auspices of the Higher Education Act as amended. Should a student’s eligibility be impacted at any time during the loan period, the Stafford Loan will be subject to adjustment. All eligibility changes will be reported to the student’s lender.

#### *Federal Perkins Loan*

The Federal Perkins Loan is a need-based loan made by the University to assist graduate students experiencing financial hardship. The Perkins Loan Program requires that the student borrower repay, with interest, this source of financial assistance. The following are some additional terms, subject to revision by federal law, of the Perkins Loan: no origination or insurance fee; five percent interest rate; interest and repayment begin nine months after the student ceases to be enrolled in school on at least a half-time basis and generally extends over a 10-year period; annual borrowing limit is \$6,000; aggregate borrowing limit is \$40,000.

#### *The Notre Dame Loan*

The University of Notre Dame offers a privately financed student loan program in cooperation with Citibank and its Student Loan Corporation (SLC), a long-term provider of higher education financing programs.

Benefits of this competitively priced alternative loan program include:

*Low Interest Rate.* Variable interest rate, adjusted quarterly, based upon the 91-day T-bill plus 2.25 percent.

*No Loan Fees.* “No loan fees” means you get 100 percent of the money you borrow. There are no origination or insurance fees—fees other student loans typically charge.

*Cosigner Option.* Graduate, law, and graduate business students who have established a sufficient positive credit history may apply *without* a creditworthy cosigner. Students with no credit history will need to have a creditworthy

cosigner in order to apply. International students (who are not U.S. citizens or permanent residents) must apply with a creditworthy U.S. cosigner.

*No Payment While in School.* Repayment of accrued interest and principal begins six months after the student ceases to be enrolled in school, not to exceed seven years from the first disbursement of the first loan, and generally extends up to 15 years.

*Loan Limits.* Eligible students may borrow up to the total cost of attendance less any other financial aid that is awarded.

Students considering both the Stafford Loan (subsidized or unsubsidized) and the Notre Dame Loan are strongly encouraged to also consider using Citibank as their Stafford Loan lender, assuming that they have not previously borrowed from another lender. For ease during the repayment period, provisions have been made for such borrowers to have one billing statement sent by Citibank’s Student Loan Corporation, thus providing one monthly repayment process for both loans.

Additional information and an application for the Notre Dame Loan for graduate, law, and graduate business students may be obtained at <http://www.nd.edu/~finaid/graduate/loans/ndl.shtml> or from the Office of Financial Aid.

#### *Student Employment*

Many graduate students working on campus are employed on assistantship agreements directly with their academic departments. Other campus jobs may also be available and are posted on the job board at <http://studentemployment.nd.edu>.

## **Research Opportunities and Support**

#### *Office of Research*

Telephone: (574) 631-7432

Web: <http://www.nd.edu/~research/>

University policies on research and other sponsored programs are maintained on the Web site of the Graduate School Office of Research at [http://www.nd.edu/~research/Pol\\_Proc/toc.html](http://www.nd.edu/~research/Pol_Proc/toc.html).

#### *Graduate Student Union Conference Presentation Program*

Awards from the Graduate Student Union will subsidize, in part, expenses incurred by graduate students for presenting the results of research at professional conferences. This

program was formerly known as the Travel Grant Program. All graduate students who are dues paying members of the Graduate Student Union are eligible. This grant is to be used as supplemental, last resort funding.

#### **Graduate Student Research Support**

*The Joseph F. Downes Memorial Fund* was established in 1973 to assist graduate students with costs associated with attendance at workshops and seminars.

*The Farabaugh Fund*, established in 1990, provides funds for graduate research in alcohol and drug abuse.

*Retirement Research Foundation Thomas Kirby Memorial Grant* supports student research in aging and retirement.

*The Albert Zahm Research Travel Fund* subsidizes, in part, travel expenses incurred by graduate students for purposes directly related to their research. First priority will be accorded doctoral students who have been admitted to candidacy and whose research is the basis for their dissertation. Research master's degree students who have completed all requirements except the thesis will receive second priority.

#### **Oak Ridge Associated Universities**

Web: <http://www.orau.org>

Since 1992, students and faculty of the University of Notre Dame have benefited from its membership in Oak Ridge Associated Universities (ORAU). ORAU is a consortium of 96 colleges and universities and a contractor for the U.S. Department of Energy (DOE) located in Oak Ridge, Tennessee. ORAU works with its member institutions to help their students and faculty gain access to federal research facilities throughout the country; to keep its members informed about opportunities for fellowship, scholarship, and research appointments; and to organize research alliances among its members.

For more information about ORAU and its programs, contact Anthony K. Hyder, associate vice president for graduate studies and research at Notre Dame and ORAU council member at (574) 631-8591, or Monnie E. Champion, ORAU corporate secretary, at (865) 576-3306; or visit the ORAU home page.

## **Postdoctoral Scholars**

Telephone: (574) 631-7283

Web: <http://www.nd.edu/~postdoc/>

Postdoctoral Scholar is a University status distinct from faculty or student status. Appointments are made by the Graduate School for all academic units of the University.

The paragraphs below provide summary information on each of the major appointment categories.

#### **Research Associates**

Appointments to non-faculty research positions with the title Senior Research Associate, Postdoctoral Research Associate, or Research Associate are made by the Graduate School in departments, institutes, and centers throughout the University. The length of appointment varies but is normally for one year; renewal is upon mutual agreement between the appointee and the faculty adviser. Research associates receive salary and substantial benefits. Application should be made directly to the faculty member with whom the applicant wishes to pursue studies.

#### **Teaching Scholars**

Appointments to non-faculty teaching positions with the title Teaching Scholar are made by the Graduate School in departments throughout the University. The length of appointment is normally for one year; renewal is upon mutual agreement between the appointee and the chair/director of the appointing unit. Teaching scholars receive salary and substantial benefits. Application should be made directly to the chair/director of the appropriate unit.

#### **Visiting Scholars**

Appointments to non-faculty research positions with the title Visiting Scholar are made by the Graduate School in departments, institutes, and centers throughout the University. The length of appointment varies but is normally for a semester or a year; renewal is upon mutual agreement between the appointee and the chair/director of the appointing unit. Visiting scholars receive no salary and only limited benefits. Application should be made directly to the chair/director of the appropriate unit.

#### **Research Visitors**

The Graduate School appoints students enrolled in graduate or undergraduate degree programs at other universities to research positions with the title Research Visitor for

the purpose of using University libraries or consulting with a faculty member. The length of appointment varies but is normally for a semester or a year. Research visitors occasionally receive a stipend, but there are no benefits. Application should be made directly to the faculty member the student wishes to consult, or to the chair of the appropriate department.

## **University Resources and Policies**

### **Academic Resources**

#### **University Libraries**

Telephone: (574) 631-6258

Web: <http://www.nd.edu/~ndlibs>

The University library system consists of 10 libraries, which house most of the books, journals, manuscripts, and other non-book library materials available on the campus. Currently, the collections contain nearly three million volumes, more than three million microform units, and over 20,800 audiovisual items to support the teaching and research programs. In the past year, the libraries added over 64,803 print volumes in addition to those in other formats and received about 14,400 serial titles.

Through the Notre Dame Web site and the NT/Windows network, users have immediate access to the University Libraries' catalog, an array of electronic periodical indexes and full-text documents, and professionally developed subject guides to local and Internet-based resources. From their computers, users may request individualized reference assistance, place Interlibrary Loan requests, suggest titles for purchase, and recall or renew charged materials.

The Theodore M. Hesburgh Library, a 14-story structure, serves as the main library and its collections are of primary interest to the students and faculty of the College of Arts and Letters and the Mendoza College of Business. The tower also contains the University Archives, the Medieval Institute Library with the Frank M. Folsom Ambrosiana Microfilm and Photographic Collection and the Mary K. Davis Drawings Collection, and the Jacques Maritain Center.

Orientation sessions are presented by the library staff at the start of each semester and the summer session and are available to interested students and faculty.

A limited number of closed carrels are available to advanced graduate students upon application to their academic departments. Lokmobiles, a type of locker on wheels, also are available to graduate students upon application to the Circulation Desk.

The Business Information Center, located in the Mendoza College of Business complex, is an innovative, all-electronic facility supporting existing and emerging programs and research. This state-of-the-art facility is equipped with 30 individual workstations and two group learning areas with six workstations each, and provides access to and instruction and assistance in the use of a broad range of bibliographic, numerical, full-text, and graphic databases in business and related disciplines.

The remaining eight libraries were established to meet the teaching and research needs of the College of Engineering, the College of Science, the School of Architecture, and the Law School. These libraries generally contain the more recent literature and the Hesburgh Library retains the older materials.

The Architecture Library, located in Bond Hall, has a collection of over 26,100 volumes and over 100 currently received journals pertaining to various aspects of architecture.

The Chemistry/Physics Library, located in 231 Nieuwland Science Hall, maintains a collection of some 49,291 volumes and currently receives over 218 paper journals and 471 e-journals in all fields of chemistry and physics. It can provide database searches and bibliographic instruction.

The Engineering Library, located on the first floor of the Cushing Hall of Engineering, has a collection of 48,800 volumes and approximately 25,000 microform units and receives over 450 paper journals and about 1,400 e-journals related to engineering. The facility provides database searches as well as bibliographic instruction.

The Life Sciences Library, located on the first floor of the Paul V. Galvin Life Sciences Center, houses an estimated 32,000 volumes and receives approximately 425 print journals and 900 e-journals in the field of biological sciences. It offers database searching and bibliographic instruction.

The Mathematics Library, located in 001 Hayes-Healey Center, has a collection estimated at 48,000 volumes and subscribes to

about 150 paper journals and 355 e-journals, which deal with all areas of pure mathematics.

The Radiation Chemistry Reading Room, located in 105 Radiation Research Building, has a collection of approximately 4,800 volumes and receives 27 journals in radiation chemistry. It serves many of the information service needs of the radiation chemical community throughout the United States and abroad.

The Kellogg/Kroc Information Center is located in 318 Hesburgh Center for International Studies and supports its work in international studies.

The Kresge Library, located in the Law School, is available for use by all students, faculty, and staff although it is not administratively a part of the regular library system. It has a collection of over 588,749 volumes of law and law-related materials.

The University, along with more than 208 major universities, colleges, and research libraries, maintains a membership in the Center for Research Libraries, which has access to over 3.5 million volumes of materials and 1.5 million microforms important to research. The University Libraries were elected to the Association of Research Libraries in 1962.

#### *Information Technologies*

Telephone: (574) 631-5600

Web: <http://www.nd.edu/~ndoit>

The Office of Information Technologies (OIT) supports 11 public-access computer clusters around the campus, plus one in the Hesburgh Library for the exclusive use of graduate students. These clusters provide access to almost 600 computers, running Macintosh, Windows, and UNIX operating systems, and high-quality printers for all students, faculty, and staff. Five clusters are usually open 24 hours every day. The OIT employs student consultants to help support these facilities. For more information about the Notre Dame computer clusters, go to <http://www.nd.edu/~ndoit/clusters/>.

The clusters, academic and most administrative buildings, and the residence halls are linked to a fiber-based campus network that provides access to a number of Notre Dame resources, as well as the Internet. Standard services include access to electronic mail and the World Wide Web. Notre Dame provides direct ethernet connections to the campus network to graduate students in Fischer

and O'Hara-Grace graduate student residences. Ethernet connections are available in Hesburgh Library carrels by request and a cluster of networked computers is available in the married student housing community center. In addition to the locations listed above, all students have access to ResNet connections in LaFortune Student Center, DeBartolo Interactionary Area, and the second floor of the Hesburgh Library.

Many support services are provided by the OIT. Computers can be purchased in the OIT Solutions Center on the first floor of the Information Technology Center. Students, faculty, and staff can purchase computers and printers at educational discounts. The Solutions Center also provides a variety of software at educational discount prices. CDs of Microsoft and Corel software are currently available to the Notre Dame community for a substantial savings through an annual license fee. See <http://www.nd.edu/~ndoit/solutions> for more information about the OIT Solutions Center.

The OIT Help Desk is located in Room 111 of the Information Technology Center. The Help Desk provides answers to usage questions, diagnosis of problems, and problem resolution, and is open Monday through Friday from 8:00 a.m. to 5:00 p.m. See <http://www.nd.edu/~ndoit/helpdesk> for more information about the Help Desk.

Educational Technology Services offers computer-related, noncredit daytime courses to staff, faculty, and the students of the Notre Dame, Saint Mary's, and Holy Cross communities. The classes cover a wide range of applications in both Windows and Macintosh, and are free of charge. For more information on these and other training programs, see <http://www.nd.edu/~ndoit/training>.

The OIT maintains a High Performance Computing Cluster (HPCC) to provide a parallel computing environment for computationally intensive work and research. Some primary users of the HPCC include Chemistry, the Radiation Lab, Center for Applied Mathematics, Computer Science and Engineering, and the Theoretical Solid State Electrophysics Research Group. The University community also has access to national super-computing and data resource facilities. More information about the HPCC can be found at <http://www.nd.edu/~hpcc>.

The Media Resource Library in DeBartolo Hall includes many video and other

multimedia items for use in classes. The Media library also assists in locating and ordering new titles. The Media Resource Library is located on the first floor of DeBartolo Hall in Room 115. Please contact Roberta McMahon at (574) 631-5934.

DeBartolo Hall, the University's high-technology classroom building, has 42 permanent computers on podia for class presentations. Two classrooms have a computer on each student desk for collaborative work. Media-On-Call, a fiber-optic video delivery system, provides media to all classrooms in DeBartolo and the Mendoza College of Business complex. In addition to the shared facilities of the OIT, specific colleges have their own facilities.

Anyone using Notre Dame computers and networking resources is responsible for observing the policies set forth in the document G0001 *Responsible Use of Information Technologies at Notre Dame*. The full text of this policy is available from the Help Desk or online at the Web page: <http://www.nd.edu/~doc/G0001.html>.

#### *Interdisciplinary and Specialized Research Institutes*

In pursuance of its public service commitment, the University, assisted by various private foundations and federal agencies, maintains several interdisciplinary and specialized research institutes.

University institutes, centers, and special programs include:

Alliance for Catholic Education  
 Center for Applied Mathematics  
 Center for Asian Studies  
 Center for Astrophysics  
 Center for Catalysis and Reaction Engineering  
 Center for Civil and Human Rights  
 Center for Environmental Science and Technology  
 Center for Ethics and Culture  
 Center for Ethics and Religious Values in Business  
 Center for Family Studies  
 Center for Flow Physics and Control  
 Center for Molecularly Engineered Materials  
 Center for Nano Science and Technology  
 Center for Orphan Drug Development  
 Center for Philosophy of Religion  
 Center for Research in Banking  
 Center for Social Concerns  
 Center for Tropical Disease Research and Training

Center for U.S.-Japanese Business Studies  
 Center for Zebrafish Research  
 Cushwa Center for the Study of American Catholicism  
 Ecumenical Institute (Jerusalem)  
 Erasmus Institute  
 Fanning Center for Business Communication  
 Freimann Life Science Center  
 Gigot Center for Entrepreneurial Studies  
 Hank University of Notre Dame Environmental Research Center (UNDERC)  
 Hessert Laboratory for Aerospace Research  
 Higgins Labor Research Center  
 Institute for Church Life  
 Institute for Educational Initiatives  
 Institute for Latino Studies  
 Interdisciplinary Center for the Study of Biocomplexity  
 Keck Center for Transgene Research  
 Kellogg Institute for International Studies  
 Keough Institute for Irish Studies  
 Kroc Institute for International Peace Studies  
 Laboratory for Image and Signal Analysis  
 Lizzadro Magnetic Resonance Center  
 LOBUND Laboratory  
 Maritain Center  
 Marital Therapy and Research Center  
 Medieval Institute  
 Mendelson Center for Sports, Character, and Community  
 Multinational Management Program  
 Nanovic Institute for European Studies  
 Nuclear Structure Laboratory  
 Philosophic Institute  
 Radiation Laboratory  
 Reilly Center for Science, Technology and Values  
 South Bend Center for Medical Education  
 Walther Cancer Research Center  
 White Center for Law and Government

Those centers with particular relevance for graduate education are described in the "Centers, Institutes, and Laboratories" section of this *Bulletin*.

#### *Inter-University Visitation Program*

The Midwest Catholic Graduate Schools (MCGS) is a consortium of the Catholic universities of the Midwest that have significant doctoral programs. In addition to Notre Dame, the members are Loyola University of Chicago, Marquette University, and Saint Louis University.

A degree-seeking graduate student at an MCGS university, after initiating a program of studies at the "home university," may with appropriate approvals take course work

or pursue research at one of the other three institutions ("host universities") as a visiting student. Procedures have been introduced to facilitate such visits. The student registers at both the home and the host universities. Tuition is assessed at the home university at its rate. Registration entries and final grades are forwarded from the host to the home university for listing on the student's permanent record.

Inter-university visitation makes it possible for students to take advantage of courses or research opportunities offered by the other three institutions that might not be readily available at the home university. Thus, the program expands the choices available to MCGS students for shaping a degree program.

Interested students should review the graduate bulletins and class schedules of the host universities and consult with their advisers and major-field directors.

To participate, a student must complete an "Application for Inter-university Visitation" and secure the necessary approvals from the home institution. Then the graduate dean of the host university must approve the visitation. Finally, an "Intra-MCGS Enrollment Form" must be completed for each course to be taken at the host institution.

Participation is restricted to those fields of study that are under the academic jurisdiction of the graduate deans at both the home and the host institutions. A degree-seeking student must first have completed at least the equivalent of one full semester at the home university. No more than nine credit/semester hours of courses from host institutions can form part of a degree program at the home institution. Interested students may obtain further information and application forms from the Graduate School, 502 Main Building. Nondegree or transient students at the home institution may not participate in inter-university visitation.

#### *Kaneb Center for Teaching and Learning*

Telephone: (574) 631-9146  
 Web: <http://kaneb.nd.edu>

The John A. Kaneb Center for Teaching and Learning provides the means for faculty and graduate teaching assistants (TAs) to hone the art of teaching that has characterized a Notre Dame education over the years. Located in DeBartolo Hall, the Kaneb Center serves faculty as they evaluate and improve



their teaching and provides programs for TAs to help them develop their teaching skills and function effectively in their teaching roles. The center also helps faculty and TAs use new or existing technology.

Upon completing a series of five or more TA workshops on teaching, TAs receive a "Striving for Excellence in Teaching" certificate.

In collaboration with departments, colleges, and other University units, the center provides analysis and critiques of classroom instruction, assistance with departmental and college planning, assistance in developing teaching techniques, and University-wide stimulation for reflection on teaching and learning.

#### *Laboratory for Social Research*

Telephone: (574) 631-7458  
Web: <http://www.nd.edu/~lsrweb>

The Laboratory for Social Research (LSR) is an interdisciplinary training and service facility.

*Service.* The LSR provides data-processing and test-grading services through its software and optical scanner. Additionally, services are provided in questionnaire development, programming, and consultation in all phases of research (design, sampling, analysis, and evaluation).

*Research.* The LSR offers research services to both students and faculty, including consultative services regarding the formulation of research strategies, the development and implementation of statistical procedures, the construction of research-oriented classroom learning experiences, and technical assistance for quantitative data. The center provides access to a large number of data sets that cover a wide range of substantive topics. These data sets are acquired through the University's membership in the interuniversity Consortium for Political and Social Research and through other outside services.

*Teaching.* The LSR faculty teach advanced quantitative methods classes in the economics, political science, psychology, and sociology departments as well as an interdisciplinary training course for first-year graduate students. The LSR also provides undergraduate and graduate assistance in using SPSS, SAS, Systat, Stata, etc.

#### *The Snite Museum of Art*

Telephone: (574) 631-5466  
Web: <http://www.nd.edu/~sniteart>

The museum features collections that place it among the finest university art museums in the nation.

The Mesoamerican collection highlight is the comprehensive, exceptional holdings of works of the Olmecs, the earliest Mexican civilization.

The Kress Study Collection has been the foundation for developing Italian Renaissance art, which includes a rare Ghirlandaio altarpiece panel. The Baroque collection highlights works by Bloemaert, Coypel, and van Ruisdael. Selections from the Feddersen Collection of 70 notable Rembrandt van Rijn etchings are exhibited frequently; and, the 18th-century collection includes such masters as Boucher, Vigée-Lebrun, Reynolds, Conca, and de Mura.

The critically acclaimed John D. Reilly Collection of Old Master to 19th-century drawings includes examples by Tintoretto, Tiepolo, Oudry, Fragonard, Ingres, Géricault, Millet, and Degas. The Noah and Muriel Butkin Collection of 19th-Century French Art is the foundation of one of the museum's major strengths, featuring paintings and drawings by Corot, Boudin, Couture, Courbet, and Gérôme.

The Decorative and Design Arts Gallery spans the 18th through 20th centuries and exhibits early porcelains from Sèvres and Meissen. Exceptional ceramics, furniture, glass, and silver pieces represent both the Arts and Crafts and Art Nouveau styles of the 19th century in addition to the Art Deco and Bauhaus modern movements. Twentieth-century-designed pieces by Wright, Stickley, Tiffany, and Hoffman are also on view.

The Janos Scholz Collection of 19th-Century European Photography contains some 5,500 images of persons and places taken during the first 40 years of camera use.

Native American art focuses on early 19th-century Plains Indian-painted war records and costumes; it also features Mimbres and Anasazi painted ceramics from the prehistoric Southwest.

The developing American collection has 19th-century landscapes by Durand and Inness and portraits by Eakins, Sargent, and

Chase. Among highlights of the West and the Southwest regions are paintings by Higgins, Ufer, Russell, and Remington.

Traditional works of African art such as textiles, masks, and sculptures are in the collection.

Twentieth-century styles and movements are seen in paintings by Miro, O'Keeffe, Avery, Glackens, Pearlstein, and Scully. Modern sculptures by Barlach, Zorach, Cornell, Calder, and Rickey complement the paintings and drawings.

Croatian-American sculptor Ivan Mestrovic, who taught at Notre Dame from 1955 until his death in 1962, created many works that remain on campus. Major pieces can be seen in the museum, at the Eck Visitor Center, and the Basilica of the Sacred Heart.

Loan exhibitions from major museums and private collections, in addition to exhibitions mounted by the Snite, are offered periodically in the O'Shaughnessy Galleries, as is the annual exhibition of student art by candidates for M.F.A. and B.F.A. degrees. Special events and programs include lectures, recitals, films, and symposia held in the 304-seat Annenberg Auditorium and in the galleries.

## **Other Facilities and Services**

### *Campus Ministry*

Telephone: (574) 631-7800  
Web: <http://www.nd.edu/~ministry>

Notre Dame is a Catholic institution, which extends a welcome and our desire to be of service to students of all denominations and faith traditions.

Through the programs offered by Campus Ministry, we hope to offer opportunities for students to deepen their faith, to develop a spirituality that will serve them well as adult believers, and to discuss the religious and ethical aspects of questions that are essential for all of us.

Pastoral needs of graduate students are met in a variety of ways. Liturgies, prayer services, retreats, and spiritual counseling are available through personnel at University Village and at the Fischer-O'Hara-Grace Graduate Residences as well as through the offices of Campus Ministry. There is a chapel at Fischer Graduate Residences for the use of graduate students with daily and Sunday Masses and opportunities for sacramental reconciliation.

Campus Ministry offers programs in marriage preparation and family life, retreats, faith sharing, sacramental preparation, and pastoral counseling. It coordinates liturgies in the Basilica of the Sacred Heart and in the residence hall chapels. Graduate students are welcome to participate in these celebrations and to serve as Eucharistic ministers, lectors, or members of the Notre Dame liturgical choirs and music groups. Campus Ministry prepares a listing of all Catholic Masses offered each week at the Basilica of the Sacred Heart and in the residence halls. In addition to this, lists of local Protestant churches, as well as synagogues and mosques, are mailed to all graduate students at the beginning of the academic year with times of services and telephone numbers to call for transportation.

Campus Ministry offices are located in the Coleman-Morse Center and in 103 Hesburgh Library Concourse.

#### *Campus Security*

Telephone: (574) 631-8338

Web: <http://www.nd.edu/~ndspd>

*Safety Information from Notre Dame Security/Police.* The security of all members of the campus community is of paramount concern to the University of Notre Dame. Each year the University publishes an annual report outlining security and safety information and crime statistics for campus. This document provides suggestions regarding crime prevention strategies and important policy information about emergency procedures, reporting of crimes, law enforcement services on campus, and information about support services for victims of sexual assault. The brochure also contains information about the University's policy on alcohol and other drugs, the SafeWalk program, and the campus shuttle service. You may view the document on the Web at <http://www.nd.edu/~ndspd/safebroc.html>. A printed copy of this brochure is available by sending an e-mail request to [ndspd@nd.edu](mailto:ndspd@nd.edu) or by writing to: Office of the Director, University Security/Police, 101 Campus Security Building, Notre Dame, IN.

#### *Child Care*

Telephone: (574) 631-3344

An on-campus childcare center for the children of faculty, staff, and students was opened at Notre Dame in 1994. The Early Childhood Development Center (ECDC) provides a play-oriented learning curriculum that fosters a child's understanding of self,

others, the world, and problem solving. Literature, creative dramatics, music, play, and art are integrated into the daily schedule. The six-classroom center is staffed by 20 full-time employees, including six lead teachers who hold at least a bachelor's degree. Notre Dame and Saint Mary's College students serve as part-time teacher-assistants.

The program serves children ages two to six during the school year and two to nine in the summer. A number of full- and part-time schedules are offered to meet varying family needs, and the weekly cost of the program is tied to family income. ECDC also has operated a childcare program at nearby Saint Mary's for 28 years.

Call for more information or to get on the waiting list.

#### *Counseling Services*

Telephone: (574) 631-7336 (24 hours)

Web: <http://www.nd.edu/~ucc>

The University Counseling Center, located on the third floor of the University Health Center, offers professional services to all graduate students. The center is devoted to meeting the students' needs and assisting them with their problems and concerns. These concerns might include personal growth and self-enhancement, vocational issues and academic anxieties, interpersonal relationships and social difficulties, depression, substance abuse and addiction, and a number of more severe emotional and psychological problems.

The center is staffed by licensed clinical psychologists, counseling psychologists, an addiction specialist, clinical social workers, and doctoral interns and students who are supervised by professional psychologists, a consulting psychiatrist, and a consulting nutritionist. The center operates under an ethical code of strict confidentiality.

Professional services are usually by appointment and can be arranged either in person or by telephone, but provision is always made for an emergency. Services are offered at a minimal fee of \$4 per session. There is no charge for the initial appointment.

#### *Food Services*

Phone: (574) 631-5000

Web: <http://food.nd.edu>

All graduate students, whether they live on campus or off campus, may purchase meal plans for the University dining halls. A variety

of options are available in 2003–2004. Students may pick from 10 different meal plans providing a variety that can meet any schedule and any budget.

For added flexibility, students may also choose from our Domer Dollar or Flex Point programs. Each option allows for greater flexibility, safety, and convenience because the student never has to carry cash to dine in any of Food Services' operations. Visit the Card Services Office Web page to learn more about meal plans, Flex Points, and Domer Dollars ([http://food.nd.edu/on\\_campus\\_students/services/idcard.php](http://food.nd.edu/on_campus_students/services/idcard.php)) or call the Card Services Office at the South Dining Hall: (574) 631-7814.

#### *Graduate School Career Services*

Telephone: (574) 631-5200

Web: <http://careercenter.nd.edu>

The Career Center at Notre Dame offers students diverse and comprehensive services, including individual advising and counseling, dossier and credential file services, career assessment inventory testing, group workshops, videotape mock interviews, and more.

Programs of particular relevance to graduate students include

- Preparing your curriculum vitae
- Job search strategies for Ph.D.s in industry
- Improve your presentation skills
- Learn to network effectively

In addition to a wide variety of reference materials available in its Flanner Hall offices, the center also provides an online resource, *Go IRISH (Internet, Recruiting, Interviewing, Scheduling, Hotlink)*, that allows students to pursue internships, sign up for interviews, and research careers.

#### *Health Services*

Telephone: (574) 631-7497/7567

Web: <http://www.nd.edu/~uhs/uhs.html>

The University Health Center provides comprehensive treatment of illness and injuries to all students enrolled at the University. The services provided include an ambulatory clinic, pharmacy, laboratory, x-ray facilities, and an inpatient unit.

There is no fee to see the University physicians or nurses. Students must pay for prescriptions, over-the-counter medications, supplies, and specially prescribed treatments/

procedures. A statement of the charges for services rendered will be mailed to students, enabling them to file for personal insurance reimbursement. Most charges are covered under the University-sponsored student insurance plan, and the Health Center clerical staff files those claims.

The ambulatory clinic services are available on a walk-in or scheduled basis. Allergy shots must be scheduled. Referrals are made to local physicians for consultation and treatment of special cases. Inpatient beds are available for students during the fall and spring semesters when prescribed by a University physician.

Registered nurses provide 24-hour-per-day care. There are no inpatient room and board fees for on-campus students. Off-campus students pay a nominal inpatient room and board fee. All inpatient students pay for their laboratory tests, medications, and treatments.

Laboratory services are provided on site through a satellite facility of the South Bend Medical Foundation, a large local laboratory that also serves the local hospitals.

In case of emergency, the University Security Department provides for transportation of students to local hospitals. Local ambulance services are readily available. Transportation to local physicians' offices for care that is not an emergency is provided by Health Services if a University physician has referred the patient. Hours of transportation are limited to 12:15 p.m. to 5 p.m., Monday through Friday, during the academic year when the University is in session.

All student health records are kept confidential. No information is released to anyone, including parents and University authorities, without the student's prior permission. In the event of emergency requiring hospitalization, when it is impossible to obtain a student's permission, a University physician or the hospital will notify a parent or legal guardian.

#### *International Student Services and Activities*

Telephone: (574) 631-3825  
Web: <http://www.nd.edu/-issa>

The University of Notre Dame's international student body is made up of 900 students from over 100 countries. The campus community benefits from this diversity through opportunities to learn about other cultures, the sharing of experiences, the promotion of intercultural understanding, and the chance to practice other languages. Many of the

services and programs that enhance international educational exchange are offered through International Student Services and Activities (ISSA). This office strives to create a supportive atmosphere where students can live and learn effectively. The office also promotes international programs as a means of stimulating cross-cultural understanding and interest within the campus and community.

Services and programs offered include the International Orientation Program, Family Friendship Program, International Resource Bureau, annual International Week, international club advising, community outreach, general advising, counseling, and referral.

Since many international graduate students bring their families with them to Notre Dame, ISSA tries to meet their needs as well. For example, English as a Second Language classes are offered to spouses of degree-seeking international students, and an International Women's Club offers support and activities to the wives of all international students and scholars throughout the year.

International Student Services and Activities is located in Room 204 LaFortune Student Center. A separate Office of Foreign Student Visas is located at 112 Institute for Educational Initiatives Building (formerly the Earth Science Building) and advises international students and scholars with nonimmigrant status.

#### *Multicultural Student Programs and Services*

Telephone: (574) 631-6841  
Web: <http://www.nd.edu/-msps>

The Multicultural Student Programs and Services office encourages and supports traditionally underrepresented students in using all academic and leadership opportunities at the University. The office focuses on student leadership development skills, provides networks for internships and summer research positions, and offers diversity and multicultural educational programming for the entire campus. While working with 19 ethnic organizations, Multicultural Student Programs and Services collaborates with other academic and student affairs departments, the Student Union board, and Student Government to ensure representation of the total student body in programming efforts.

In conjunction with Student Affairs, the office sponsors an annual fine arts lecture series, which addresses various issues impacting people of color. This series serves as a

medium to begin dialogue on commonalities, differences, and interests. Another major programming effort is the First Friday luncheon held to permit faculty, administrators, and undergraduate and graduate students an opportunity to interact in an informal atmosphere. The MSPS Building Bridges Program provides first-year students with mentors who are faculty, administrators, upperclass MSPS scholars, and upperclassmen. The participants are exposed to career and graduate school initiatives, scholarships, and University awards. For further information, contact the office in the Intercultural Center, 210 La Fortune Student Center.

#### *Office for Students with Disabilities*

Telephone: (574) 631-7141 (voice),  
(574) 631-7173 (TTY)  
Web: <http://www.nd.edu/-osd>

The Office for Students with Disabilities (OSD) provides a variety of services to ensure that qualified students with disabilities have access to the programs and facilities of the University. Services do not lower course standards or alter essential degree requirements, but instead give students the opportunity to demonstrate their academic abilities. Students can initiate a request for services by registering with the OSD and providing information that documents their disability.

While the services or accommodations provided depend on the student's disability and course or program, some of the services that have been used include extended time on exams and/or separate testing rooms; textbooks in a variety of formats, such as large print, Braille, cassette tape, and computer disk; readers, note takers, and academic aides; screening and referral for diagnostic testing for a learning disability or attention deficit disorder; housing modifications; and hearing amplification equipment. OSD also has a room in the library with CCTV, an Arkenstone Reader, and a Braille printer for student use.

For more information on services or to receive a copy of the University of Notre Dame *Policies and Procedures for Students and Applicants with Disabilities*, please contact: Coordinator, Office for Students with Disabilities, 109 Badin Hall, E-mail: [nd.osd.1@nd.edu](mailto:nd.osd.1@nd.edu).

#### *Parking*

Telephone: (574) 631-5053  
Web: <http://www.nd.edu/-ndspd/parking.html>

Students must register vehicles operated or parked on campus. Information about traffic and parking regulations and vehicle registration is available from the Parking Services office, 117 Campus Security Building.

### **Policies on Harassment and Other Aspects of Student Life**

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Sexual and discriminatory harassment and harassment in general are prohibited by the University. Definitions and policies regarding all forms of harassment and other aspects of student life and behavior are described in the *Graduate and Professional Student Handbook*, which contains the University's description of student life policies and procedures for advanced-degree students. The codes, rules, regulations, and policies that establish the official parameters for student life at Notre Dame are contained in the handbook. Unless otherwise noted, the policies and procedures in the handbook apply to all graduate and professional students, whether the behavior occurs on or off campus. The handbook may be obtained from the Office of Residence Life and Housing, located at 305 Main Building, and is available from the Office of Residence Life and Housing Web site at <http://orlh.nd.edu>.

# Centers, Institutes, and Laboratories

## **Alliance for Catholic Education**

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### *Academic Director:*

Thomas Doyle, Ph.D., *Professional Specialist*

Telephone: (574) 631-7052

Fax: (574) 631-7939

Location: 112 Badin Hall

E-mail: ace.1@nd.edu

Web: <http://www.nd.edu/~ace>

The Alliance for Catholic Education (ACE) seeks to develop a corps of highly motivated and committed young educators to meet the needs of our country's most underserved elementary and secondary schools.

To carry out its core teaching mission, ACE recruits talented graduates from a broad variety of undergraduate disciplines, representing a diverse set of backgrounds and experiences, and provides an intensive two-year service experience encompassing professional development, community life, and spiritual growth. These three components are at the heart of the ACE initiative. They aim to provide excellence in education and to maximize opportunities for personal and professional growth for program participants.

ACE teachers undergo an intensive teacher education in Notre Dame's master of education program under the direction of Thomas Doyle. The ACE professional training spans two years and integrates graduate-level course work with an immersion experience in teaching. During the two summers after admission to the program, ACE teachers live and study together at the University of Notre Dame. The summer sessions combine an innovative teaching curriculum taught by seasoned practitioners and select faculty from the University of Notre Dame as well as from other major universities with supervised field experience in both the public and Catholic elementary schools of South Bend, Indiana, and in the Upward Bound Program at Notre Dame.

At the completion of the summer training component, ACE teachers travel to under-resourced parochial schools of the Southeast and Southwest to serve as full-time teachers during the regular school year. In addition

to the support of mentor-teachers in the parochial schools where they teach, all ACE teachers are brought together once during the school year in a retreat setting to deepen and enhance their commitment to becoming professional educators. Upon completion of two years in the ACE program, participants will have fulfilled the requirements for a master of education degree and will have provided an urgently needed presence in the lives of our nation's school children.

In addition to a fully funded graduate program, ACE participants receive a modest monthly stipend, medical insurance, travel reimbursement, and an educational award of \$4,725 from the Corporation for National Service.

Begun in 1994, ACE currently has over 150 recent graduates from the University of Notre Dame and Saint Mary's College, as well as a number of other select colleges and universities. These graduates teach in over 100 parochial schools throughout the urban and rural Southern United States.

## **Center for Applied Mathematics**

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### *Director:*

Panos Antsaklis, *the H. C. and E. A. Brosey Professor of Electrical Engineering*

Telephone: (574) 631-7245

Fax: (574) 631-6579

Location: 262 HurleyHall

E-mail: cam@nd.edu

Web: <http://www.nd.edu/~cam>

The Center for Applied Mathematics was established to enhance interdisciplinary use of applied mathematics and to provide support for faculty and student research. The center promotes interaction and cooperation among the Notre Dame researchers using mathematics in a variety of disciplines spanning engineering and science and including business and social sciences. It also helps in faculty development by acting as a University source of information on new mathematical concepts and methods essential for developing and carrying out innovative and timely interdisciplinary research at Notre Dame.

The center works closely with the interested departments to formulate, establish, and help coordinate the applied mathematics courses at the University.

The primary activities of the center are as follows:

1. Sponsor lecture series and seminars for faculty and graduate students.
2. Sponsor short and long term faculty visitors working in interdisciplinary research projects in applied mathematics.
3. Support student research by providing fellowships to a limited number of graduate students designated as center fellows; also by providing summer fellowships to a limited number of graduate and undergraduate students.
4. Sponsor an annual research workshop for graduate students.
5. Promote interdisciplinary research groups and help secure funding for research.
6. Give institutional recognition to members of the Notre Dame faculty doing research in applied mathematics.

## **Center for Astrophysics**

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### *Director:*

Grant J. Mathews, *Professor of Physics*

Telephone: (574) 631-6919

Fax: (574) 631-5952

Location: 225 Nieuwland

E-mail: astro@nd.edu

Web: <http://www.nd.edu/~astro>

The Center for Astrophysics at Notre Dame University (CANDU) provides a synergistic focal point for various faculty research interests under the common theme of "astrophysical and cosmological origins" and encourages collaborations both within and beyond the University community.

The national and international visibility of Notre Dame within the astrophysics community has steadily increased in recent years, with world-renowned programs in theoretical/observational cosmology, nuclear astrophysics, cosmic-ray physics, dark matter searches, solar system formation, and

extra-solar planet searches. In addition, Notre Dame has made a commitment to the Large Binocular Telescope (LBT) international collaboration. When completed, the LBT will be the largest telescope in the world on a single mount. It will provide image resolution as much as 10 times better than the Hubble Space Telescope.

Research activities of the center focus on cross-disciplinary efforts to explore outstanding scientific questions concerning the origin and evolution of astrophysical phenomena. In addition to the specific scientific missions outlined below, CANDU acts as a cross-disciplinary focal point for interactions among scholars with related interests in other departments such as mathematics, history, philosophy, and the Program of Liberal Studies. Two specific areas of research/collaboration targeted by CANDU fall under the headings of astrophysical and cosmological origins.

**Cosmological origins** includes topics such as the origin and structure of the universe, the big bang, primordial nucleosynthesis, cosmic background radiation studies, measurements of cosmological expansion rate, age, and matter content, the origin and evolution of galaxies, space-time geometry, and historical, philosophical, and theological foundations.

**Astrophysical origins** is concerned with the origin of stars and the formation of extra-solar planetary systems, origin and evolution of the elements in stars and supernovae, origin of cosmic rays, gamma-ray bursts, astrophysical neutrinos, and gravity waves.

The center encompasses a broad range of academic interests and is a focal point for undergraduate and graduate research projects. It provides fellowship support for both undergraduate and graduate students, and it also acts as a forum for public outreach and invited lecture series, providing a unique academic environment for intellectual progress.

Another activity of the center is to provide and develop space-based missions. The center is currently developing a NASA mission to detect Earth-mass planets orbiting other stars through an innovative gravitational lensing technique. This will also detect supernovae at large distances, providing a means to measure the age and acceleration of the universe.

Other significant facilities of CANDU include access to the Vatican Telescope; telescope facilities at Mt. Stromlo, Australia, and in South Africa; the Notre Dame nuclear accelerator laboratory; and the Notre Dame Project GRAND cosmic air shower array.

### Center for Environmental Science and Technology

*Director:*

Patricia A. Maurice, *Associate Professor of Civil Engineering and Geological Sciences*

Telephone: (574) 631-8376

Fax: (574) 631-6940

Location: 152A Fitzpatrick Hall

E-mail: cest.1@nd.edu

Web: <http://www.nd.edu/~cest>

The Center for Environmental Science and Technology, established in 1987, conducts basic scientific and engineering research that involves faculty from all divisions of the Graduate School. The center serves as a focal point for the promotion and encouragement of the following activities:

1. Conduct basic research in pollution control that combines microbiology, biochemistry, physical chemistry, geochemistry, mathematics, and physics with engineering.
2. Educate undergraduate and graduate science and engineering students to the need for and methods of science-based environmental research.
3. Develop innovative technologies grounded in sound scientific principles for application to environmental problems.
4. Develop interdisciplinary teams to apply cutting-edge technologies to real world problems in many areas of national and international concern.

As a cooperative effort between the Colleges of Engineering and Science, the center fosters interdisciplinary environmental research and education by providing cutting-edge analytical technologies needed to address environmental problems. The goals of the center are to develop a truly comprehensive research and educational program, and to ensure that students obtain basic scientific knowledge needed to address current and future pollution control problems.

Students connected with the center are either enrolled in a degree program in one of the participating departments (e.g., biological

sciences, chemical engineering, chemistry and biochemistry, civil engineering and geological sciences, mathematics, physics, or anthropology) or visiting from another institution. The center supports students through the Bayer endowment for predoctoral and postdoctoral fellowships, in addition to various internship opportunities.

### Center for Flow Physics and Control

*Director:*

Thomas C. Corke, *the Clark Professor of Aerospace and Mechanical Engineering*

Telephone: (574) 631-7007

E-mail: [flowpac@nd.edu](mailto:flowpac@nd.edu)

Web: <http://www.nd.edu/~flowpac>

The University of Notre Dame has a long tradition of achievement in experimental fluid dynamics and aerodynamics that dates back to 1882, with the development of one of the earliest wind tunnels in the United States. Since 1943, contributions to aircraft technology from Notre Dame's Aerospace Engineering Laboratory have been recognized world wide through its development of low-turbulence, subsonic, transonic, and supersonic, smoke-visualization wind tunnels. These unique wind tunnels continue to support new research, and form the nucleus of the other new facilities.

As an outgrowth of this long tradition, the Center for Flow Physics and Control was formed in 2001. Research funding comes from a broad number of government agencies, including all branches of the Department of Defense (Army, Air Force and Navy); DARPA; and NASA Langley, Ames, Glenn, and Dryden Research Centers. A general theme of research that bridges this group involves flow diagnostics, prediction, and control. A combination of basic research is aimed at verifying or developing theories for fluid dynamic behavior, and the application of theory towards controlling flows. The work has involved a multitude of flow fields including laminar and turbulent boundary layers, jets, shear layers, and wakes at incompressible and compressible Mach numbers. The applications have included transition control, drag reduction, mixing, flow-induced vibration, and acoustics.

In addition to experiments, the center continues a long tradition of theoretical and computational fluid dynamics (CFD) and

modeling of complex flows. The combination of these elements in a single site is a particular strength of the group.

The facilities in the center are primarily located in the Hessert Laboratory for Aerospace Research. This is a modern 40,000-square-foot building that includes laboratories, computer facilities, fully staffed machine and electronics shops, faculty and student offices, and conference and meeting rooms.

The research facilities include numerous high-quality subsonic, transonic, and supersonic wind tunnels, as well as specialty facilities such as a high-speed heated anechoic jet facility, an anechoic open-jet wind tunnel, and an atmospheric boundary layer wind tunnel. Specialized laboratories focus on particle dynamics, optical measurements, digital time-series acquisition and image processing, and computational fluid dynamics.

Research in the center is broken into five areas—*aero-optics, aero-acoustics, fluid-structure interactions, multiphase flows, and intelligent flow control*—and involves faculty in the departments of aerospace and mechanical engineering, electrical engineering, civil engineering and geological sciences, computer science and engineering, and mathematics.

Advisers from industry provide intellectual feedback and industrial teaming.

### Center for Molecularly Engineered Materials

*Director:*

Arvind Varma, *the Arthur J. Schmitt Professor of Chemical Engineering*

Telephone: (574) 631-9388  
 Fax: (574) 631-8366  
 Location: 118B Cushing Hall  
 E-mail: cmem@nd.edu  
 Web: <http://www.nd.edu/~cmem>

Materials engineered at the molecular level offer tremendous potential for new technological applications, especially in key industries such as aerospace, automotive, biomaterials, chemicals, defense, electronics, energy, metals, and telecommunications.

The Center for Molecularly Engineered Materials actively explores multidisciplinary fundamental concepts in materials science and engineering, with emphasis on the study of materials at the molecular level. At Notre

Dame, it is the primary interdisciplinary unit dedicated to the molecular-level design, synthesis, characterization, and development of advanced materials.

The center's objective is to utilize molecular-level engineering of materials to explore promising technological applications in a variety of fields ranging from catalysts, adsorbents, and sensors to fuel cells, biomaterials, and nanomagnetism. An important focus of the center is integrating materials engineering over length scales from the molecular up to macroscopic dimensions so as to have maximum utility. A key goal is to serve as a national resource for exploring long-range molecular-level materials engineering concepts for applications that would otherwise not be possible due to the near-term focus of the commercial sector.

The aim is to develop materials and systems whose structure and components exhibit novel and significantly improved physical, chemical, and biological properties, phenomena, and processes, due to their molecular-scale design and engineering. Included among the areas of emphasis are the synthesis and characterization of new materials with features on the molecular scale, experimental studies and mathematical modeling, and advanced processing techniques. For example, molecular-level synthesis and assembly methods will result in chemical/biological sensors with improved accuracy and sensitivity that can rapidly test large quantities of food for bacterial contaminants or airborne toxins; novel catalyst structures that provide both an ideal chemical environment on the molecular scale and the optimal macrostructure for efficient high-volume chemical, petroleum, and pharmaceutical processing; significant improvements in semiconductor interfaces for solar energy conversion; environmentally benign corrosion inhibitors; and better sensors and controls to increase efficiency in manufacturing.

The center integrates interdisciplinary research groups in catalysis and reaction processes, electrochemical interfaces and processes, nanostructured materials, advanced processing techniques, and biology inspired materials. It includes researchers from several departments in the Colleges of Engineering and Science and the Radiation Laboratory. The thrust activities are synergistically planned, coordinated, and executed so as to provide a coherent approach to targeted and evolving concepts.

### Center for Nano Science and Technology

*Director:*

Wolfgang Porod, *the Frank M. Freimann Professor of Electrical Engineering*

Telephone: (574) 631-6376  
 Fax: (574) 631-4773  
 Location: 203 Cushing Hall  
 E-mail: ndnano@nd.edu  
 Web: <http://www.nd.edu/~ndnano>

Research conducted in the Center for Nano Science and Technology entails the study of small device structures and device-related phenomena on a spatial scale of less than one-tenth of a micron—that is, one thousandth the diameter of a human hair. The center integrates research programs in molecular- and semiconductor-based nanostructures, device concepts and modeling, nanofabrication, electrical and optical characterization, and integrated systems-level design to address common application goals.

The center comprises a multidisciplinary collaboration of faculty from the departments of electrical engineering, computer science and engineering, chemistry and biochemistry, and physics who are exploring fundamental concepts and issues in nano science and developing unique engineering applications using principles of nano science. The center was established on a base of 15 years of faculty research and educational development at Notre Dame in nano science and technology.

At present, center faculty are engaged in such initiatives as quantum-based devices and architectures; high-speed resonant-tunneling devices and circuits; photonic integrated circuits; the interaction of biological systems with nanostructures; and the design and fabrication of microelectromechanical systems.

In addition to training students for immediate participation in nano science and technology and preparing them to be productive and extremely competitive in the future marketplace, the center also allows faculty to conduct *avant-garde* research and provides industry leaders with a forum, a "think tank," to explore long-range ideas. Involvement with industrial technologists also benefits students by providing experience in working with the commercial sector.

### Keck Foundation Initiative

The W.M. Keck Foundation Initiative on "Integrated Nanoelectronics: Information Processing at the Molecular Level" is a major research program within the Center for Nano Science and Technology.

This initiative explores the use of nanoelectronics in developing radically different approaches to information processing. The research aims to combine novel device concepts with both fundamental fabrication issues in physics and chemistry and higher-level integration issues of systems, architectures, and algorithms. This initiative builds on the notion of Quantum-Dot Cellular Automata (QCA), a concept developed at Notre Dame, which is based on encoding binary information through the charge configuration of quantum-dot cells.

### Facilities

(<http://www.nd.edu/~ndnano/research.htm>)

The center has excellent on-site research facilities and capabilities. These include nanolithography and scanning tunneling microscopy; nanodevice and circuit fabrication; nano-optical characterization including femtosecond optics and near-field scanning optical microscopy; electrical characterization at helium temperatures and in 10 T magnetic fields; 50 GHz high-speed circuit analysis; and device and circuit simulation and modeling. In recent years, federal grants received to support research in nano science and technology total approximately \$10 million.

### Center for Philosophy of Religion

#### Director:

Thomas P. Flint, *Professor of Philosophy*

Telephone: (574) 631- 7339

Location: 418 Malloy Hall

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Web: <http://www.nd.edu/~cprelig>

The Center for Philosophy of Religion was established at Notre Dame in 1976. Although operating in close association with the Department of Philosophy, it is not a degree-granting institution. Its aim is to advance the understanding of religion and religious belief and to promote and advance a specifically Christian and theistic approach to some of the main topics and problems of philosophy.

In pursuit of these goals, the center sponsors several different sorts of activities. First, it offers stipendiary fellowships on a competitive basis to scholars who then come to Notre Dame to work on projects in philosophy of religion and Christian philosophy. It also extends nonstipendiary resident fellowships to scholars who are on sabbatical leave and would like to come to Notre Dame to work on a topic in Christian philosophy or philosophy of religion; such fellows receive guest faculty status and secretarial services.

The center periodically sponsors conferences and lectureships on selected issues.

The center also publishes a series of volumes that includes conference proceedings and monographs. The center will address its subject from within a posture that is committed and Christian; its perspective (though not necessarily that of its fellows and lecturers) is that of the committed believer, rather than one of artificial neutrality.

### Center for Tropical Disease Research and Training

#### Director:

Frank H. Collins, *the George and Winifred Clark Professor of Biological Sciences*

Telephone: (574) 631- 9245

Location: 313 Galvin Life Sciences

E-mail: [collins.75@nd.edu](mailto:collins.75@nd.edu)

Web: <http://www.science.nd.edu/biology/programs/parasitology.html>

This world-renowned research group includes faculty whose interests center on human parasites and their arthropod vectors as well as the host response to infection. The vector biologists' research interests include genetics, genomics, reproductive physiology, vector competence and immunity, insecticide resistance, bionomics, population genetics, and systematics. The major vector groups studied include mosquito vectors of malaria parasites, filarial worms, and arboviruses as well as tick vectors of the causative agents of Lyme disease and ehrlichiosis. This center's laboratories house the World Health Organization's *Aedes* Reference Center, a large reference collections of *Anopheles* species and genetic strains, and an extensive set of genomic and cDNA libraries from the malaria vector *Anopheles gambiae* and the yellow fever vector *Aedes aegypti*.

The research interests of the parasitologists include comparative biochemistry, immunology, pharmacology, cell biology, genetics, genomics, and vaccine development. The major parasitic organisms studied include malaria parasites, *Leishmania*, *Toxoplasma*, *Mycobacteria*, filarial nematodes, and *Ehrlichia*. Ongoing research projects involve functional assays of recombinant proteins, population genetics and transmission of malaria parasites, gene expression and protein trafficking in parasitic protozoa, isolation of mycobacterial virulence factors, signal transduction in mycobacterial-infected cells, and *Plasmodium* genomics.

Excellent facilities exist for studies involving parasite biochemistry, molecular biology, cell biology, electron and confocal microscopy, large scale DNA and cDNA sequencing, microarray and quantitative gene expression analysis, and animal models (including work with nonhuman primates). Most of the faculty in this program study not only vectors and pathogens of importance in the United States but also tropical parasites and their vectors in several locations in Africa, Papua New Guinea, the Caribbean, and South America. Research projects also utilize the University of Notre Dame's Environmental Research Center (UNDERC) in Michigan's Upper Peninsula. Excellent facilities exist for genomic and postgenomic studies through the department's involvement with the Indiana Center for Insect Genomics, a significant part of which is located on the Notre Dame campus.

Faculty in the Center for Tropical Disease Research and Training receive support from major federal funding agencies such as the NIH, NSF, and USDA, from private foundations like the John D. and Catherine T. MacArthur Foundation, the Gates Foundation, and the Wellcome Trust, from international funding bodies like the World Health Organization, and from the University of Notre Dame. The program has had an NIH Training Grant for almost 30 continuous years that has supported graduate students and postdoctoral fellows. Genome projects for two species of mosquitoes, *Anopheles gambiae* and *Aedes aegypti*, and a number of other insects are coordinated through grants to center faculty. These faculty also direct and participate in the Indiana Center for Insect Genomics, a collaborative network of Indiana academic and biotechnology institutions that conducts genomic research with insects of both medical and agricultural importance.



## Charles and Margaret Hall Cushwa Center for the Study of American Catholicism

### Director:

Timothy Matovina, *Associate Professor of Theology*

Telephone: (574) 631-5441

Fax: (574) 631-8471

Location: 1135 Flanner Hall

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Web: <http://www.nd.edu/~cushwa>

The Cushwa Center for the Study of American Catholicism is widely recognized as the leading center for the historical study of Roman Catholicism in the United States.

Cushwa Center seminars, conferences, and research projects, many of which produce scholarly volumes or popular educational publications, engage a national body of historians and colleagues from theology, women's studies, sociology, religious studies, American studies, and English. The center also provides resources and critical commentary for media coverage of U.S. Catholicism and collaborates with church leaders and pastoral workers to enhance the vitality of Catholic life in the United States. In all aspects of its mission—research, teaching and faculty development, and public service—the Cushwa Center seeks interdisciplinary and ecumenical cooperation.

### Events

The Cushwa Center sponsors a number of programs that promote the study of American Catholicism:

Twice a year, the American Catholic Studies Seminar brings scholars from across the country to present papers at Notre Dame. Published in a working paper format, these essays are made available to the public for the cost of duplication.

Once each semester a prominent scholar in the field of American Catholic studies delivers a Cushwa Center Lecture.

The Notre Dame Seminar in American Religion is a semiannual gathering of historians of American religion and other scholars who meet to discuss a recent book published in the field. The author of the book is present for the seminar.

The Cushwa Center sponsors a conference each spring, covering topics such as: Catholicism in Twentieth Century America, U.S.

Hispanic Catholicism, African American Catholicism, and Catholicism in International and Comparative Contexts.

### Publications and Research

The Cushwa Center's American Catholic Studies Newsletter, published twice a year, reviews the latest scholarship in the field. It also features personal news items and provides information on archival holdings pertinent to the study of U.S. Catholicism.

The Cushwa Center offers two publication awards, in conjunction with the University of Notre Dame Press. These provide for the publication of the best manuscripts submitted for two series: Notre Dame Studies in American Catholicism and The Irish in America.

The fourteen books published to date in these series, as well as the center's specialized studies of the growth of Hispanic Catholicism in the United States and the history of Catholic parish life, have helped to build the Cushwa Center's reputation. Increasingly, the center is also earning recognition for important interdisciplinary research in American religion and culture, the experiences of women in religious history, the impact of the Second Vatican Council on the American Catholic community, and the Catholic presences and diverse religious practices of U.S. Catholic men and women in the twentieth century.

Research travel grants, offered annually, assist scholars who wish to use Notre Dame's library and archival collection in Catholic Americana.

The center also administers a Hibernian Research Award and a program of lectures, publications, and conferences related to the Irish American experience. These activities are funded by an endowment from the Ancient Order of Hibernians.

### Twentieth Century Project

Initiated in 1997, "Catholicism in Twentieth Century America" seeks to integrate the experiences and contributions of Catholics more fully into the narratives of American history. Faculty and dissertation fellows participated in one of three working groups: Public Presences, Catholic Women, and Catholic Practices and Identity. Several completed manuscripts from the project have been published in a new publication series, Catholicism in Twentieth Century America, which is under the general editorship of Scott Appleby and sponsored by the Cushwa Center and Cornell University Press.

## Devers Program in Dante Studies

### The Albert J. Ravarino Director:

Theodore J. Cachey Jr., *Professor of Italian Language and Literature*

Telephone: (574) 631-5610

Fax: (574)631-6308

Location: 102 Hesburgh Library

E-mail: [devers@nd.edu](mailto:devers@nd.edu)

Web: <http://www.dante.nd.edu>

The William and Katherine Devers Program in Dante Studies supports rare book acquisitions in the John A. Zahm, C.S.C., Dante Collection, as well as teaching and research about Dante across the humanities curriculum, in particular in the medieval and Italian studies areas, through the sponsorship of conferences, fellowships, lecture series, seminars, and visiting professorships. It also sponsors print and electronic publications of scholarly research through the *Devers Series in Dante Studies*, published by the University of Notre Dame Press, and as a founding member of the ItalNet Consortium for the creation of scholarly internet resources in the Italian studies area. The Devers Program also funds an annual program of research and travel grants for faculty and students.

## Erasmus Institute

### Director:

Rev. Robert E. Sullivan, *Associate Professor of History*

Telephone: (574) 631-9346

Fax: (574) 631-3585

Location: 1124 Flanner Hall

E-mail: [erasmus@nd.edu](mailto:erasmus@nd.edu)

Web: <http://www.nd.edu/~erasmus>

The Erasmus Institute was founded to foster research grounded in Catholic intellectual traditions and focused on significant issues in contemporary scholarship. Its mission is not to advance study of the church or theology as such, but rather to bring resources from two millennia of Catholic thought to bear on problems in the humanities, social sciences, and arts. An exemplary case is the use by Sara Maitland of theological perspectives to illuminate the structure and limits of the modern novel: a contribution to literary understanding significant to all scholars in the field, regardless of religious belief. Another is Jean Bethke Elshtain's work on just-war theory in political science: a discourse drawing heavily on Catholic thinkers, especially Augustine,

but as important to secular-minded political theorists as to Christian ones. One can imagine analogous research involving notions of the body in gender studies, conceptions of authority in sociology, or historical studies of religious sources of apparently secular institutions or modes of thinking. The institute favors first-order scholarship over policy-oriented or applied investigations. Though concerned primarily with the Catholic intellectual heritage, the institute supports complementary research deriving from other Christian intellectual traditions as well as from Jewish and Islamic ones. It invites the participation of scholars without regard to religious belief.

By encouraging work of this sort, the institute hopes, on the one hand, to enrich our common academic efforts with neglected assets and, on the other, to strengthen ties between the church's intellectual life and that of the academy. In so doing, the institute seeks to promote scholarship of high quality, reflecting a broad array of interests, without aligning itself with any ideological perspective.

International in the scope of its mission, the Erasmus Institute offers residential fellowships at its center on the campus of the University of Notre Dame. These include faculty, post-doctoral, and dissertation fellowships. It also organizes conferences and colloquia on campuses in this country and abroad, sponsors a publication program, and arranges summer seminars for graduate students and faculty.

## **Institute for Church Life**

### *Executive Director:*

John Cavadini, Ph.D., *Chair and Associate Professor of Theology*

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Fax: (574) 631-6968

Location: 1201 Hesburgh Library

E-mail: icl@nd.edu

Web: <http://www.nd.edu/~icl>

The Institute for Church Life (ICL) exists as an integral component of the University's larger mission of teaching, research, and service to society and to the Church. Through its resources, projects, and affiliate centers the institute reaches out to the whole spectrum of Church leaders—its bishops, clergy, religious, and laity—to provide training and service as well as opportunities for spiritual rejuvenation and personal growth.

In this work, the institute seeks to embody the spirit and mandate of the Second Vatican Council, to implement a mission of transforming the Church and society in light of the Gospel, and to renew the theological, ministerial, pastoral, catechetical, and liturgical traditions of the Church. In part, the institute's efforts are realized through its ongoing collaboration with the Center for Pastoral Liturgy, the Center for Social Concerns, NDVI (the Notre Dame Vocation Initiative), STEP (Satellite Theological Education Program), and the academic departments and schools of Notre Dame, especially the Department of Theology.

For more than 25 years, ICL has provided distinguished leadership through its publications, training sessions, service to episcopal and national organizations, involvement in social concerns, research, and educational programs. Guided by its executive committee, ICL is expanding its programs and initiatives for the special needs of a Church at the beginning of the new millennium.

As a bridge between the University and the Church, ICL links programs and personnel on campus with Church leaders, University graduates, and others who are concerned with the development of vital communities of faith. Further, ICL hopes to serve as a catalyst for cooperation among a variety of entities and agencies within the University and within the Church.

### *Components of the Institute for Church Life*

*The Center for Pastoral Liturgy* is concerned primarily with the pastoral dimensions of the reform of liturgy that express and shape the religious experience of people. Bringing together a variety of resources, the center's staff provides educational programs on the liturgy and pastoral life to assist parishes and dioceses with renewal of worship. The center also sponsors an annual conference at Notre Dame as well as regional conferences, and publishes a newsletter, *Assembly*, and books on various aspects of worship. Established in 1971, the Notre Dame Center for Pastoral Liturgy was designated by the bishops in the United States as an official liturgical center.

*The Center for Social Concerns* offers programs aimed at raising the consciousness of students, faculty, staff, and alumni/ae to social, cultural, and justice issues in our society. Experiences in the South Bend area, throughout the United States, and internationally are developed for participating students and enhanced with

course work, readings, and discussion. The staff also works with faculty to assist them in incorporating into their courses information about justice issues, as well as experiential and community-based service learning models appropriate to their courses. The center staff invites the discussion of self-initiated social justice, service, and leadership opportunities with interested graduate students.

*Retreats International* (RI), a professional organization serving the larger retreat movement, provides the structure and format for networking and collaboration among its some 360 member retreat centers and houses of prayer. RI also gathers and publishes significant data pertinent to retreat/renewal ministry, and publishes various monographs on topics of interest to those involved. Retreats International conducts the Institute for Adult Spiritual Renewal on the Notre Dame campus that attracts more than 500 persons involved in many church ministries.

*The Satellite Theological Education Program* (STEP) provides quality theological education to pastoral ministers and other adult Catholics from dioceses across the country. The primary services STEP provides are designed to assist dioceses enhance catechetical, ministry formation, and adult education programs through online courses ("eCourses"). STEP eCourses are conducted entirely online via the Internet with the adult learner in mind, taking advantage of the flexibility this medium allows to bring the resources of Notre Dame to dioceses and parishioners from across the country. STEP's courses are developed and taught by members of the Notre Dame faculty.

*Vocare, the Notre Dame Vocation Initiative*, was established to help students "understand their future work in light of their faith commitments and provide talented young people with opportunities to explore ministry, either lay or ordained, as their life's work." Vocare intends to foster a sense of vocation in a broad range of youth, from high-school students to young adults who have graduated from college. It has three component programs, one directed to Notre Dame students and faculty, another to high-school youth, and the third to Notre Dame graduates as they make the transitions into careers.

## **Institute for Educational Initiatives**

### *Director:*

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In its mission to improve the education of all youth, particularly the disadvantaged, the Institute for Educational Initiatives conducts four programs designed to address specific educational goals. These are the Program on the Social Organization of Schools, the Alliance for Catholic Education (ACE), the Mendelson Center for Sports, Character, and Community. Through the research and teaching of these programs, the institute seeks to contribute to the revitalization of American education and, consistent with Notre Dame's mission as a Catholic university, to benefit parochial education in a special way.

*The Program on the Social Organization of Schools* conducts basic and applied research on school and the learning process. Researchers study the formal and informal organization of schools, the curriculum, teacher practices, and student social relationships in an effort to determine how these factors interact with student background and ability to affect student learning. Special attention is given to the study of Catholic schools, particularly in reference to the education of at-risk students.

*The Alliance for Catholic Education* seeks to develop a corps of highly motivated and committed young educators to meet the needs of our country's most underserved elementary and secondary schools. ACE teachers undergo an intensive teacher education program that spans two years and integrates graduate-level course work with an immersion experience in teaching. The ACE program also seeks to influence and support Catholic education through educational outreach. Outreach activities include support for mentoring and tutoring in the South Bend area schools, summer institutes for Catholic school superintendents, assistance for foundations interested in educational issues, and partnerships with teacher-service programs at other colleges and universities.

*The Mendelson Center for Sports, Character and Community* encourages sport participants, sport organizations, sports leaders, and educational institutions that sponsor sport programs to embody values and behaviors

that promote holistic human development and social justice. In recognition of the importance of sport in contemporary society and culture, the center conducts research on the relationship between sport and broader culture, exploring both the possibilities and the limitations of sport's contributions to a more just and compassionate world. It also develops and offers educational opportunities for those involved in sport and holds a biennial conference. The center also houses the Institute for Coaching and Education.

## **Institute for Latino Studies**

### *Director:*

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The Institute for Latino Studies was founded in 1999 to advance knowledge and understanding of the Latino experience in the United States. Building upon the outstanding intellectual tradition of Julián Samora (professor in the Department of Sociology, 1959–1985), the institute fosters interdisciplinary study, research and outreach in Latino studies as a vital component of the University's mission. The institute promotes and develops Latino-focused scholarship by working with students, faculty, and fellows to create a University-wide academic program, including an undergraduate minor in Latino studies. Its Galería América offers exhibitions and special programs on Latino art, and the Julián Samora Library and Archives provide resources for study and reflection.

The institute conducts research in areas central to our nation's future through five programs:

*The Inter-University Program for Latino Research (IUPLR)* is a nationwide consortium of 16 Latino centers for which the institute serves as headquarters. IUPLR is also an official Census Information Center and disseminates census information and analysis to its consortium members and the public.

*Latino Ecclesial and Pastoral Concerns* addresses pastoral issues and theological questions in the Catholic context and works closely with the Department of Theology.

*Border and Inter-American Affairs* explores points of intersection between the interests of U.S. Latinos and the populations of their countries of origin.

The *Center for the Study of Latino Religion* conducts ecumenically focused research on the impact of religion on the political, social, cultural, and educational life of U.S. Latinos.

The *Metropolitan Chicago Initiative* oversees research and community-outreach projects focusing on the status of Latino families and neighborhoods and ways to improve their health, education, and well-being.

## **W.M. Keck Center for Transgene Research**

### *Director:*

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The W.M. Keck Center for Transgene Research employs innovative genetic technology to study human diseases that involve blood-clotting and clot-dissolving proteins, such as heart disease, atherosclerosis, and cancer. Established in 1997, the center brings together research in transgenic manipulations with other laboratories around the world that possess special expertise in characterizing the genetically altered animals. The director's own laboratory at Notre Dame is considered among the foremost worldwide conducting basic biochemical research on blood-clotting mechanisms.

In establishing this sophisticated cutting-edge technology at Notre Dame, the center hopes to better understand how certain blood-clotting and clot-dissolving proteins work in a living organism, in this case mouse models of disease. In transgene research, scientists alter genetic material in a very precise manner in an animal's embryo, either by adding, deleting, or exchanging certain genes in the few cells of the newly formed embryo. This changes the animal in every cell in its body, for its entire life span, and the changes will be handed down to future generations.

By breeding animals with differently altered genes, Notre Dame researchers expect to get a clearer view of the complex interplay of all

genes involved in particular diseases. They are attempting to determine how these coagulation proteins function in a living organism; if the cells have some backup mechanism for clotting and clot dissolving; and if there are other processes within the animal, such as inflammation, atherogenesis (production of degenerative changes in arterial walls), tumorigenesis (production of tumors), and metastasis (the spread of malignant tumors), for example, that are affected as well.

## Kellogg Institute for International Studies

*Acting Director:*

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The Helen Kellogg Institute for International Studies promotes comparative international studies. Each year, Kellogg hosts about 15 residential visiting fellows and guest scholars from the United States and abroad. The institute also comprises some 60 Kellogg fellows, all of whom are Notre Dame faculty members, coming from 13 departments. It awards individual support for research to faculty and graduate students, and internships and grants to undergraduates. In support of intellectual exchange, Kellogg schedules a twice-weekly speaker series, conferences, round tables, current affairs panels and cultural events, and it disseminates research through publications. Through these activities, Kellogg fosters interdisciplinary research on contemporary political, economic, social, and religious issues in international affairs.

The institute emphasizes five major themes: democratization and the quality of democracy; growth and development; public policies for social justice; religion and the Catholic Church; and, social movements and organized civil society.

The institute promotes research that is germane to major issues in the contemporary world, and its research on democracy attracts worldwide attention. Similarly, Kellogg's research on public policies seeks to influence not only academic debates but also public policy discussions.

Kellogg researchers place special emphasis on Latin America, reflecting both the region's importance to the United States and Notre Dame's longstanding ties there. Despite its prominence on the institute's research agenda, Latin America does not command exclusive attention. Over time, Kellogg has fostered a growing range of research on other regions of the world while retaining the Latin American emphasis for which it is best known. Researchers at the institute seek thematic comparisons with Europe, Asia, and Africa.

From the outset, the institute has attempted to build bridges in innovative ways between the United States and Latin America and other regions, actively seeking balanced participation between its U.S. and foreign scholars. The institute collaborates with foreign social science centers in joint research projects and sponsors a continual interchange of ideas with scholars from Latin America and the world over.

Working groups provide a forum for thematically focused discussion amongst fellows, visitors, outside speakers, graduate students, and the University community. These groups provide an opportunity for scholars to define and explore emerging research themes, shape the field of comparative international study, and even influence public policy choices.

### *Research Support for Graduate Students*

Kellogg plays an active role in support of graduate training without awarding degrees itself.

The institute encourages graduate student involvement in research projects, working groups, and in its seminars and lectures. Many graduate students work as teaching assistants to professors who teach undergraduate courses. Regular interaction with Kellogg fellows, visiting fellows, and international conference participants keeps students abreast of international developments and the latest research trends. Kellogg recently established a student and faculty exchange program in Brazil focused on social entrepreneurship with the University of São Paulo (USP), the Pontifical Catholic University of Rio de Janeiro (PUC-Rio), and Harvard University.

Kellogg supplements departmental fellowships to attract Ph.D. students from Latin America, awarding a stipend of \$5,000 for each of five years to outstanding candidates.

Financial assistance to other graduate students includes Foreign Language and Area

Studies (FLAS) fellowship, pre-dissertation travel awards, seed money grants, and dissertation fellowships to support various stages of field research or the writing of doctoral dissertations. These grants have funded initial research in many countries and have helped graduate students to obtain external support at a later date. The winners of these competitive awards in 2002 included doctoral candidates working on topics such as policy making in Lithuania and Ukraine, Catholic revival in a Chinese village, and economic reform in Latin American democracies.

For more information about dissertation fellowships and seed money grants for Notre Dame graduate students or about the supplemental fellowships for graduate students from Latin America, please contact Academic Coordinator Holly Rivers at (574) 631-6023 or [hrrivers@nd.edu](mailto:hrrivers@nd.edu). For FLAS and KI/Tinker award information, contact Assistant Program Manager Thayne Cockrum, at (574) 631-8523 or [tcockrum@nd.edu](mailto:tcockrum@nd.edu). Also, see our Web site under Grants/Fellowships and Research.

The Kellogg/Kroc Information Center (<http://www.nd.edu/~kic>) maintains a small collection focused on current events, including working papers, newsletters, and reference sources. Access to numerous electronic resources, including indices and full-text databases, is also available through the center.

## Keough Institute for Irish Studies

*Director:*

Christopher B. Fox, *Professor of English*

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The Keough Institute for Irish Studies is an interdisciplinary project devoted to teaching and research in Irish culture, primarily in the English and Irish languages, and in all its internal and external relations. These relations include not only specific connections and comparisons with other cultures, but also recognitions, at both theoretical and empirical levels, of the various ways in which this field of study can be organized and illuminated in the light of contemporary theory. Ireland has an extraordinary tradition in literature (in both the Irish and English languages), a unique historical position in relation to British and European historical development,

and an influence, disproportionate to its size, on the history of the United States.

On the Notre Dame campus, the Keough Institute hosts major conferences, which have included special conferences on the Famine and on the Great Irish Rebellion of 1798, cosponsored by the Irish government; a conference entitled "Partition and Memory: Ireland, India and Palestine," cosponsored by the United States Institute for Peace; the American Society for Eighteenth-Century Studies; and North American Celtic Studies Association national meetings. In April 2005, the institute will host the national meeting of the American Conference of Irish Studies.

Graduate students in Irish studies are encouraged to participate in the regular bi-weekly faculty-graduate on-campus seminar series and in graduate workshops. Recent speakers have included Benedict Anderson, Ciaran Carson, Elizabeth Cullingford, David W. Miller, Seamus Deane, John McGahern, Katie Trumpener, Marjorie Howe and David Lloyd.

The month-long Irish Seminar is held in Dublin, Ireland, every summer at the Notre Dame Keough Centre in Newman House. The Irish Seminar attracts participants from universities worldwide to participate in discussion and debate with major figures, including recent guests Seamus Heaney, Nuala Ó Faoláin, Stephen Rea and Edward Said.

Funded opportunities allow students to participate in the Irish Seminar or advance their knowledge of Irish by studying in a joint program at the National University of Ireland (NUI)-Galway.

The core faculty in Irish studies at Notre Dame includes members of the departments of English, history, and classics. The core faculty is also regularly supplemented by visiting scholars who come as fellows of the Keough Institute. Recent visiting professors have included Thomas Bartlett of University College Dublin, Ciaran Brady of Trinity College Dublin, Joseph Cleary of St. Patrick's College-NUI, Terry Eagleton of Oxford University, Maud Ellman of Cambridge University, John Kelly of Oxford University and Margaret O'Callahan of Queen's University Belfast. Through the National Endowment for the Humanities, the Keough Institute also awards an annual fellowship to a visiting scholar to concentrate on research and writing while in residence.

The University's Hesburgh Library sustains advanced research in all areas of Irish Studies. Its rare special collections include the A. A. Luce Berkeley Collection, the William B. Todd Burke Collection, the 1798 Irish Rebellion and Act of Union Collection, the Grattan Collection of Irish Pamphlets, the O'Neill Collection of Irish Music, the Keough Vienken Collection of Swift, the David J. Butler Collection of Irish Maps, collections relating to eighteenth-century drama, the Abbey Theatre and the Cuala Press, and the massive Herbert Allen Keough Eighteenth-Century Microfilm Collection with over 200,000 eighteenth-century books, broadsides and other printed materials. Recent acquisitions include major collections in Irish language materials, the Goldsmith Kress Collection in Economic Literature and, through the new Irish Fiction Initiative and Smurfit Fund, the Loeber Collection of Irish Fiction. Containing many rare eighteenth- and nineteenth-century works, the Loeber collection is the most comprehensive collection of Irish fiction in the world. Through major funding from the National Endowment for the Humanities and the ongoing Medieval Literature Initiative, the Notre Dame Medieval Institute in the Hesburgh Library also contains substantial collections that support Irish studies.

A graduate program in Irish language and literature may be pursued through the Ph.D. program in literature, and Irish studies through a doctoral program in English or history.

### **Joan B. Kroc Institute for International Peace Studies**

*Director:*

R. Scott Appleby, *the John M. Regan Jr. Director and Professor of History*

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The Kroc Institute is founded on the belief that peace is inseparable from the resolution of violent conflicts and the promotion of social justice and equitable development. This comprehensive understanding of peace is rooted in the Catholic social tradition, a broadly ecumenical tradition of moral wisdom that stresses the necessity for justice in bringing about peace.

The institute's mission embraces both the prevention of violence or war, sometimes called "negative peace," and the building of cooperative, just relations between people, or "positive peace." Among the many college and university programs in peace and conflict studies, the Kroc Institute is a leader in addressing the political, cultural, religious, social, and economic factors that lay the foundation for positive peace.

The institute pursues its mission through innovative, interdisciplinary educational programs on the graduate and undergraduate levels. To foster research on peace, the institute sponsors visiting fellows, working groups, conferences, and guest lectures by scholars, policymakers, and peace practitioners. The institute publishes a semiannual *Peace Colloquy*, a series of occasional papers, and policy briefs on current issues.

#### *Themes*

The Kroc Institute's educational and research programs are organized around four themes:

*The role of international norms and institutions in peacemaking.* Institute faculty and students search for ways to make intergovernmental organizations and other international institutions more effective and representative, and to increase compliance with fundamental norms of peace and human rights.

*The impact of religious, philosophical, and cultural influences on peace.* Through teaching and research, the institute explores the ethics of the use of force, the ways in which the world's religious traditions foment violence or encourage peace, the practice of nonviolence, the importance of philosophies of global justice, and the ingredients of cultures of peace.

*The dynamics of intergroup conflict and conflict transformation.* Students and faculty explore multidisciplinary understanding of the conditions that give rise to violent conflicts in order to identify local and international responses able to transform conflicts and encourage peacebuilding. All of the institute's conflict studies incorporate cross-cultural examination of key issues.

*The promotion of social, economic, and environmental justice.* Students and faculty interested in social change examine the role of individuals, nongovernmental organizations, commercial enterprises, and states, in sustainable economic development and respect for human rights, and conflict transformation.

With more than 300 alumni from 70 countries around the world, the Kroc network of Notre Dame peacemakers is beginning to exert a truly uplifting influence in many local communities, in transnational civil society, and in policymaking circles. Approximately half of the institute's graduates pursue further graduate education, either in their home countries or in doctoral or professional programs in the United States, before accepting employment in intergovernmental and non-governmental organizations or conducting peace research and education in academic institutions at home or worldwide. Graduates have also taken leadership roles in government agencies, church-sponsored international development and humanitarian projects, research institutes, and other peacemaking efforts around the globe.

For a description of the master of arts program in peace studies, please refer to the Division of Social Sciences section of this *Bulletin*.

### Medieval Institute

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*Director:*

Thomas F. X. Noble, *the Robert M. Conway Director of the Medieval Institute and Professor of History*

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The Medieval Institute, established in 1946, is a center of research and advanced instruction in the civilization of the Middle Ages, with particular strengths in religious and intellectual history, Mediterranean civilization, Old and Middle English, Medieval Latin, theology and philosophy, Dante studies, medieval musicology, and liturgy. The graduate studies curriculum combines programmatic interdisciplinary course work, training in the technical skills of medieval studies, and linguistic preparation.

The institute's library contains nearly 90,000 volumes and various collections of pamphlets, reprints, and photographic materials. The reference collection contains major primary source collections, bibliographic and reference materials, catalogs, journals, and indexes.

The institute's library has long held extensive collections relevant to the Latin culture of the Middle Ages. Holdings in the history of medieval education are unrivalled in North America. Recently, the institute has enlarged its focus to include vernacular and Latin literatures, musicology, liturgy, medieval Judaism and Islam, and art history. Microfilms of more than 3,000 medieval manuscripts from European libraries and a collection of more than 200 facsimiles of medieval seals supplement this collection. Over the years, the institute has accumulated a valuable collection of medieval manuscripts, incunabula, and other manuscripts and rare books that are preserved in the Department of Special Collections. Also found there is the John Augustus Zahm, C.S.C., Dante Collection containing early and rare editions and an extensive and valuable set of literary studies of the Divine Comedy from the 19th and early 20th centuries. Recently, the institute acquired 90 medieval coins, likewise housed in Special Collections.

What sets Notre Dame's institute apart is its convenient gathering in one place of most of the printed materials essential to medieval studies. The Reading Room holds major dictionaries, bibliographical guides, reference works, and primary source collections. The Astrik L. Gabriel Universities Collection in a separate room offers remarkable resources, both published and unpublished, about the history of medieval universities. Another room, equipped with faculty and study carrels, holds a large collection of manuscript catalogs and materials pertinent to paleography, diplomatics, and early printed books.

Research in the institute is also supported by the University's Milton V. Anastos Collection in Byzantine Studies, which has extraordinary holdings in the intellectual history of the Byzantine Empire.

The Frank M. Folsom Ambrosiana Microfilm and Photographic Collection consists of microfilms of the 12,000 medieval and Renaissance manuscripts held in the Biblioteca Ambrosiana in Milan. The collection also contains about 50,000 photographs and negatives of miniatures and illuminated initials from the manuscripts, supplemented by some 15,000 color slides. The Mary Davis Drawings Collection contains photographs, negatives, and color slides of the 8,000 drawings in the Ambrosiana. The institute purchases all volumes related to the Ambrosiana materials and maintains a bibliography of all citations to Ambrosiana manuscripts.

The institute sponsors conferences, colloquia, and research seminars. Each year, there are a variety of guest lectures and compact seminars. In 2002, the institute inaugurated the Conway Lectures, an annual series of three lectures delivered by a distinguished medievalist and published under institute auspices.

For a description of the Master of Medieval Studies and Doctor of Philosophy programs in medieval studies, please refer to the Division of Humanities section of this *Bulletin*.

### Nanovic Institute for European Studies

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*Director:*

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The Nanovic Institute has been at the intellectual crossroads of European studies at Notre Dame since its founding in 1993. The institute has particular interest in the ideas, institutions, and values that have shaped the European experience over the past two centuries. Through grants and program support, the institute seeks to bring together faculty and students with interests in both the humanities and the social sciences. By focusing on issues of importance to Europeans today—the nation-state and beyond, liberalism and its critics, secularism in the contemporary world, and the ongoing crisis of modernity—the Nanovic Institute provides an interdisciplinary home for fields of inquiry as wide-ranging as theology, politics, philosophy, literature, history, and the arts.

The Nanovic Institute's many faculty fellows organize campus events (including conferences, lectures, and film series) to promote European studies at Notre Dame. Comprehensive grant programs for students and faculty support research and teaching. The institute directly involved in Notre Dame's growing activities in Europe and the University's mission in this crucial region of the world.

## Radiation Laboratory

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### Director:

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The Radiation Laboratory is a University institute and a government-owned facility of the U.S. Department of Energy, a member of the network of national laboratories spread across the country. The mission of the laboratory is to study chemical reactions initiated by light or ionizing radiation. Such studies provide the fundamental underpinnings for energy science and technology development in areas as diverse as solar energy conversion, nuclear energy, and environmental management. Because of its broad applicability, research in the laboratory is frequently the subject of interdisciplinary projects involving faculty and students in various areas of science and engineering.

The Radiation Laboratory's research programs are principally conducted by members of the University's faculty aided by students of all levels, postdoctoral fellows, and visiting scholars from around the world. Several members of the laboratory faculty are also professors in academic departments. Scientists at the Radiation Laboratory conduct research in collaboration with faculty members. Graduate students are accepted as members of the laboratory on recommendation by their faculty and Radiation Laboratory research advisers. Graduate students frequently are supported financially by Radiation Laboratory research fellowships during the development of their doctoral dissertations.

The Radiation Laboratory operates from its own building that houses many special facilities developed for the study of the effects of light and radiation. Three electron accelerators are housed in underground vaults adjacent to the main laboratory building. These accelerators include an 8-million-electron-volt (MeV) linear accelerator used to study chemical and physical processes occurring at nanosecond or longer times; a 2 MeV Van de Graaff accelerator used in studies of Raman spectroscopy of short-lived radicals and electronically excited molecules; and a 3 MeV Van de Graaff dedicated to studies of electron spin resonance of intermediates produced during radiation chemical processes. In

addition, the laboratory has three cobalt sources ( $^{60}\text{Co}$ ) for irradiation rated at sixteen, four, and one kilocuries.

Studies with visible and ultraviolet light are carried out using many different types of light sources. These include several nitrogen lasers, dye lasers, excimer lasers, and high-intensity YAG lasers capable of producing light pulses as short as  $10^{-11}$  sec, for irradiation in the visible and ultraviolet regions. Facilities are available for study of radiation processes at high pressures and very low temperatures. Analytical facilities include various types of spectrophotometers, electron-spin-resonance (ESR) spectrometers, a Raman spectrograph for time-resolved studies, high-resolution Raman spectrograph/microscope, spectrofluorimeter and fluorescence lifetime apparatus, gas and liquid chromatographs, capillary electrophoresis, an ion chromatograph, a mass spectrometer, a differential scanning calorimeter, a Fourier-transform infrared spectrometer, light-scattering and electrochemical apparatus, and other similar types of equipment. A state-of-the-art Atomic Force Microscope operates in the laboratory to characterize materials on the nanometer scale and near-field-scanning microscopy capabilities are currently under development. A transmission electron microscope is also available at the Rad Lab. Computer facilities support research programs in theoretical chemistry and kinetic modeling. The laboratory operates its own glass, electronics, graphics, and machine shops.

The Radiation Laboratory is home to the Radiation Chemistry Data Center, which provides the international scientific, engineering, and industrial communities with bibliographic and numeric databases on topics of importance to the fundamentals of energy generation and environmental management.

## John J. Reilly Center for Science, Technology, and Values

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### Director:

Gerald P. McKenny, *Associate Professor of Theology*

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The John J. Reilly Center for Science, Technology, and Values is committed to advancing the understanding of science and technology

as human, knowledge-producing endeavors, and the variety of ways these rapidly changing institutions have an impact upon and are affected by society at large.

In keeping with the University's mission as a preeminent Catholic university, the center seeks to make a distinctive contribution to the humanistic understanding of science and technology. It supports outstanding scholarship in the fields of science and technology studies. Through conferences and publications emphasizing the complementary roles of scientific, technological, ethical, and theological perspectives, it facilitates broad public dissemination of outstanding work reflecting these viewpoints. Within the Notre Dame community, the center endeavors to foster a greater awareness of the significance and complexity of interactions among science, technology, and society.

Activities pursued at the center fall under the headings of academic programs and research (including support of conferences and publications).

### Academic Programs

The Reilly Center provides administrative support and a campus "home base" for three very different educational programs:

The *Graduate Program in History and Philosophy of Science* (HPS), established in 1989, offers courses of study leading to both the M.A. and Ph.D. degrees. It provides advanced training primarily for students intent on a career of teaching and scholarship at the college and university level. The program relies on the expertise of more than 20 faculty representing six University departments, making it one of the larger research groups in this field in the United States.

The undergraduate *Minor Program in Science, Technology, and Values* (STV) is available to all undergraduates at the University regardless of their major field of study. Courses are organized around such themes as technology and public policy, history and philosophy of medicine, science and religion, environmental science and ethics, biotechnology and society, and medical ethics.

The *Five-Year, Double Degree Program in Arts and Letters/Engineering* enables students to earn two undergraduate degrees in 10 semesters of course work. It provides a select group of students the opportunity to combine the values of an intensive liberal arts education

with their professional training in engineering.

### **Research: Conferences, Lectures, and Publications**

The center regularly brings to campus distinguished speakers to lecture on topics relevant to the interests of students and faculty involved in all of its academic programs. This includes a major speaker series in the History and Philosophy of Science (HPS), bringing to campus eight or more well-known scholars every year. The center also sponsors activities and lectures specifically devoted to applied science and technology and to their social and ethical implications. Issues pertaining to risk assessment, the environmental crisis, current issues in biotechnology, medical ethics, and science and religion have all been the subject of lectures or panel discussions recently, as have computer ethics and nuclear weapons control.

Over the years, the Reilly Center and HPS Program have cosponsored several major academic conferences. The most recent events have included "The Need for a New Economics of Science," which examined the changing economic relations of science and funded research; a major international conference held on "Galileo and the Church;" and a joint conference on science and values, cosponsored by the HPS programs at Notre Dame and the University of Bielefeld (Germany). Proceedings of major conferences are made available as volumes in the series *Studies in Science and the Humanities from the Reilly Center*, published through the University of Notre Dame Press. In addition, smaller conferences are sponsored on an occasional basis.

### **South Bend Center for Medical Education**

#### *Acting Director:*

John F. O'Malley, *Adjunct Associate Professor of Biological Sciences*

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The South Bend Center for Medical Education is one of eight centers for medical education in the Indiana University Medical School system. The center offers the first- and second-year program in medicine and participates in programs leading to a master's and

a doctoral degree in biomedically oriented sciences in conjunction with the Notre Dame Graduate School.

Although all students in the center's programs are registered in the University of Notre Dame, admission to the medical program is a function of the Indiana University Medical School, and applications should be directed to its admissions office. Admission to biomedical graduate programs is a joint function of the center and the several cooperating departments of the Graduate School. Application for these programs should be made to the Office of Graduate Admissions.

At present, biomedically oriented graduate programs in which the center plays a conspicuous role are offered in the areas of human anatomy, human physiology, and neuroscience. The student's major adviser for these programs is chosen from the center faculty, and the student's committee is composed of faculty from the center and the appropriate graduate departments.

A unique M.D./Ph.D. program is available to outstanding students. These students are admitted simultaneously to the Indiana University School of Medicine and the University of Notre Dame Graduate School. The M.D./Ph.D. program is described in the Division of Science section of this *Bulletin*.

Students interested in this program should contact the office of the director, South Bend Center for Medical Education. Other graduate students may take courses in the center subject to approval of the course instructor, the center director, and the home department of the student, and subject to the availability of space in the desired course.

### **Walther Cancer Research Center**

#### *Director:*

Rudolph M. Navari, M.D.,  
*Associate Dean, College of Science*

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The Walther Cancer Research Center is a collaboration between the University of Notre Dame and the Walther Cancer Institute, a private nonprofit research organization affiliated with major universities and medical

institutions. The Walther Cancer Center's activities include a wide variety of specific areas including cell biology, biochemistry, drug design, clinical oncology, and patient care. The center emphasizes collaboration and communication among its members in order to maximize the transfer of information between the laboratory and the clinic.

The specific objectives of the research center at the University involve four major areas of investigation: the molecular biology and gene targeting program, the cell biology and cell signaling program, drug design and development, and clinical oncology.

The molecular biology and gene targeting program utilizes transgene technology to develop mice with either delayed expression or expression of mutated forms of proteins. These technologies permit the study of the relative contribution of components of the coagulation and fibrinolytic systems in various stages of cancer and methods to potentially identify new therapeutic regimens.

The cell biology and cell signaling program studies the mechanisms and regulation of cell proliferation, cell motility, angiogenesis, apoptosis, and transformation. Using a variety of cancer cell culture systems and techniques, an *in vitro* assessment of cell proliferation, cell death, invasion, and migration is carried out with an emphasis on the biology of hormone-dependent cancers, experimental therapeutics, and hormone resistance.

The drug design and development program investigates the synthesis and the structural details of various potential chemotherapeutic agents as well as their interaction with biological receptors at the molecular level. The structural characterization is accomplished using high-field nuclear magnetic resonance mass spectroscopy and X-ray crystallographic techniques.

The clinical oncology program studies the doctor-patient relationship with the goal of improving communication in the areas of truth telling, confidentiality, informed consent, decision making, and end-of-life care. Current studies include the development of an educational intervention for patients with a new cancer diagnosis, the development of new antiemetics, antibiotic use in hospice care, and palliative care.

The 21 faculty in the Walther Cancer Center are members of the departments of biological sciences and chemistry and biochemistry.



# The School of Architecture

## *Chair:*

Michael Lykoudis

## *Director of Graduate Studies:*

Norman Crowe

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Location: 110 Bond Hall

E-mail: crowe.2@nd.edu

Web: <http://www.nd.edu/~arch>

## **The Program of Studies**

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The School of Architecture offers graduate programs for the master of architecture professional degree and the master of architectural design and urbanism postprofessional degree. The two available areas of concentration, the N.A.A.B. accredited professional degree and the postprofessional degree, are both four semesters in duration.

### *Traditional and Classical Architecture: Professional Degree and Postprofessional Degree*

This concentration is intended for students entering the University of Notre Dame with a four-year preprofessional degree in architecture and seeking a professional graduate degree. It is also open to students who hold a five-year degree and wish to study within the classical discipline.

The theoretical direction of the curriculum is rooted in a world-view based on the principles of classical architecture. The intent is to foster an orientation to design that is based on tradition, is classical in spirit and form, and is responsive to the exigencies of contemporary practice.

Course work begins with an intensive study of design, theory, and elements of classical architecture. The second semester is spent in residence at the University of Notre Dame's Rome Studies Center in the Centro Storico, where the student engages in design, history, and theory courses focused on the Rome context. The final two semesters are spent on the Notre Dame campus. Three studios are offered, providing the student with opportunities to design in a variety of scales and contexts in which contemporary architectural

issues are explored. The course of studies culminates in a thesis that synthesizes the student's design experience.

### *Urban Design: Postprofessional Degree*

This concentration is intended for students entering the University of Notre Dame with a professional degree in architecture.

The goal of the postprofessional degree is to develop design and critical thinking skills to address architecturally the problems confronting contemporary cities. The theoretical direction of this concentration is based on the paradigms of traditional European and American cities. The student is compelled to address design strategies based on an awareness of the complexity of scales and contexts within which the city's historical developments unfold. The issues range from environmental concerns and the size of a city, to the city's composition consisting of quarters, squares, streets, and blocks, to the balance of the architecture of the public and private realms.

Course work begins with an intensive study of the traditional city's morphology and architecture. The second semester is spent in residence at the University of Notre Dame's Rome Studies Center in the Centro Storico, engaging in design, urban history, and theory. Paralleling the first concentration, three studios are offered. These provide the student with opportunities to design in a variety of scales and contexts in which contemporary issues of architecture and the city are explored. The course of studies culminates in a thesis that synthesizes the student's design experience.

### *Degree Requirements*

Degree requirements include three course components that are applicable to both concentrations: advanced architectural design, theory classes and approved electives, and thesis preparation and direction, for a total of 39 credit hours. (Total number of credit hours for the professional degree varies, depending on the candidate's undergraduate degree.) Advanced architectural design consists of two six-credit-hour studios. Theory classes consist

of four three-credit-hour seminars. Thesis preparation and direction consists of a thesis preparation course and a six-credit-hour studio where candidates explore special areas of design and research within the framework of the program. The thesis is developed under the direction of a specific faculty member whose expertise and interests coincide with the candidate's proposal. Approval of all thesis proposals is made by the graduate studies committee.

In both concentrations, selection of specific courses is tailored to each candidate in response to the candidate's interests and undergraduate experience.

### *Application*

In addition to the Graduate School's requirements for application, the following documents are to be submitted with the regular application material:

- Letters of Recommendation—for those applicants with practice experience in architecture, a minimum of one letter of recommendation from a registered practicing architect is required in addition to the references required by the Graduate School.
- Portfolio—all applicants must submit a portfolio of their work from academic experience, from independent projects, and/or from practice. The portfolio size should be a maximum 11 x 14 inches and should include only reproductions, not originals.

A visit to the campus and a personal interview are encouraged. The School of Architecture's graduate studies committee conducts interviews.

Completed applications and all admission requirements except the portfolio should be directed to the Office of Graduate Admissions. Portfolios only (with self-addressed return package and sufficient return postage if return of portfolio is desired) should be directed to: Graduate Studies Committee, School of Architecture, University of Notre Dame, 110 Bond Hall, Notre Dame, IN 46556-5652.

### Financial Support

Candidates in the program receive financial support in the form of full tuition scholarships and stipends in the form of graduate assistantships and fellowships including the Bond-Montedonico Fellowship program, the Joseph Z. Burgee and Joseph Z. Burgee Jr. Fellowship program, the James A. Nolen Jr. Fellowship, and the Joseph M. and Virginia L. Corasaniti Architecture Fellowship. Teaching or research requirements for students receiving stipends comprise a minimum of three out of four semesters, 15 hours per week, during the academic semester.

### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

### Required Courses

#### 643. *Advanced Architectural Design I* (0-8-6) Pajares

Introduction to classical design principles and to principles of traditional urbanism. Projects involve drawing the orders, their application to architecture, and the creation of traditional urbanism in the context of existing American settings. (Fall)

#### 644. *Advanced Architectural Design II (Rome)* (0-8-6) Staff

Designing in the context of the traditional European city. Projects involve both architectural design and urbanism. (Spring)

#### 645. *Thesis Preparation and Design*

(3-0-3) Crowe, Lykoudis, Marcantonio, Stroik

Preparatory analyses, precedents, and data required to begin design thesis. (Fall)

#### 646. *Design Thesis*

(6-0-6) Staff

Culminating design studio in the master's program. Students individually select their thesis and thesis director. Thesis is defended and presented to faculty and student body in a final review. (Spring)

#### 647. *Thesis Prep II*

(3-0-3) Crowe

Fundamentals of design thesis, including organization of material, research methods and procedures, and formation of theoretical argument and relationship to the design process. (Fall)

#### 692. *Roman Urbanism and Architecture II (Rome)*

(3-0-3) Staff

The urban and architectural history of Rome within the context of the social and political factors that brought it about. (Spring)

#### 693. *Architectural Theory I*

(3-0-3) Westfall

This course reviews, through lectures, discussions, analysis of assigned texts, and the writing of research papers, the intersection of the religious, civil, architectural, and urban characteristics of the built world within the Western tradition. (Fall)

#### 693A. *Architectural Theory II*

(3-0-3) Deupi

This seminar explores the philosophical, historical, and literary background of traditional architecture by probing within the domain of architectural theory through a careful reading of primary sources, including Vitruvius, Abbot Suger, Alberti, Serlio, Palladio, Vignola, Claude Perrault, etc. (Fall)

#### 693B. *Architectural Theory III*

(3-0-3) Economakis

A survey of contemporary traditional architecture and urbanism, including works by Raymond Erith, Hasan Fathy, Pierre Barbe, Demetri Pikionis, Leon Krier, and Demetri Porphyrios, and concluding with the most recent events, building, and urban developments. Emphasis will be given to works that exemplify the urban, constructional, and formal principles of contemporary traditional architecture. (Spring)

#### 693C. *Architectural Theory IV (Rome)*

(3-0-3) Younés

The purpose of this seminar is to reflect on some of the most distinctive issues in architectural theory needed by contemporary classicists. The selected topics will cover the following: the reading of history, architecture and ontology, architecture and technique, aesthetics of architecture, imitation and invention, character and style, politics and the polis, classicism and pluralism, architecture and language, and nature and the man-made. (Spring)

#### 698A. *Special Studies (Rome)*

(V-V-V) Younés

The graduate studies seminar in Rome concerns topics in theory and history that pertain to Rome's urbanism and architecture. Topics are either chosen by the student in consultation with the faculty, or assigned by the faculty. Students are encouraged to choose topics not usually covered in studio and other seminars. The requirements are a notebook and term paper. (Spring)

### Faculty

Robert L. Amico, *Professor*. B.Arch., Univ. of Illinois, 1961; M.Arch., Harvard Univ., 1965. (1978)

Robert Brandt, *Professional Specialist*. B.S., Univ. of Southern Indiana, 1986; M.F.A., Indiana State Univ., 1989. (1992)

Rev. Richard S. Bullene, C.S.C., *Associate Professional Specialist*. B.S., Univ. of Notre Dame, 1976; M.S., Univ. of Pennsylvania, 1992; Ph.D., *ibid.*, 1994. (1993)

Braulio Casas, *Visiting Assistant Professor*. B.Arch., Univ. of Notre Dame, 1994; M.Arch., *ibid.*, 1996. (2002)

Norman A. Crowe, *Professor and Director of Graduate Studies*. B.Arch., Univ. of Oregon, 1964; M.Arch., Cornell Univ., 1970. (1974)

Alan Defrees, *Associate Professional Specialist*. B.S., Univ. of Notre Dame, 1974. (1996)

Victor Deupi, *Assistant Professor*. B.S., Arch., Univ. of Virginia, 1986; M.Arch., Yale Univ., 1989; Ph.D.Arch., Univ. of Pennsylvania, 1999. (1999)

Dennis P. Doordan, *Professor of Architecture and Chair and Concurrent Professor of Art, Art History, and Design*. B.A., Stanford Univ., 1973; M.A., Columbia Univ., 1976; M.Phil., *ibid.*, 1978; Ph.D., *ibid.*, 1983. (1990)

Richard Economakis, *Associate Professor*. B.Arch., Cornell Univ., 1983; M.A., *ibid.*, 1996. (1996)

Barbara Kenda, *Assistant Professor*. B.Arch., Univ. of Ljubljana, 1989; M.Arch., Cornell Univ., 1992; M.S., Univ. of Pennsylvania, 1995; Ph.D.Arch., *ibid.*, 1998. (2000)

Michael N. Lykoudis, *Chair and Professor*. B.Arch., Cornell Univ., 1979; M.Arch., Univ. of Illinois, 1983. (1991)

Dino Marcantonio, *Assistant Professor*. B.A., Univ. of Toronto, 1990; M.Arch., Univ. of Virginia, 1993. (1999)

Ettore Maria Mazzola, *Visiting Assistant Professor*. Dipl. di Laurea, Univ. degli Studi, La Sapienza, Roma, 1992. (2001)

Michael Mesko, *Visiting Assistant Professor*. B.Arch., Univ. of Notre Dame, 1996; M.Arch., *ibid.*, 1998. (2002)

Paloma Pajares, *Associate Professor*. T.deA., Politécnica de Madrid, 1987; M.Arch., Yale, 1989; Ph.D., Politécnica de Madrid, 1997. (2000)

Thomas Gordon Smith, *Professor*. B.A., Univ. of California, Berkeley, 1970; M.Arch., *ibid.*, 1975. (1989)

John Stamper, *Associate Professor*. B.S., Univ. of Illinois, 1973; M.A., *ibid.*, 1975; M.A., Williams College, 1977; Ph.D., Northwestern Univ., 1985. (1984)

Duncan G. Stroik, *Associate Professor*. B.S.Arch., Univ. of Virginia, 1984; M.Arch., Yale Univ., 1987. (1990)

Carroll William Westfall, *the Frank Montana Professor*. B.A., Univ. of California, Berkeley, 1961; M.A., Univ. of Manchester, England, 1963; Ph.D., Columbia Univ., 1967. (1998)

Samir Younés, *Director of the Rome Studies Center and Associate Professor*. B.Arch., Univ. of Texas, 1981; M.Arch., *ibid.*, 1984. (1991)

# The Division of Engineering

Five departments in the Division of Engineering offer program opportunities to qualified graduate students for advanced instruction and research leading to the degrees of master of science and doctor of philosophy. The graduate program strikes a balance between basic science and engineering application, theory and experiment, and scholarly achievement and professional development. The division has attracted scholars—faculty, postdocs and students—with interests encompassing a wide range of modern computer science, geological sciences, and engineering theory and practice.

Through its program of sponsored research, the division enhances the opportunities available to its faculty and graduate students to conduct research in their areas of interest. Responding to the requirements of an increasingly complex and interrelated social context, the division has developed a number of interdisciplinary programs of advanced teaching and research. Some of these programs are in collaboration with faculty members of other divisions and institutes within the University, while others involve cooperative efforts with professional colleagues from outside organizations. (<http://www.nd.edu/~engineer/graduate/grad.html>)

## Aerospace and Mechanical Engineering

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### *Chair:*

Stephen M. Batill

### *Director of Graduate Studies:*

Thomas C. Corke

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Location: 365 Fitzpatrick Hall

E-mail: [amedept@nd.edu](mailto:amedept@nd.edu)

Web: <http://www.nd.edu/~ame>

### *The Program of Studies*

The Department of Aerospace and Mechanical Engineering offers graduate programs of study and research leading to the degrees of master of science in aerospace engineering, master of science in mechanical engineering, and master of engineering in mechanical engineering, as well as doctor of philosophy. In addition, a combination master of engineering/juris doctor degree program is available only to Notre Dame law students.

For those students seeking a master's degree, the programs aim at proficiency and creative talent in the application of basic and engineering sciences to relevant problems in the two engineering disciplines. The doctoral program strives to prepare students for creative and productive scholarship. It is designed to suit each student's interests and gives students the opportunity to conduct individual theoretical and/or experimental research under the supervision of the department faculty.

Students in either the master's degree or the doctoral degree programs must satisfy departmental and University course requirements along with the residence requirement.

Every degree-seeking student is required to participate in the academic programs of the department by performing a teaching-related assignment.

Current research efforts are within the areas of aerospace sciences, biomechanics and biomaterials, mechanical systems and design, solid mechanics and materials, and thermal and fluid sciences.

### *Aerospace Sciences*

The aerospace sciences area emphasizes both the theoretical and the experimental aspects of aeroacoustics, aero-optics, aerospace systems design, high-lift aerodynamics, low Reynolds-number aerodynamics, low speed aerodynamics, particle dynamics, flow control, transonic, supersonic and hypersonic flows, and vortex aerodynamics.

### *Biomechanics and Biomaterials*

The biomechanics and biomaterials area offers opportunities for both basic and applied research using both experimental and computational techniques. Research focuses on the design and manufacture of next-generation orthopaedic devices, biological material characterization, the design, synthesis, and characterization of novel biomaterials, biocompatibility, tribology, surgical simulation, human body kinematics, and computational modeling of biomechanical systems. Collaborative research efforts are maintained with

industrial partners and the Departments of Biological Sciences, Chemical Engineering, and Computer Science and Engineering.

### *Mechanical Systems and Design*

Research in this area is in both the theoretical and the experimental aspects of computer-aided design and manufacturing, design for manufacturing, design optimization, model-based design, reliability, dynamic and control systems, mechanism and machine theory, robotics, and tribology.

### *Solid Mechanics and Materials*

Research in this area focuses on the theoretical, experimental, and computational aspects of coupled field phenomena in continuum mechanics, cyclic plasticity, damage mechanics, dynamic deformation and fracture, fatigue crack initiation, fracture analysis of aircraft structures, high temperature fatigue of engineering alloys, inelastic buckling, interface fracture mechanics, modeling of composite and fused deposition polymeric materials, and structural stability.

### *Thermal and Fluid Sciences*

Experimental and theoretical research in this area is conducted in boundary layer phenomena, chaos in fluid systems, computational fluid mechanics, detonation theory, droplet sprays, fire research, fluid-structure interaction, flow control, food processing technology, hydronics, hydrodynamic stability, industrial energy conservation, microfluid mechanics, molecular dynamics, multiphase and buoyant flows, reacting flows, turbulent flows, and solidification of liquid metals.

In cooperation with the Department of Civil Engineering and Geological Sciences, the Department of Aerospace and Mechanical Engineering offers an interdisciplinary program of study and research in the areas of solid, continuum, and structural mechanics. Courses in these subject areas listed by each department are cross-listed and are offered jointly. Students pursuing research in the areas of biomaterials and biomechanics may take selected courses offered by the Department of Chemical Engineering.

### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

#### 520. *Introduction to Aeroelasticity* (3-0-3) Staff

*Prerequisite:* Consent of instructor. Aerodynamic loadings, steady state aeroelastic problems, flutter analysis under various flow conditions, analytical methods in aeroelasticity demonstrated by selected problems. (As needed)

#### 521. *Numerical Methods* (3-0-3) Paolucci

Interpolation, differentiation, integration, initial value and boundary value problems for ordinary differential equations; solution methods for parabolic, hyperbolic, and elliptic partial differential equations; applications to classical and current research problems in engineering and science. (Every fall)

#### 530. *Physical Gas Dynamics* (3-0-3) Jumper

An introduction to quantum mechanics, internal structure, and quantum energy states of monatomic and diatomic gases. Application to chemical reactions, dissociating gases, and ionized gases. High temperature properties of air. (Alternate spring semesters)

#### 538. *Intermediate Fluid Mechanics* (3-0-3) Staff

*Prerequisites:* Elementary fluid mechanics, differential equations. Derivation of governing equations of mass, momentum, and energy for a viscous, compressible fluid; general survey of vortex dynamics, potential flow, viscous flow, and compressible flow. (Every fall)

#### 541. *Advanced Kinematics* (3-0-3) Stanisic

An in-depth study of the curvature theory of planar one and two degree-of-freedom motions. Applications to synthesis of mechanisms and control of manipulators. Introduction to spatial kinematics and screw theory. (Every spring)

#### 542. *Advanced Mechanical Behavior of Materials* (3-0-3) Staff

*Prerequisite:* Consent of instructor. Description of the mechanical behavior of metals, polymers, composites, ceramics, and glass, and characterization of the relationships between macroscopic deformation and fracture behavior of solids and meso/micro- and atomic-level mechanisms and models.

#### 544. *Optimum Design of Mechanical Elements* (3-0-3) Renaud

Introduction to basic optimization techniques for mechanical design problems. Current applications. (Every spring)

#### 545. *Intermediate Heat Transfer* (3-0-3) Staff

Fundamentals of heat convection and radiation, scaling and heat transfer analysis in external and internal flows, turbulent heat transfer, thermal radiation properties of ideal and real surfaces, radiative transfer in black and gray enclosures, introduction to radiative transfer with participating media. (Every spring)

#### 550. *Advanced Control Systems* (3-0-3) Goodwine, Skaar

*Prerequisites:* ME 437 or equivalent. The application of techniques such as the phase-plane method, Lyapunov method, vector-format method, the z-transform method, and statistical methods to the design of control systems. (Alternate years)

#### 551. *Advanced Vehicle Dynamics* (3-0-3) Nelson

*Prerequisites:* AERO 444 or ME 335, ME 437 or equivalent. The equations of motion of a rigid airplane are developed and analyzed. The relationship between aerodynamic stability derivatives, vehicle motion, and handling qualities is presented. Also classical and modern control theory is applied to the design of automatic flight control systems. (Alternate years)

#### 552. *Mathematical Theory of Robotic Manipulation*

(3-0-3) Goodwine  
*Prerequisite:* AME 469 or equivalent. Homogeneous representation of rigid motion in  $R^3$ , exponential coordinates for rigid motions, twists and screws, spatial and body velocities, and adjoint representation for coordinate transformations. Manipulator kinematics via the product of exponentials formulation, inverse kinematics, Jacobians, singularities, and manipulability. Multi-fingered hand kinematics including contact models, the grasp map, force closure, grasp planning, grasp constraints, and rolling contact kinematics.

#### 553. *Introduction to Acoustics and Noise* (2-2-3) Atassi

*Prerequisite:* Consent of instructor. A course that treats the fundamentals of sound and noise production, transmission, and measurement. Theoretical, experimental, environmental, and legislative topics. (Alternate years)

#### 554. *Analytical Dynamics* (3-0-3) Skaar

Fundamental principles and analytical methods in dynamics with applications to machine design, robot analysis, and spacecraft control. (Every spring)

#### 558. *Elasticity*

(3-0-3) Mason, Corona  
The fundamental theories and techniques in elasticity are covered. Variational methods and complex variable techniques are included, and applications are demonstrated by selected problems. (Every spring)

#### 559. *Advanced Mechanics of Solids* (3-0-3) Staff

The course covers fundamental principles and techniques in stress analysis of trusses, beams, rigid frame, and thin-walled structures. Emphasis is placed on energy methods associated with calculus of variations. (Every fall)

#### 560. *Finite Element Methods in Structural Mechanics*

(3-0-3) Staff  
*Prerequisite:* Consent of instructor. Finite element methods for static and dynamic analysis of structural and continuum systems. Displacement approach for two- and three-dimensional solids along with beams, plates, and shells. Material and geometric nonlinearities. (As needed)

*561. Mathematical Methods I*

(3-0-3) Staff

*Prerequisite:* Consent of instructor.

Multidimensional calculus, linear analysis, linear operators, vector algebra, ordinary differential equations. (Every fall)

*562. Mathematical Methods II*

(3-0-3) Staff

Continuation of AME 561.

Partial differential equations, characteristics, separation of variables, similarity and transform solutions, complex variable theory, singular integral equations, integral transforms. (Every spring)

*563. Finite Elements in Engineering*

(3-0-3) Staff

*Prerequisite:* Consent of instructor.

Fundamental aspects of the finite element method are developed and applied to the solution of PDEs encountered in science and engineering. Solution strategies for parabolic, elliptic, and hyperbolic equations are explored. (As needed)

*565. Tribology*

(3-0-3) Schmid, Ovaert

Fundamentals of the nature of surface contact. Regimes of fluid film lubrication, friction and wear models, and surface characteristics are analyzed and applied to machine elements and manufacturing processes. (As needed)

*569. Structural Dynamics*

(3-0-3) Staff

*Prerequisite:* Consent of instructor.

Examines problems in the vibration of continuous linear elastic structures, including strings, rods, beams, membranes, and plates; Hamilton's principle; solution by separation of variables, integral equation and transform methods; variational methods of approximation including the finite element method; computational methods. (As needed)

*570. Advanced Measurements Laboratory*

(2-1-3) Staff

A graduate short course designed to give students laboratory experience in the use of modern measurements and the design of experiments for specific problems. (Every fall)

*598. Special Studies*

(V-V-V) Staff

Individual or small group study under the direction of a faculty member in a graduate subject not currently covered by any University course. (As needed)

*599. Thesis Direction*

(V-V-V) Staff

This course is reserved for the six-credit-hour thesis requirement of the research master's degree. (Every semester)

*600. Nonresident Thesis Research*

(0-0-1) Staff

For master's degree students. (As needed)

*601. Viscous Flow Theory I*

(3-0-3) Staff

*Prerequisite:* AME 538.

Properties and solutions of the Navier-Stokes equations, high and low Reynolds number approximations for steady and unsteady flows. (Every spring)

*602. Viscous Flow Theory II*

(3-0-3) Staff

*Prerequisite:* AME 601 or consent of instructor.

Approximate methods in solving the boundary layer equations. Properties and solutions of viscous compressible flows. Introduction to equations of motion in turbulent shear flows. (As needed)

*603. Turbulence*

(3-0-3) Thomas

*Prerequisite:* Consent of instructor.

Experimental facts, measurements, theory, correlations, simple approximations. Homogeneous turbulence, spectra, direct interaction, numerical models, theory of Kraichnan, meteorology, diffusion. (Alternate spring semesters)

*604. Hydrodynamic Stability*

(3-0-3) Staff

*Prerequisite:* Consent of instructor.

Introduction of the major fundamental ideas, methods, and results of the theory of hydrodynamic stability. Examples of major applications are presented. (Alternate fall semesters)

*610. Flow Control*

(3-0-3) Staff

*Prerequisite:* AME 538

Passive, active, and reactive flow management strategies to achieve transition delay/advance, separation control, mixing augmentation, drag reduction, lift enhancement, and noise suppression.

*611. Dynamics of Compressible Fluids*

(3-0-3) Staff

*Prerequisite:* Consent of instructor.

Theoretical gas dynamics, including properties of compressible real fluids and fundamental relations for subsonic and supersonic flows. (As needed)

*612. Unsteady Aerodynamics and Aeroacoustics*

(3-0-3) Atassi

*Prerequisites:* Fluid mechanics, ideal aerodynamics.

Unsteady flows, unsteady aerodynamics of airfoils, cascades, and finite wings, acoustics in moving media, aerodynamic sound, Lighthill's analogy, far field conditions, Kirchhoff's method, numerical methods in aeroacoustics. (Alternate fall semesters)

*620. Computational Fluid Mechanics*

(3-0-3) Paolucci

*Prerequisite:* AME 521, AME 538

Generalized coordinate transformation, grid generation, and computational methods for inviscid flow, viscous incompressible flow, and viscous compressible flow. (Alternate years)

*621. Thermal Radiation*

(3-0-3) Staff

*Prerequisite:* Consent of instructor.

Basic concepts and laws of thermal radiation. Radiative properties of gases and surfaces. Radiative exchange between surfaces. Gaseous radiation interaction. (Alternate fall semesters)

*623. Thermal Convection*

(3-0-3) Staff

*Prerequisite:* AME 601.

Forced convection in ducts; Graetz solution and extensions; free or forced flow boundary layer heat transfer; turbulent heat transfer; combined forced and free convection; heat transfer including phase change. (Alternate fall semesters)

*641. Spatial Kinematics*

(3-0-3) Stanisc

*Prerequisite:* Kinematic Synthesis, Linear Algebra and AME 541.

A study of the finite and instantaneous kinematics of rigid body systems including closed and open loop systems with up to five degrees-of-freedom. Position analysis via coordinate transformations. Development of Screw Theory with applications to dimensional synthesis of mechanisms and path tracking control of manipulators.

*650. Advanced Topics in Solid Mechanics*

(3-0-3) Corona, Mason

*Prerequisite:* Consent of instructor.

Topics in solid mechanics normally not covered in elementary graduate courses. Topics covered may vary. (As needed)

*651. Fracture of Materials*

(3-0-3) Staff

*Prerequisite:* AME 559 or equivalent.

Concepts of fracture of brittle and ductile materials. Methods for determination of stress intensity factors, crack open displacements, and energy release rates under static and dynamic conditions. (Alternate years)

652. *Mechanics of Irreversible Deformation*  
(3-0-3) Corona

*Prerequisite:* AME 658 and AME 559 or consent of instructor.

Introduction to inelastic deformation of solids. Basic concepts and applications of classical plasticity, viscoelasticity, and viscoplasticity.

653. *Mechanics and Failure of Composites*  
(3-0-3) Mason

*Prerequisites:* AME 558, AME 561, and AME 562.

An introduction to the mechanics and failure of composites. Concepts in static and dynamic anisotropic elasticity are covered as are basic concepts in viscoelasticity and hygrothermal behavior. These topics lead into a discussion of laminate theory, failure theories, shear lag theory, and micro-mechanics of composites.

654. *Geometric Nonlinear Control Theory*  
(3-0-3) Goodwine

*Prerequisite:* Consent of instructor.

Review of state space linear dynamical control systems, basic Lyapunov theory, and bifurcation theory. Basic concepts and methods from differential geometry including manifolds, tangent spaces, vector fields, distributions, Frobenius' Theorem, and matrix groups and their application to nonlinear control including I/O and full state linearization via state feedback, controllability and observability, trajectory generation for nonlinear systems, and applications to stratified systems such as legged robotic locomotion and robotic manipulation.

657. *Continuum Mechanics*  
(3-0-3) Staff

*Prerequisite:* AME 558 or AME 538 or consent of instructor.

Deformation and motion of continua and singular surfaces; general balance equations; stress principle; balance laws for mass, momentum, and energy; thermodynamics of continua; entropy balance; constitutive relationships; material symmetry and invariance theory; linear and nonlinear constitutive models; variational foundations; topics of special interest. (Alternate years)

666. *Stability Theory of Structural Systems*  
(3-0-3) Staff

*Prerequisite:* AME 559 or consent of instructor.

The general principle of stability of structural systems. Euler buckling and post-buckling behavior of discrete and continuous systems are presented. (As needed)

667. *Theory of Plates and Shells*  
(3-0-3) Staff

*Prerequisite:* AME 559 or consent of instructor.

Differential geometry of surface in tensor form, stress resultants and stress couples, equations of equilibrium, principle of virtual work, Sanders-Koiter nonlinear shell theories, compatibility relations, linear shell theories, static-geometric duality, stability of shells, applications to shells of various geometries.

697. *Directed Readings*  
(V-V-V) Staff

Content, credit, and instructor will be announced by the department. (As needed.)

698. *Special Studies*  
(V-V-V) Staff

Content, credit, and instructor will be announced by the department. (As needed)

699. *Research and Dissertation*  
(V-V-V) Staff

Required for candidates for the advanced degree in the research program. (Every semester)

700. *Nonresident Dissertation Research*  
(0-0-1) Staff

This course is reserved to provide the required continuing minimal registration of one credit hour per academic semester for nonresident graduate students who wish to retain their degree status. (As needed)

701. *Graduate Seminar*  
(2-0-0) Staff

Required for all aerospace graduate students. Discussion of current topics in research and engineering by guest lecturers and staff members. (Every semester)

In addition to the courses listed above, 400-series courses for advanced undergraduates may be taken for graduate credit, subject to approval of the Department of Aerospace and Mechanical Engineering. For information on these courses, refer to the College of Engineering section of the *Bulletin of Information*, Undergraduate Programs.

*Faculty*

Hafiz Atassi, *the Viola D. Hank Professor*. Engineer, Ecole Centrale de Paris; Licence, Univ. of Paris, 1963; Ph.D., *ibid.*, 1966. (1969)

Stephen M. Batill, *Chair and Professor*. B.S., Univ. of Notre Dame, 1969; M.S., *ibid.*, 1970; Ph.D., *ibid.*, 1972. (1978)

Alan P. Bowling, *Assistant Professor*. B.S., Univ. of Texas, 1983; Ph.D., Stanford Univ., 1998. (2001)

Raymond M. Brach, *Professor Emeritus*. B.S., Illinois Institute of Technology, 1958; M.S., *ibid.*, 1962; Ph.D., Univ. of Wisconsin, 1965. (1965)

Thomas C. Corke, *Director of Hessert Laboratory for Aerospace Research, Director of Graduate Studies, and the Clark Equipment Professor*. B.S., Illinois Institute of Technology, 1974; M.S., *ibid.*, 1976; Ph.D., *ibid.*, 1981. (1999)

Edmundo Corona, *Associate Professor*. B.S.A.E., Univ. of Texas, Austin, 1983; M.S., *ibid.*, 1986; Ph.D., *ibid.*, 1990. (1991)

Patrick F. Dunn, *Professor*. B.S., Purdue Univ., 1970; M.S., *ibid.*, 1971; Ph.D., *ibid.*, 1974. (1985)

J. William Goodwine, *Assistant Professor*. B.S., Univ. of Notre Dame, 1988; J.D., Harvard Law School, 1991; M.S., California Institute of Technology, 1993; Ph.D., *ibid.*, 1998. (1998)

James E. Houghton, *Assistant Professor Emeritus*. B.S.E.E., Univ. of Notre Dame, 1949; M.S., *ibid.*, 1962. (1952)

Robert A. Howland Jr., *Associate Professor*. B.A., Yale Univ., 1965; M.S., *ibid.*, 1966; Ph.D., North Carolina State Univ., 1974. (1981)

Nai-Chien Huang, *Professor Emeritus*. B.S., National Taiwan Univ., 1953; M.S., Brown Univ., 1958; Ph.D., Harvard Univ., 1963. (1969)

Frank Incropera, *the Matthew H. McCloskey Dean of the College of Engineering and the H. Clifford and Evelyn A. Brosey Professor of Mechanical Engineering*. S.B., Massachusetts Institute of Technology, 1961; M.S., Stanford Univ., 1962; Ph.D., *ibid.*, 1966. (1998)

Edward W. Jerger, *Professor Emeritus*. B.S., Marquette Univ., 1946; M.S., Univ. of Wisconsin, 1947; Ph.D., Iowa State Univ., 1951. (1955)

Eric J. Jumper, *Professor*. B.S.M.E., Univ. of New Mexico, 1968; M.S.M.E., Univ. of Wyoming, 1969; Ph.D., Air Force Institute of Technology, 1975. (1989)

Francis M. Kobayashi, *Professor Emeritus and Assistant Vice President Emeritus for Research*. B.S., Univ. of Notre Dame, 1947; M.S., *ibid.*, 1948; Sc.D., *ibid.*, 1953. (1948)

Lawrence H. N. Lee, *Professor Emeritus*. B.S., Utopia Univ., 1945; M.S., Univ. of Minnesota, 1947; Ph.D., *ibid.*, 1950. (1950)

John W. Lucey, *Associate Professor*. B.S., Univ. of Notre Dame, 1957; S.M., Massachusetts Institute of Technology, 1963; Ph.D., *ibid.*, 1965. (1965)

James J. Mason, *Associate Professor*. B.S., Univ. of California, 1986; M.S., *ibid.*, 1988; Ph.D., California Institute of Technology, 1993. (1993)

Stuart T. McComas, *Professor Emeritus*. B.S.M.E., Marquette Univ., 1956; M.S., Univ. of Minnesota, 1960; Ph.D., *ibid.*, 1964. (1963)

Scott C. Morris, *Assistant Professor*. B.S., Michigan State Univ., 1994; M.S., *ibid.*, 1997; M.S., *ibid.*, 2001 Ph.D., *ibid.*, 2002. (2002)

Thomas J. Mueller, *the Roth-Gibson Professor of Aerospace Engineering*. B.S., Illinois Institute of Technology, 1956; M.S., Univ. of Illinois, 1958; Ph.D., *ibid.*, 1961. (1965)

Victor W. Nee, *Professor Emeritus*. B.S., National Taiwan Univ., 1957; Ph.D., Johns Hopkins Univ., 1967. (1965)

Robert C. Nelson, *Professor*. B.S., Univ. of Notre Dame, 1964; M.S., *ibid.*, 1966; Ph.D., Pennsylvania State Univ., 1974. (1975)

Glen Niebur, *Assistant Professor*. B.S., Univ. of Minnesota, 1986; M.S.M.E., *ibid.*, 1995; Ph.D., Univ. of California at Berkeley, 2000. (2001)

Timothy C. Ovaert, *Professor*. B.S., Univ. of Illinois, 1981; M.S., Northwestern Univ., 1985; Ph.D., *ibid.*, 1989. (2000)

Samuel Paolucci, *Professor*. B.S., Drexel Univ., 1975; Ph.D., Cornell Univ., 1979. (1989)

Joseph M. Powers, *Associate Professor*. B.S., Univ. of Illinois, 1983; M.S., *ibid.*, 1985; Ph.D., *ibid.*, 1988. (1989)

Francis H. Raven, *Professor Emeritus*. B.S., Pennsylvania State Univ., 1950; M.S., *ibid.*, 1951; Ph.D., Cornell Univ., 1958. (1958)

John E. Renaud, *Professor*. B.S., Univ. of Maine, 1982; M.S., Rensselaer Polytechnic Institute, 1989; Ph.D., *ibid.*, 1992. (1992)

Ryan K. Roeder, *Assistant Professor*. B.S., Purdue Univ., 1994; Ph.D., Purdue Univ., 1999. (2001)

Steven R. Schmid, *Associate Professor*. B.S., Illinois Institute of Technology, 1986; M.S., Northwestern Univ., 1989; Ph.D., *ibid.*, 1993. (1993)

Mihir Sen, *Professor*. B.Tech., Indian Institute of Technology, 1968; Sc.D., Massachusetts Institute of Technology, 1975. (1986)

Steven B. Skaar, *Associate Chair and Professor*. A.B., Cornell Univ., 1975; M.S., Virginia Polytechnic Institute and State Univ., 1978; Ph.D., *ibid.*, 1982. (1989)

Michael M. Stanisic, *Associate Professor*. B.S., Purdue Univ., 1980; M.S., *ibid.*, 1982; Ph.D., *ibid.*, 1986. (1988)

Albin A. Szewczyk, *Professor Emeritus*. B.S.M.E., Univ. of Notre Dame, 1956; M.S.M.E., *ibid.*, 1958; Ph.D., Univ. of Maryland, 1961. (1962)

Flint O. Thomas, *Professor*. B.S., Indiana State Univ., 1977; M.S.M.E., Purdue Univ., 1980; Ph.D., *ibid.*, 1983. (1988)

Kwang-Tzu Yang, *the Viola D. Hank Professor Emeritus of Aerospace and Mechanical Engineering*. B.S., Illinois Institute of Technology, 1951; M.S., *ibid.*, 1952; Ph.D., *ibid.*, 1955. (1955)

## Chemical and Biomolecular Engineering

### Chair:

Mark J. McCready

### Director of Graduate Studies:

Mark A. Stadtherr

Telephone: (574) 631-5580

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Location: 182 Fitzpatrick Hall

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### The Program of Studies

The department offers programs leading to the degrees of master of science and doctor of philosophy. The aim of the graduate program is to prepare qualified candidates for research, development, teaching, and other professional careers in chemical engineering. Thus, the Ph.D. program is emphasized.

The objective of the doctoral program is to superimpose upon a broad education the ability to think independently in new fields, to coordinate technical ideas at an advanced level, and to make a systematic approach to the solution of new problems.

The course work is chosen in consultation with department faculty and the dissertation research adviser according to procedures outlined in *A Guide to Graduate Studies in Chemical Engineering*.

The master's degree program consists of at least 15 credit hours of course work, plus 15 credit hours of thesis research and graduate seminar. For the Ph.D. degree, a minimum of 30 credit hours of course work is required, in addition to 42 credit hours of dissertation research and graduate seminar. There are required courses in the areas of thermodynamics, reaction engineering, transport phenomena, and mathematical methods.

After the second semester of residence, each Ph.D. student presents written and oral reports based on thesis research or project work. These reports, along with performance in courses, in research, and in teaching assistantship duties, constitute the comprehensive evaluation in chemical engineering. This allows the faculty to evaluate the student's grasp of chemical engineering fundamentals and his or her ability to perform original, independent research. Students who pass the comprehensive evaluation may continue to the Ph.D. program.

Ph.D. students generally take the oral candidacy examination before the end of the fifth semester in residence. This examination focuses on the progress achieved in thesis-related work and on the proposed future research.

The departmental faculty believes that all students seeking advanced degrees in chemical engineering should have some experience related to the instruction of others. Therefore, all first- and second-year graduate students are assigned teaching assistant duties. These duties consist of conducting recitation sections for lecture courses, supervising laboratory courses, or grading homework.

Full-time students normally complete the Ph.D. degree requirements in about four-and-a-half years beyond the bachelor's degree. Requirements for the master's degree can normally be completed in two years of full-time study.



A student pursuing the Ph.D. degree will be eligible to receive an M.S. degree after completing five semesters in the Ph.D. program, passing the Ph.D. Candidacy Exam, and preparing and submitting for publication a research paper in collaboration with the student's research advisor(s). This paper shall describe work in which the student has a primary (not supporting) role, be submitted to a research journal or to the proceedings of a technical conference, and be subject to peer review.

New graduate students in chemical engineering select their research area and director during their first semester in residence at Notre Dame. Areas of current research include applied mathematics; biological materials; bioseparations; catalysis and surface science; ceramic materials; chemical reaction engineering; combustion synthesis of materials; drug delivery systems; ecological modeling; environmentally conscious design; fuel cells; gas-liquid flows; ionic liquids; materials science; microfluidic devices; molecular modeling and simulation; molecular theory of transport; nano-structured materials; parallel computing; phase equilibria; pollution prevention; polymer rheology; process dynamics and control; process optimization and design; process simulation; statistical mechanics; superconducting materials; supercritical fluids; suspension rheology; and transport in porous media.

More detailed descriptions of the research interests of individual faculty members may be found in the brochure, *Chemical Engineering, University of Notre Dame*, and at the departmental Web site.

In addition to graduate assistantships and Peter C. Reilly Fellowships, several industrial fellowships also are available for highly qualified students.

#### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

#### 510. *Advanced Thermodynamics*

(3-0-3) Strieder

*Prerequisite:* CHEG 327 or equivalent.

An advanced treatment of physical and chemical thermodynamics for engineers.

#### 538. *Introduction to Statistical*

*Thermodynamics for Engineers*

(3-0-3) Strieder

*Prerequisite:* CHEG 327 or equivalent.

Development of the fundamentals of statistical mechanics and thermodynamics. Applications to monatomic gases and solids, diatomic and polyatomic gases, chemical equilibrium, dense gases, solids, and liquids.

#### 542. *Mathematical Methods in Engineering I*

(3-0-3) Hill

*Prerequisite:* Consent of instructor.

Rigorous development of tools of mathematical analysis and application of these to solve engineering problems. Topics include matrices, linear and nonlinear ordinary differential equations, special functions, and modeling. (Fall)

#### 544. *Transport Phenomena I*

(3-0-3) Chang

Differential balance equations that govern transport processes are derived and used to solve problems that demonstrate the physical insight necessary to apply these equations to original situations. The emphasis in this course is on fluid mechanics. (Every year)

#### 545. *Transport Phenomena II*

(3-0-3) Leighton

The differential equations that govern transport phenomena are applied to the solution of various heat and mass transfer problems.

#### 546. *Advanced Chemical Reaction Engineering*

(3-0-3) Varma

*Prerequisite:* Undergraduate course in chemical reaction engineering.

Analyses and mathematical modeling of chemical reactors with emphasis on heterogeneous reaction systems. (Every year)

#### 552. *Mathematical Methods in Engineering II*

(3-0-3) Chang

*Prerequisite:* CHEG 542 or consent of instructor.

Continuation of 542, which covers treatment of partial differential equations, transform methods, perturbation methods, and approximation methods, including methods of weighted residuals and variational method. (Spring)

#### 553. *Advanced Chemical Engineering*

*Thermodynamics*

(3-0-3) Maginn

*Prerequisite:* Consent of instructor.

This course is focused on an advanced

treatment of thermodynamic concepts. An introduction to molecular thermodynamics is given, followed by detailed treatments of phase equilibrium, equation-of-state development and activity coefficient models.

#### 556. *Polymer Engineering*

(3-0-3) Hill

*Prerequisite:* Senior or graduate student standing in science or engineering.

A course for seniors and graduate students in science and engineering who are interested in applications of engineering to polymer science and technology. Topics include polymerization reactions and the structure, properties, processing, and production of polymers. (Every year)

#### 567. *Heterogeneous Catalysis*

(3-0-3) Wolf

*Prerequisite:* Consent of instructor.

Introduction to solid state and surface chemistry, adsorption, reaction of gases on solid surfaces, experimental techniques in catalysis, catalyst preparation, and industrial catalytic processes.

#### 598. *Special Studies*

(V-V-V) Staff

*Prerequisite:* Consent of instructor.

Individual or small group study under the direction of a faculty member in a graduate subject not concurrently covered by any University course. (Every semester)

#### 598A. *Phase Transformations in Solids*

(3-0-3) McGinn

This course covers a range of common phase transformations found in a wide range of materials. Topics covered include phase diagrams, diffusion, interfaces in solids, solidification phenomena, and diffusional and diffusionless phase transformations. Nucleation, precipitate growth, ordering, and martensitic transformations are all discussed. The level is aimed at advanced undergraduate and first-year graduate students.

#### 598C. *Electrochemistry and Corrosion*

(3-0-3) Miller

A study of some of the major concepts of electrochemistry and materials science that provides the student with a foundation for understanding, at a conceptual level, some of the important corrosion processes, as well as the methods of their control as practiced today in various industrial environments.

*598D. Structure of Solids*

(3-0-3) McGinn

This class will deal with the crystallographic structure of solids, primarily as found in metals, alloys, and ceramics. Imperfections in the arrangements of atoms will be emphasized, especially as regards their impact on properties. The study of structure through x-ray diffraction will be a recurring theme.

*598E. Ceramic Materials*

(3-0-3) Miller

An introduction to the principles that govern the synthesis, processing, structure, and performance of modern ceramic materials. Emphasis is on the use of these principles to understand and solve engineering problems with ceramics.

*598F. Chemical Process Simulation and Optimization*

(3-0-3) Stadtherr

This course will provide an overview of the computational methodologies used for chemical process simulation and optimization. Topics will include: (1) how to formulate process models; (2) how to solve process models (linear and nonlinear equation solving, etc.); and (3) how to optimize using process models (linear and nonlinear programming, global optimization, etc.).

*598G. Principles of Materials Selection*

(3-0-3) Miller

One of the most important tasks that an engineer may be called upon to perform is that of materials selection with regard to component design. It is essential that the engineering student become familiar with and versed in the procedures and protocols that are normally employed in this process. This course will discuss materials selection issues in several contexts and from various perspectives. A case study method will be used to frame real-life engineering problems so that they can be carefully analyzed in detail so that the student may observe the procedures and rationale that are involved in the materials selection decision-making process. Mechanical, IC packaging, and corrosion case studies, in addition to others, will be used.

*598J. Selected Topic/Materials Processing*

(3-0-3) McGinn

This course covers a limited number of materials processing techniques used by materials researchers as well as industrial manufacturers. The primary areas to be covered include thin film processing, fine ("nanoscale") particle processing, crystal growth, and a few selected ceramics processing techniques. Within each

of these areas various techniques will be discussed, with both the theoretical and practical aspects being described.

*598M. Macromolecular Bioengineering*

(3-0-3) Ostafin

Recent advances in molecular biology have made it possible to thoroughly study biological macromolecules. These macromolecules can perform many important functions, such as information transfer, catalysis, energy acquisition, transport regulation, and energy generation. This course focuses on the unique characteristics of macromolecules and how they can contribute in the area of engineering, such as in developing nanoscale devices, innovative materials, information storage devices, energy capture and storage, and many other applications.

*598N. Biomedical Engineering Transport Phenomena*

(3-0-3) Palmer

This course brings together fundamental engineering and life science principles, and provides a focused coverage of key concepts in biomedical engineering transport phenomena. The emphasis is on chemical and physical transport processes with applications toward the development of drug delivery systems, artificial organs, bioartificial organs, and tissue engineering.

*598R. BioProcess Engineering*

(3-0-3) Ostafin

BioProcess Engineering is the application of engineering principles to design, develop, and analyze processes that use biocatalysts. These may be in the form of a living cell, its substructures, or their chemical components. In this course you learn concepts of cellular biology, and are introduced to mathematical-based engineering analysis of complex biological systems. By the end of this course you should be able to understand basic structure and function of cells, homogeneous and heterogeneous enzyme kinetics, the regulation of cell growth, the design and operation of bioreactors, recovery and characterization of products, and methods in genetic engineering and molecular cloning.

*599. Thesis Direction*

(V-V-V) Staff

Research to satisfy the six credit hours required for the master's degree.

*600. Nonresident Thesis Research*

(0-0-1) Staff

Required of nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.

*669, 679. Graduate Seminar*

(1-0-1) (1-0-1) Staff

Staff members, guest speakers, and doctoral students discuss current research problems. (Every semester)

*698. Special Studies in Chemical Engineering*

(V-V-V) Staff

This number is reserved for specialized and/or experimental graduate courses. Content, credit, and instructor will be announced by department. (Every year)

*698A. Ceramics*

(3-0-3) Miller

The theoretical and empirical principles of ceramic materials.

*698B. Nonlinear Dynamics and Pattern Formation*

(3-0-3) Chang

This course reviews some classical pattern formation dynamics in extended domains. Specific topics include Rayleigh-Benard convection, Hamiltonian dynamics, wave phenomena, solidification, Turing patterns, etc. Analytical and numerical tools will be introduced to reduce the model dimension and to classify the pattern dynamics.

*698D. Molecular Theory*

(3-0-3) Maginn

*Prerequisite:* Consent of instructor.

An introduction to statistical mechanical theories and molecular simulation techniques used to calculate properties of interest to chemical engineers.

*699. Research and Dissertation*

(V-V-V) Staff

Research and dissertation for resident doctoral students.

*700. Nonresident Dissertation Research*

(0-0-1) Staff

Required of nonresident graduate students who are completing their dissertations in absentia and who wish to retain their degree status.

*Faculty*

Sudhir Aki, *Assistant Research Professor*. B.S., Andhra Univ., 1991; Ph.D., Univ. of Toledo., 1998. (2001)

Joan F. Brennecke, *the Keating-Crawford Professor of Chemical Engineering*. B.S., Univ. of Texas, 1984; M.S., Univ. of Illinois, 1987; Ph.D., *ibid.*, 1989. (1989)

Hsueh-Chia Chang, *the Bayer Corporation Professor of Chemical Engineering*. B.S., California Institute of Technology, 1976; Ph.D., Princeton Univ., 1980. (1987)

Evgeny Demekhin, *Research Professor*. Ph.D., Moscow State Univ., 1981. (2002)

Daniel E. E. Hayes, *Visiting Research Professor*. B.S.M.E., Oklahoma State Univ., 1968; M.S., Air Force Institute of Technology, 1971; M.S., Univ. of Dayton, 1981. (2001)

Davide A. Hill, *Associate Professor*. Dottore in Ingegneria Chimica, Univ. di Napoli, Italy, 1983; Ph.D., Univ. of California, Berkeley, 1989. (1990)

Jeffrey C. Kantor, *Vice President for Graduate Studies and Research, Dean of the Graduate School, and Professor of Chemical and Biomolecular Engineering*. B.S., Univ. of Minnesota, 1976; M.A., Princeton Univ., 1977; Ph.D., *ibid.*, 1980. (1981)

David T. Leighton Jr., *Professor*. B.S.E., Princeton Univ., 1980; M.S., Stanford Univ., 1981; Ph.D., *ibid.*, 1985. (1985)

Edward J. Maginn, *Associate Professor*. B.S., Iowa State Univ., 1987; Ph.D., Univ. of California, Berkeley, 1995. (1995)

Mark J. McCready, *Chair and Professor*. B.Ch.E., Univ. of Delaware, 1979; M.S., Univ. of Illinois, 1981; Ph.D., *ibid.*, 1984. (1984)

Paul J. McGinn, *Professor*. B.S., Univ. of Notre Dame, 1980; M.S., *ibid.*, 1983; Ph.D., *ibid.*, 1984. (1987)

Albert E. Miller, *Professor*. B.S., Colorado School of Mines, 1960; Ph.D., Iowa State Univ., 1964. (1967)

Alex S. Mukasyan, *Research Professor*. M.S., Moscow Physical Engineering Institute, 1980; Ph.D., Institute of Chemical Physics, USSR Academy of Sciences, 1986; D.Sc., Institute of Structural Macrokinetics, Russian Academy of Sciences, 1994. (1997)

Kenneth R. Olson, *Adjunct Professor of Biological Sciences (South Bend Center for Medical Education) and Concurrent Professor*. B.S., Univ. of Wisconsin-LaCrosse, 1969; M.S., Michigan State Univ., 1970; Ph.D., *ibid.*, 1972. (1975)

Agnes E. Ostafin, *Assistant Professor*. B.S., Wayne State Univ., 1989; Ph.D., Univ. of Minnesota, 1994. (1999)

Andre F. Palmer, *Assistant Professor*. B.S., Harvard Univ., 1995; Ph.D., The Johns Hopkins Univ., 1998. (2001)

Roger A. Schmitz, *the Keating-Crawford Professor of Chemical Engineering*. B.S., Univ. of Illinois, 1959; Ph.D., Univ. of Minnesota, 1962. (1979)

Mark A. Stadtherr, *Director of Graduate Studies and Professor*. B.Ch.E., Univ. of Minnesota, 1972; Ph.D., Univ. of Wisconsin, 1976. (1996)

William C. Strieder, *Professor*. B.S., Pennsylvania State Univ., 1959; Ph.D., Case Institute of Technology, 1963. (1966)

Arvind Varma, *Director of the Center for Molecularly Engineered Materials and the Arthur J. Schmitt Professor*. B.S., Punjab Univ., 1966; M.S., Univ. of New Brunswick, 1968; Ph.D., Univ. of Minnesota, 1972. (1975)

Eduardo E. Wolf, *Professor*. B.S., Univ. of Chile, 1969; M.S., Univ. of California, Davis, 1972; Ph.D., Univ. of California, Berkeley, 1975. (1975)

## Civil Engineering and Geological Sciences

### Chair:

Peter C. Burns

### Director of Graduate Studies:

Yahya C. Kurama

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### The Program of Studies

The graduate program in civil engineering and geological sciences provides an interdisciplinary atmosphere conducive to preparation of qualified candidates for careers in structural/geotechnical engineering, environmental engineering, bioengineering, and geological sciences.

Advanced study in civil engineering and geological sciences includes research and professional specialization in the following fields: biological treatment of hazardous wastes; earthquake/wind/offshore engineering; environmental chemistry; groundwater hydrology; hydraulics and water resources; structural mechanics and design; structural reliability; mantle petrology and planetary differentiation; sedimentology; environmental mineralogy; paleontology; low-temperature geochemistry; and biogeochemistry.

Many synergies exist among the respective research programs: structural engineers and geotechnical engineers, water chemists and geochemists, groundwater hydrologists, and hydrogeologists all work together to develop unique new insights in their respective research endeavors. Moreover, the department's analytical strength is complemented by the Center for Environmental Science and Technology, which involves faculty from seven science and engineering departments in basic scientific research in pollution control.

The department is home to the Environmental Molecular Science Institute, which institute blends the environmental science and engineering expertise and facilities of the University with those at Argonne, Sandia, and Oak Ridge National Laboratories. The scientific mission of the institute is to determine the effects of nano- and micro-particles (e.g., bacteria, natural organic matter, and mineral aggregates) on heavy metal and actinide transport in geologic systems. Students in the institute experience a highly interdisciplinary research environment and are encouraged to participate in the internship program, which enables graduate students to conduct research with our national laboratory and industry partners.

The bioengineering program integrates principles of engineering, microbiology, chemistry, and biochemistry to address problems of fermentation engineering, biological treatment of hazardous wastes, and naturally induced genetic changes in mixed culture systems. An emphasis of study is the use of forcing functions to select for appropriate population distributions in industrial and municipal treatment facilities.

The environmental engineering program emphasizes water chemistry, hydrology, water supply, wastewater treatment, and water pollution control. Research topics include numerical modeling in surface and subsurface hydrology, experimental methods in surface and subsurface hydrology, and development of water and wastewater systems appropriate for rural U.S. areas and developing countries.

The structural/geotechnical engineering program provides a modern, progressive curriculum that emphasizes theory and application along with classical and modern numerical solution procedures. Areas of research emphasis include civil infrastructure development, wind/offshore/earthquake engineering, structural design, structural behavior, soil-structure

interaction, soil dynamics, and material characterization and durability. Course offerings represent a cooperative interdisciplinary effort among the Departments of Aerospace and Mechanical Engineering, Electrical Engineering, and Civil Engineering and Geological Sciences.

The geological sciences program integrates classical geology with an interdisciplinary view of global evolution and the environment. Research topics include planetary differentiation, mantle petrology, biogeochemistry, environmental geochemistry and mineralogy, analytical geochemistry, and mass extinctions. Students are encouraged to explore related courses in other departments in order to foster interdisciplinary thinking in their research and beyond.

The programs of study offered by the department lead to the master of science degree and the doctor of philosophy degree. The department requires a minimum cumulative grade point average of 3.0 for graduation from its degree programs.

Although both research and nonresearch options are available to students seeking the master's degree, the research option is the preferred and normal route. The nonresearch option is allowed only in exceptional circumstances. In the research option, 30 credit hours are required with six to 12 of these credits devoted to thesis research, depending on the program of study developed in conjunction with the department. The research option requires a completed thesis and an oral defense of that thesis. The master's research is commonly completed by the end of the fourth semester of enrollment.

Requirements for the doctor of philosophy degree include approximately one academic year of course work (24 credits) beyond the master's degree, approximately one year of doctoral research, and successful completion of the candidacy and dissertation examinations.

Programs of study and research are arranged to suit the specific background and interests of the individual student, with guidance and approval of the faculty of the department and in conformity with the general requirements of the Graduate School.

Regardless of funding source, all students participate in the educational mission of the department by serving as teaching assistants for eight hours per week during their first year, four hours per week during their second

year, and four hours per week during one additional semester.

Students in all the graduate programs are encouraged to include courses from other departments and colleges within the University to expand their understanding of today's complex technological-social-economic problems. In the past, students have shown particular interest in extradepartmental courses in biological sciences, chemical engineering, chemistry, economics, electrical engineering, mathematics, and mechanical engineering.

Admission to graduate study in civil engineering and geological sciences is not limited to undergraduate majors in civil engineering and/or geology. Those with undergraduate majors in other fields of engineering or the physical sciences are encouraged to apply.

Financial aid is available to qualified candidates in the form of tuition scholarships and competitive stipends. Additional fellowships are available for students from underrepresented groups.

#### Course Descriptions

Each course listing includes:

- Course Number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course Description

#### Civil Engineering

525. *Advanced Geostatistics*  
(3-0-3) Silliman

*Prerequisite:* CE 331 or consent of instructor.

Introduction to modern geostatistical techniques, including principal component analysis, factor analysis, kriging, and 3-D simulation. The focus is on application to field data and analysis. Substantial computer programming required. (Every other year)

530. *Environmental Chemistry*  
(3-0-3) Maurice

*Prerequisite:* Consent of instructor.

Applications of acid-base, solubility, complex formation, and oxidation reduction equilibria to water supply, wastewater treatment, and natural environmental systems. (Fall)

531. *Introduction to Bioengineering*  
(3-0-3)

*Prerequisite:* Consent of instructor.

Biological systems, including those involved in the fermentation industry and biological

wastewater treatment, are discussed. An introduction to microbiology and biochemistry is provided. (Fall)

534. *Design of Biological Waste Treatment Systems*  
(3-0-3)

*Prerequisite:* CE 531 or consent of instructor.

In-depth discussion of biological waste treatment. Review of pilot and full-scale treatment systems from bench scale studies for both domestic and industrial wastes. Heavy emphasis on literature reviews, designs, and discussions. (Alternate spring)

539. *Advanced Hydraulics*  
(3-0-3) Westerink

Application of the basic principles of fluid mechanics. Study of laminar flow, turbulent flow, and dispersion processes with emphasis on conduit and open channel flow. (Fall)

544. *Advanced Groundwater*  
(3-0-3) Silliman

*Prerequisite:* CE 444 or consent of instructor.

The equations of flow and transport are derived for porous media and fractured rocks. Additional topics include well test analysis, advanced transport theory, and state-of-the-art field methods. (Fall)

550. *Advanced Control Systems*  
(3-0-3) Staff

*Prerequisite:* EE 337.

The application of techniques such as the phase-plane method, Lyapunov method, vector-format method, the z-transform method, and statistical methods to the design of control systems.

554. *Analytical Mechanics*  
(3-0-3) Staff

*Prerequisite:* ME 356.

Introduction to advanced methods in analytical mechanics. A study of nonholonomic systems, stability of motion, and variation principles in classical and continuum mechanics.

557. *Continuum Mechanics*  
(3-0-3) Staff

*Prerequisite:* Consent of instructor.

Tensor analysis, general kinematics, equilibrium conditions and thermodynamics of continuous media, constitutive equations. Extensions and applications in the theory of elasticity, fluid dynamics, thermoelasticity, viscoelasticity, and thermoviscoelasticity.

*558. Elasticity*

(3-0-3) Staff

The fundamental theories and techniques in elasticity are covered. Variational methods and complex variable techniques are included, and applications are demonstrated by selected problems.

*559. Advanced Mechanics of Solids*

(3-0-3) Staff

*Prerequisite:* Consent of instructor.

Advanced topics in mechanics of solids including elasticity, torsion, stability, energy principles, and inelastic materials.

*560. Finite Elements in Structural Mechanics*

(3-0-3) Kirkner

*Prerequisite:* CE 356 or consent of instructor.

Finite-element methods for static and dynamic analysis of structural and continuum systems. Analysis of two- and three-dimensional solids as well as plates and shells. Introduction to nonlinear analysis.

*563. Finite Elements in Engineering*

(3-0-3) Westerink

*Prerequisite:* CE 441 or consent of instructor.

Fundamental aspects of the finite-element method are developed and applied to the solution of PDEs encountered in science and engineering. Solution strategies for parabolic, elliptic, and hyperbolic equations are explored. (Spring)

*569. Structural Dynamics*

(3-0-3) Kirkner

*Prerequisite:* Consent of instructor.

Vibration of single-degree, multi-degree, and continuous linear viscoelastic systems. Dynamic analysis of structural systems in both frequency and time-domain. Also study of nonlinear and nonclassical damped systems with applications to earthquake/wind engineering. (Fall)

*571. Structural Reliability and Probabilistic Bases of Design*

(3-0-3) Staff

*Prerequisite:* CE 331 or consent of instructor.

Identification and modeling of nondeterministic problems in the context of engineering design and decision making; stochastic concepts and simulation models. (Fall)

*573. Environmental Engineering Design*

(3-0-3) Ketchum

*Prerequisite:* Consent of instructor.

Application of physical, chemical, and biological unit operations and processes to the functional designs of municipal water pollution control facilities. (Fall)

*576. Design of Structures to Resist Natural Hazards*

(3-0-3) Kareem

*Prerequisite:* CE 486 or consent of instructor.

Natural hazards and associated load effects on structures. Analysis of damage caused by wind storms, earthquakes, and ocean waves. Design provisions to resist damage from natural hazards. (Spring)

*581. Experimental Methods in Structural Dynamics*

(3-0-3) Staff

*Prerequisite:* CE 569 or consent of instructor.

Experimental methods in the behavior of structures under dynamic loading. Principles of vibration measurement and digital signal processing. Modal analysis, system identification, and control. (Alternate spring)

*598. Special Studies*

(V-V-V) Staff

Individual or small-group study under the direction of a faculty member in a graduate subject not concurrently covered by any University course.

*598B. Behavior and Design of Building Structural Systems*

(V-V-V) Staff

Behavior and design of gravity load and lateral load-resisting systems. Force distribution and elastic drift calculations. Development of ductile structures for seismic-resistant design. Moment frames, braced frames, wall systems, hybrid structures. Introduction to tall building concepts.

*598C. Environmental and Technological Aspects of Minerals*

(3-0-3) Burns

*Prerequisite:* Consent of instructor.

This course explores the chemistry and structures of minerals with emphasis on environmental and technological issues. Topics of environmental significance include the disposal of spent nuclear fuel, contamination of soils with heavy metals, and the remediation of mine tailings. Emphasis will be on the mineralogy of uranium, lead, mercury, iodine, selenium, and tellurium. Technological aspects of minerals, such as the use of zeolites and clay minerals as molecular sieves and as waste containment vessels, will be addressed.

*598D. Advanced Structural Stability*

(V-V-V) Staff

Development of classical elastic stability relationships. Inelastic buckling, torsional buckling, and load-deflection behavior of thin-walled metal members. Frame stability. Development of design equations.

*598E. Advanced Topics in Reinforced Concrete Design*

(V-V-V) Kurama

Behavior of reinforced concrete structures under earthquakes. Seismic design and detailing of RC structures. Nonlinear-inelastic modeling and analysis of RC structures. Seismic evaluation and retrofit of existing structures.

*598J. Multiphase Flow/Porous Media*

(3-0-3) Staff

Thermodynamically Constrained Averaging Theory Approach to multiphase flow in porous media is developed. Averaged conservation equations are developed that model phases, interfaces, and common lines in multiphase flow. Closure conditions are developed using the constrained entropy inequality.

*599. Thesis Direction*

(V-V-V) Staff

Research to satisfy the six credit hours required for the research master's degree.

*600. Nonresident Thesis Research*

(0-0-1) Staff

Required of nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.

*661. Random Vibration of Mechanical and Structural Systems*

(3-0-3) Staff

*Prerequisite:* CE 569 or consent of instructor.

Random vibration analysis of linear and nonlinear systems. Analytical and simulation methods are used to determine system performance and reliability. Applications are emphasized. (Alternate spring)

*663. Advanced Finite-Element Methods in Structural Mechanics*

(3-0-3) Kirkner

*Prerequisite:* CE 563 or equivalent.

Finite-element methods for static and dynamic analysis of structural and continuum systems. Displacement approach for two- and three-dimensional solids along with beams, plates, and shells. Material and geometric nonlinearities.

*669. Earthquake Engineering*

(3-0-3) Staff

*Prerequisite:* CE 569 or consent of instructor.

Analysis of structures and other constructed facilities under earthquake loads. Modeling of earthquake-induced ground motion and seismic design input. Principles of earthquake resistant design. (Alternate spring)

**671. Wind Engineering**

(3-0-3) Kareem

*Prerequisite:* CE 569 or consent of instructor.

Analysis of structural response due to wind loading. Modeling of wind-induced forces. Principles of design to resist damage due to high wind loads. (Alternate fall)

**680. Civil Engineering Graduate Seminar**

(V-V-V) Staff

Presentation of technical papers, topics of current research interest, research methodology, professional ethics, and registration.

**698. Special Studies**

(V-V-V) Staff

This number is reserved for specialized and/or experimental graduate courses. Content, credit, and instructor will be announced by the department.

**699. Research and Dissertation**

(V-V-V) Staff

Research and dissertation for resident doctoral students.

**700. Nonresident Dissertation Research**

(0-0-1) Staff

Required of nonresident graduate students who are completing their dissertations in absentia and who wish to retain their degree status.

**Upper-level Undergraduate Courses**

In addition to the CE courses listed above, the following courses offered within the department for advanced undergraduates may be taken for graduate credit (to a total of 10 credit hours).

**441. Numerical Methods in Engineering****442. Water Distribution and Wastewater Collection****443. Wastewater Disposal****444. Groundwater Hydrology****445. Introduction to Geotechnical Engineering****452. Introduction to Water Chemistry and Treatment****453. Waste Disposal Management****466. Structural Steel Design****470. Construction Management****486. Reinforced Concrete Design****Geological Sciences****503. Geochemistry**

(3-0-3) Fein

*Prerequisites:* GEOS 347 and CHEM 321 or consent of instructor.

An introduction to chemical processes in igneous, metamorphic, sedimentary, and

aqueous systems. Topics include thermodynamics, kinetics, organic and environmental geochemistry, and geomicrobiology.

**519. Surface and Subsurface Geophysics**

(3-0-3) Staff

*Prerequisite:* GEOS 458 or equivalent.

Study of seismic waves, magnetic and electromagnetic probes, and gravitational and heat flow quantization. Special attention is given to exploration with shear waves, heat flow due to climatic fluctuations, and induced polarization for detection of contaminated soils.

**528. Environmental Analysis**

(3-0-3) Staff

*Prerequisite:* Consent of instructor.

This course focuses on analytical techniques and instrumentation used in environmental research. Topics include sample preparation and extraction methods, potentiometry, spectroscopy (elemental and molecular), chromatography (gas, high performance, liquid, and ion), mass spectrometry, and data acquisition and analysis.

**542. Surficial Processes**

(2-3-3) Staff

*Prerequisite:* GEOS 342 or consent of instructor.

A quantitative study of natural chemical and physical processes (e.g., weathering) that produce both erosional and depositional landforms. One-day field trip is required.

**545. Microbes in Fluid-Rock Systems**

(3-0-3) Fein

*Prerequisite:* CE 430/530, GEOS 403/503, or equivalent.

This course explores current research involving the interaction between microbes and geologic systems, focusing on the ability of microbes to affect mass transport in fluid-rock systems. Readings concentrate on laboratory, field, and modeling studies of environmental and/or geologic interest.

**547. Geodynamics**

(3-0-3) Staff

*Prerequisite:* Consent of instructor.

This course applies continuum physics to geological problems, beginning with plate tectonics, progressing into the study of stress and strain in geologic strata from earth processes. Large-scale problems (frictional heating on faults, flow through volcanic pipes, mantle convection) are examined by applying principles from heat transfer, faulting, and fluid mechanics.

**562. ICP-MS Analytical Techniques**

(2-1-3) Neal

*Prerequisite:* Consent of instructor.

Introduction to the analytical technique of inductively coupled plasma-mass spectrometry (ICP-MS). The first half of the course covers the theory of ICP-MS as well as specialized sample introduction techniques. Three weeks are spent in the lab learning machine tuning/setup techniques, ICP-MS software, and sample preparation/calibration protocols. The last third of the course is spent conducting independent projects. Graduate students are strongly advised to relate this project to their research.

**568. Environmental Isotope Chemistry**

(3-0-3) Neal

*Prerequisite:* Consent of instructor.

The course focuses on radioactive and stable isotopes, both natural and manmade, in the environment. Specific topics include: age dating, identification of geological reservoirs, and radioactive waste disposal.

**598. Special Studies**

(V-V-V) Staff

Individual or small-group study under the direction of a faculty member in a graduate subject not concurrently covered by any University course.

**598C. Environmental and Technological Aspects of Minerals**

(3-0-3) Burns

*Prerequisite:* Consent of instructor.

This course explores the chemistry and structures of minerals with emphasis on environmental and technological issues. Topics of environmental significance include the disposal of spent nuclear fuel, contamination of soils with heavy metals, and the remediation of mine tailings. Emphasis will be on the mineralogy of uranium, lead, mercury, iodine, selenium, and tellurium. Technological aspects of minerals, such as the use of zeolites and clay minerals as molecular sieves and as waste containment vessels, will be addressed.

**599. Thesis Direction**

(V-V-V) Staff

Research to satisfy the six credit hours required for a research master's degree.

**600. Nonresident Thesis Research**

(0-0-1) Staff

Required of nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.

**634. Paleocology**

(3-0-3) Rigby

*Prerequisite:* GEOS 459 or equivalent.

This course covers pre- and postmortem ecology of ancient organisms, their depositional environments, behavior, and relationship to environmental conditions as interpreted from the rock record.

**635. High-Temperature Geochemistry**

(3-0-3) Neal

*Prerequisite:* CHEM 321, GEOS 403/503, or equivalent.

Study of magma generations and evolution from a geochemical and thermodynamic standpoint. Recognition of igneous processes will result in the formulation of petrogenetic models using actual data sets. These models will be tested using thermodynamic approaches.

**698. Special Studies**

(V-V-V) Staff

This number is reserved for specialized and/or experimental graduate courses. Content, credit, and instructor will be announced by the department.

**699. Research and Dissertation**

(V-V-V) Staff

Research and dissertation for resident doctoral students.

**700. Nonresident Dissertation Research**

(0-0-1) Staff

Required of nonresident graduate students who are completing their dissertations in absentia and who wish to retain their degree status.

**Upper-level Undergraduate Courses**

In addition to the geological sciences courses listed above, the following courses offered within the department for advanced undergraduates may be taken for graduate credit (to a total of 10 credit hours).

**454. Marine Geology****458. Geophysics****459. Paleontology****Faculty**

Peter C. Burns, *Chair and the Henry J. Massman Jr. Professor of Civil Engineering and Geological Sciences*. B.Sc., Univ. of New Brunswick, 1988; M.Sc., Univ. of Western Ontario, 1990; Ph.D., Univ. of Manitoba, 1994. (1997)

Jeremy B. Fein, *Director of the Environmental Molecular Science Institute and Associate Professor*. B.A., Univ. of Chicago, 1983; M.Sc., Northwestern Univ., 1986; Ph.D., *ibid.*, 1989. (1996)

Robert L. Irvine, *Professor Emeritus*. B.S., Tufts Univ., 1964; M.S., *ibid.*, 1965; Ph.D., Rice Univ., 1969. (1974)

Ahsan Kareem, Ph.D., *the Robert M. Moran Professor of Civil Engineering and Geological Sciences*. B.S., W. Pakistan Univ. of Engineering and Technology, 1968; M.S., Univ. of Hawaii, 1975; Ph.D., Colorado State Univ., 1978. (1990)

Sydney Kelsey, *Professor Emeritus*. B.Sc., Univ. of Leeds, 1946. (1967)

Lloyd H. Ketchum Jr., *Associate Professor and Fellow of the Helen Kellogg Institute for International Studies*. B.S.C.E., Michigan State Univ., 1960; M.S.E., Univ. of Michigan, 1964; M.Ph., *ibid.*, 1964; Ph.D., *ibid.*, 1972. (1973)

Tracy Kijewski-Correa, *the Rooney Family Assistant Professor*. B.S., Univ. of Notre Dame, 1997; M.S., *ibid.*, 2000; Ph.D. *ibid.*, 2003. (2003)

David J. Kirkner, *Associate Professor*. B.S., Youngstown State Univ., 1971; Ph.D., Case Western Reserve Univ., 1979. (1979)

Yahya C. Kurama, *Director of Graduate Studies and Associate Professor*. B.S., Bogazinci Univ., 1990; M.S., Lehigh Univ., 1993; Ph.D., *ibid.*, 1997. (1998)

Kenneth R. Lauer, *Professor Emeritus*. B.S., Univ. of Alberta, 1947; M.Sc., *ibid.*, 1948; M.C.E., Cornell Univ., 1952; Ph.D., Purdue Univ., 1960. (1956)

Jerry J. Marley, *Associate Professor Emeritus*. B.S., Univ. of Notre Dame, 1957; M.S., Iowa State Univ., 1962; Ph.D., *ibid.*, 1969. (1969)

Patricia A. Maurice, *Director of the Center for Environmental Science and Technology and Professor*. B.A., Johns Hopkins, 1982; M.S., Dartmouth, 1985; Ph.D., Stanford, 1994. (2000)

Clive R. Neal, *Associate Professor*. B.Sc., Univ. of Leicester, 1982; Ph.D., Univ. of Leeds, 1985. (1990)

Robert Nerenberg, *Assistant Professor*. M.S., Wayne State Univ., 1992; Ph.D., Northwestern Univ., 2003. (2003)

J. Keith Rigby Jr., *Associate Professor*. B.S., Brigham Young Univ., 1971; M.Phil., Columbia Univ., 1974; Ph.D., *ibid.*, 1976. (1982)

Rev. James A. Rigert, C.S.C., *Associate Professor Emeritus*. B.S., Univ. of Portland, 1957; M.S., Cornell Univ., 1960; Ph.D., Univ. of Illinois, 1971; Ph.D., Texas A&M Univ., 1980. (1973)

Stephen E. Silliman, *Professor and Fellow of the Center for Social Concerns*. B.S.E., Princeton Univ., 1979; M.S., Univ. of Arizona, 1981; Ph.D., *ibid.*, 1986. (1986)

Jeffrey W. Talley, *Assistant Professor*. B.S.F., Louisiana State Univ., 1981; M.A., Assumption College, 1985; M.L.A., Washington Univ. in St. Louis, 1988; M.S.E., Johns Hopkins Univ., 1995; Ph.D., Carnegie Mellon Univ., 2000. (2001)

James I. Taylor, *Professor Emeritus*. B.S.C.E., Case Institute of Technology, 1956; M.S.C.E., *ibid.*, 1962; Ph.D., Ohio State Univ., 1965. (1976)

Joannes J. Westerink, *Associate Professor*. B.S., State Univ. of New York, 1979; M.S., *ibid.*, 1981; Ph.D., Massachusetts Institute of Technology, 1984. (1990)

Jennifer R. Woertz, *Assistant Professor*. B.S., Univ. of Illinois, 1996; M.S., Univ. of Texas, 1998; Ph.D.; Univ. of Texas, 2003. (2003)

**Computer Science and Engineering****Chair:**

Kevin W. Bowyer

**Director of Graduate Studies:**

Gregory Madey

Telephone: (574) 631-9978

Fax: (574) 631-9260

Location: 326 Cushing Hall

E-mail: cse@nd.edu

Web: <http://www.cse.nd.edu>**The Program of Studies**

The graduate program in the Department of Computer Science and Engineering covers the major disciplines of computer science and computer engineering. The program is designed to prepare students for careers in these high technology areas, including university teaching and research as well as industrial or governmental research and advanced development.

To achieve this goal, the department offers programs of study and research leading to the degrees of master of science in computer science and engineering and the doctor of philosophy. Current research emphasizes six distinct areas: computing systems in emergent technologies, algorithms and the theory of

computation, prototyping computationally demanding applications, systems and networks software, e-technology, and computer vision and pattern recognition. New investigative thrusts highlighting nontraditional and interdisciplinary projects, such as bioinformatics and cognitive science are in the planning stages.

Some graduate students are admitted to the master's program. This program requires a minimum of 24 credit hours of course work beyond the bachelor's degree and a master's thesis. A full-time student can complete these requirements in three regular academic semesters plus the summer, although the majority of students take four semesters. The student must, upon the acceptance of the thesis, successfully pass an oral thesis defense examination.

Those students who show potential for the doctoral level work may be admitted to the Ph.D. program directly but are expected to complete the master's degree requirements first. Students who complete the master's program may also apply for admission to the doctoral program during their final semester of master's work. Doctoral students are normally required to accumulate a minimum of 36 credit hours of satisfactory course work beyond the bachelor's degree, plus a dissertation.

The doctoral program normally requires four years of full-time work. The requirements include successful completion of the Ph.D. qualifying and candidacy examinations, a dissertation, and the oral dissertation defense examination. Students are encouraged to pursue course work outside the department whenever such studies support their program in the major field.

The Ph.D. qualifying examination is written and is normally taken in the second spring semester after entering the program with a bachelor's degree. Those admitted with a master's degree are required to take the Ph.D. qualifying examination the first spring after entering the program. The Ph.D. candidacy requirement, which consists of a written and an oral part, is administered to determine if the student has identified a viable dissertation topic. The candidacy consists of a written topic proposal followed by an oral examination. After passing the Ph.D. candidacy, which typically takes place after the completion of the formal course work, the student devotes essentially all efforts to completing his or her dissertation research. At the dissertation defense, the student defends the

dissertation before an oral examining board. In recent years, students have completed the Ph.D. degree requirements in about four to five years.

Finally, both M.S. and Ph.D. candidates are required to complete a teaching apprenticeship that involves teaching duties of one semester for M.S. candidates and two semesters for Ph.D. candidates.

#### *Research Facilities*

Notre Dame's College of Engineering maintains a cluster of 99 Sun Microsystems Inc. UltraSPARC 30 workstations with 3D graphics display capability. The cluster also contains 15 iMacs, several Dell Optiplex GXPRO 180 workstations, six Hewlett-Packard 5SiMX laser printers, and a Hewlett-Packard 4500N color printer, which are available to students and researchers.

The University's computing center supports AFS file service with 20 UltraSPARC Enterprise file servers. These file servers provide over four Terabytes of RAID (0+1) mirrored/striped file storage space for the campus community. The computing center also supports a cluster of IBM RS/6000s, a 16-processor IBM SP-1, an eight-processor IBM SP-2 array and two Silicon Graphics computer/servers. The campus is currently connected to the VbNS Internet-II back-bone via a 155 million bit-per-second connection.

In addition to the cluster sponsored by the College of Engineering, the department maintains a 32-node, 64 processor Sun UltraSPARC array, three eight-node UltraSPARC 1 arrays, a 10-node 20-CPU Linux cluster, a two node 4 processor IBM SP-2 array, and three Compaq NT file servers. The department also provides 85 UltraSPARC workstations, 25 Windows workstations, 25 Linux systems, and 12 Apple Macintosh G3/G4 systems, A research ATM network, a research Myrinet gigabit network, a wireless 802.11 network, a scanner, color printer, 20 laser printers, and a large-bed plotter are also available to students.

The System and Network Administration lab contains two Compaq DL380 NT file servers, each containing 50 GB of RAID disk storage, a Sun UltraSPARC 60 file server, eight Compaq Windows 2000 workstations and eight Sun UltraSPARC 5 workstations. In addition, the lab contains a Cisco 4500 router, two Cisco 2924 Ethernet switches, an IBM 8285 ATM network, an IBM 8271 ATM to Ethernet bridge, a Hewlett Packard Internet

Advisor network analysis system, and various other pieces of network equipment.

The Artificial Intelligence and Robotics laboratory currently hosts five robots, one ActivMedia Pioneer Peoplebot, three ActivMedia Pioneer P2Dxe robots, and one Arrick Robotics Trilobot. All ActivMedia robots have an onboard Linux PC, Sony pan-tilt-zoom cameras and are equipped with wireless Ethernet links. They are operated using AGES, a distributed agent development environment under development in the lab. Additional computing equipment comprises four Dell Linux PC desktops, one Dell laptop, and one SUN UltraSPARC workstation.

Additional equipment is available by individual research group to support specific research projects. Specialized laboratories that include this equipment are the Distributed Computer Lab, the Laboratory of Computational Life Sciences, the Lab for VLSI, the Robotics Lab, and the Computer Vision Research Lab.

A specialized College of Engineering research library holds more than 50,000 volumes. The Engineering Library augments the University's Theodore M. Hesburgh Library, which contains more than three million volumes and receives 625 journals related to engineering. The Hesburgh Library also provides database searches and bibliographic instruction.

#### *Course Descriptions*

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

#### *511. Complexity and Algorithms* (3-0-3) Chen

A study of theoretical foundations of computer science and a selection of important algorithm techniques. Topics include the classes of P and NP; the theory of NP-completeness, linear programming, advanced graph algorithms, parallel algorithms, approximation algorithms, and randomized algorithms. (Spring)



*513. Numerical Methods and Computation*

(3-0-3) Izaguirre

Introduction to analysis and implementation of numerical methods for scientific computation. Topics include computer arithmetic, solution of linear and nonlinear equations, approximation, numerical integration and differentiation, numerical solution of ordinary and partial differential equations, and applications of all of these. (Fall)

*521. Computer Architecture*

(3-0-3) Ubran

Classic computer architectures are considered along with standard parameters for their evaluation. Characteristics that improve performance are introduced. Various forms of parallel processing with specific implementation examples are given. More recent architectural approaches to improve performance are discussed, such as RISC, Fault Tolerance, and others. (Spring)

*531. Programming Languages*

(3-0-3) Kogge

An introduction to modern programming concepts and computational models as embodied in a number of different classes of languages. These include (1) function-based languages such as Lisp, Scheme, SASL, ML; (2) logic-based languages such as Prolog, Parlog, Strand, OPS; and (3) object-oriented languages such as Smalltalk and C++. (Fall, even-numbered years)

*532. Software Engineering*

(3-0-3) Schaelicke

A comprehensive course about the methodologies required to control the complexity involved in the development of large software systems. Students are given the opportunity to practically apply software engineering techniques taught in this course through several medium-sized programming problems and one large-scale development project. Emphasis is on the use of requirements and prototyping for design and software reliability, reuse, and development management. (Fall, odd-numbered years)

*533. Object-Oriented Computing*

(3-0-3) Staff

Introduction to object-oriented computing and its application. Topics include: abstract data types, encapsulation, inheritance, classes and instances, C++ programming language, object implementation technologies, and example systems. (Spring, odd-numbered years)

*542. Operating System Design*

(3-0-3) Chandra, Striegel

Computer operating system design for resource management, communication, and security in a multiprogramming environment. Students will create modules for an existing operating system. (Fall)

*554. Computer Communication Networks*

(3-0-3) Staff

The analysis of computer communication protocols. The course focuses on existing communications protocols; local area networks; routing; queuing analysis; congestion control mechanisms; analysis of high-level applications. (Spring, odd-numbered years)

*562. VLSI Computer Design*

(3-0-3) Brockman

CMOS devices and circuits, scaling and design rules, floor planning, data and control flow, synchronization and timing. Individual design projects. (Fall)

*566. Computer Graphics*

(3-0-3) Flynn

Two-and-three dimensional geometric algorithms and transformations; curve and surface representation; visible surface determination; illumination and shading; advanced modeling; animation; generation and sensing of light. (Spring)

*571. Artificial Intelligence*

(3-0-3) Scheutz, Madey, Flynn

This course is intended as a base for further study in the fields encompassed by artificial intelligence. The focus is on representations, strategies, and mathematical formulation with some applications. (Fall, odd-numbered years)

*597. Directed Readings*

(V-V-V) Staff

Topics will vary from semester to semester and will be announced in advance. Possible topics might include: computer-aided design, numerical analysis and computation, distributed computing, computational geometry, special VLSI architectures, and others of interest to students and faculty.

*598. Special Studies*

(V-V-V) Staff

This number is reserved for specialized and/or experimental graduate courses. Content, credit, and instructor will be announced by department. (Offered if necessary)

*598E. Computational Methods in Biomolecular Modeling*

(3-0-3) Izaguirre

Study of algorithmic and computational issues in biomolecular modeling; multiple scale solvers for molecular dynamics, performance of several serial and parallel implementations, software engineering for scientific computing, and requirements for interactive modeling.

*598F. Behavior-Based Robotics*

(3-0-3) Scheutz

This course is designed to provide a forum for applying and testing artificial intelligence methods and models, especially behavior-based techniques, on a robot. While models will be evaluated with respect to their theoretical tenability, most emphasis will be given to issues of practicality. These practical considerations will be extensively studied in simulations as well as real-world implementations on a variety of robots. Implementations might also comprise new ideas, hopefully giving rise to original research results.

*598M. Digital Systems Testing*

(3-0-3) Michael

A comprehensive and detailed treatment of digital systems testing and testable design. Fundamental concepts as well as the latest advances and challenges in the field of ULSI/VLSI testing are examined. Topics covered include fault modeling and simulation, combinational and sequential circuit test generation, memory and delay test, and design-for-testability methods such as scan and built-in self-test. Testing of embedded cores in systems-on-chip environments is also considered. A major outcome of this course is the analysis, design, and implementation of CAD tools that give solutions to test-related problems.

*598N. Computer Networks*

(3-0-3) Chandra

Course projects will be chosen allowing the opportunity to explore research ideas of interest with a goal to produce conference-quality publications. Good research potential is preferred over a system that just works. Projects will be evaluated on the demonstration of the lessons learned as well as the coherent presentation of the results. A public mini-symposium will be organized at the end of the semester with groups presenting their experiences.

*598Q. Computer Vision*

(3-0-3) Flynn

Course is designed to give broad coverage of computer vision fundamentals and in-depth coverage of the research literature in a topic of interest to the student. Lectures introducing the fundamentals of each topic area will be followed by discussions.

*599. Thesis Direction*

(V-V-V) Staff

Research to satisfy the six credit hours required for the master's degree. (Every semester)

*600. Nonresident Thesis Research*

(0-0-1) Staff

Required of nonresident master's degree students who are completing their theses in absentia and who wish to retain their degree status. (Every semester)

*611. Parallel Algorithms*

(3-0-3) Chen

Introduction to parallel computational models (e.g., PRAM, fine-grain networks, and coarse-grain networks); relationship and simulation between different models. Parallel algorithm techniques and their implementation in various models for sorting, searching, message routing, data structures, graph problems, geometric problems, the FFT and matrix operations. Layout techniques and their relationship to VLSI layout systems. Lower bound results on communication complexity. Inherently sequential problems and P-completeness. (Spring, odd-numbered years)

*643. Principles of Parallel Computing*

(3-0-3) Schaelicke

A comprehensive study of the fundamentals and research frontiers of parallel computing. Topics include new computing paradigm of shared-memory, distributed-memory, data-parallel and data-flow models; techniques to improve parallelism, scheduling theory, algorithms for parallel machines, and interconnection networks. (Fall, odd-numbered years)

*644. Distributed Systems*

(3-0-3) Chandra

Study of recent trends in the design of distributed operating systems. It examines the role of network operating systems as distinct from distributed operating systems communication, interprocess communication issues, and questions of synchronization. Distributed naming, process management, and migration and resource allocation are also covered.

Communication and security are reviewed and important experimental systems are explored. (Spring, even-numbered years)

*655. Specialized Parallel Architectures*

(3-0-3) Staff

A comprehensive study of the fundamental issues and recent developments of designing parallel and pipelined array processors and control/data path in the algorithmic and architectural levels. Topics include methodologies of mapping algorithms onto processor arrays, partitioning, scheduling, resource binding, algorithm transformations, and fault tolerance. (Fall, even-numbered years)

*697. Directed Readings*

(V-V-V) Staff

Topics will vary from semester to semester and will be announced in advance. Possible topics might include: computer-aided design, numerical analysis and computation, distributed computing, computational geometry, special VLSI architectures, and others of interest to students and faculty.

*698. Special Studies*

(V-V-V) Staff

This number is reserved for specialized and/or experimental graduate courses. Content, credit, and instructor will be announced by department. (Offered if necessary)

*698E. Advanced Embedded Systems Design*

(3-0-3) Hu

This is an advanced graduate level course intended to expose students to the state-of-the-art design and analysis techniques for embedded systems. The main topics include system modeling, performance and power/energy analysis and estimation, system-level partitioning, synthesis and interfacing, co-simulation and emulation, and re-configurable computing platforms.

*699. Research and Dissertation*

(V-V-V) Staff

Research and dissertation for resident doctoral students. (Every semester)

*700. Nonresident Dissertation Research*

(0-0-1) Staff

Required of nonresident doctoral students who are completing their dissertations in absentia and who wish to retain their degree status. (Every semester)

*Upper-level Undergraduate Courses*

The following undergraduate courses, described in the *Bulletin of Information, Undergraduate Programs*, may be taken for graduate credit:

411. Automata

413. Algorithms

422. Computer System Design

439. Computer Simulation

443. Compilers

444. Introduction to System Administration

456. Data Networks

458. Network Management

471. Introduction to Artificial Intelligence

472. Introduction to Neural Networks

*Faculty*

Panos J. Antsaklis, *Director of the Center for Applied Mathematics, the H. C. and E. A. Brosey Professor of Electrical Engineering, and Concurrent Professor of Computer Science and Engineering*. Dipl., National Technical Univ. of Athens, 1972; M.S., Brown Univ., 1974; Ph.D., *ibid.*, 1977. (1980)

Kevin W. Bowyer, *Chair, the Schubmehl-Prein Professor, and Concurrent Professor of Electrical Engineering*. B.S., George Mason Univ., 1976; Ph.D., Duke Univ., 1980. (2001)

Jay B. Brockman, *Associate Professor and Concurrent Associate Professor of Electrical Engineering*. Sc.B., Brown Univ., 1982; M.S.E.E., Carnegie Mellon Univ., 1988; Ph.D., *ibid.*, 1992. (1992)

Ramzi K. Bualuan, *Associate Professional Specialist*. B.S.E.E., American Univ. Beirut, 1983; M.S., Univ. of Notre Dame, 1985. (1993)

Surender Chandra, *Assistant Professor*. B.E., Anna Univ., Madras, 1988; M.S., Worcester Polytechnic Institute, 1993; Ph.D., Duke Univ., 2000. (2002)

Danny Z. Chen, *Professor*. B.S., Univ. San Francisco, 1985; M.S., Purdue Univ., 1988; Ph.D., *ibid.*, 1992. (1992)

Patrick J. Flynn, *Associate Professor*. B.S.E.C.E., Michigan State Univ., 1985; M.S.C.S., *ibid.*, 1986; Ph.D., *ibid.*, 1990. (2001)

Joseph C. Freeland, *Associate Professional Specialist*. B.S.E., Purdue Univ., 1985. (1995)

Eugene W. Henry, *Professor Emeritus*. B.S.E.E., Univ. Notre Dame, 1954; M.S.E.E., *ibid.*, 1955; Ph.D., Stanford Univ., 1960. (1960)

Xiaobo (Sharon) Hu, *Associate Professor*. B.S., Tianjin Univ., 1982; M.S., Polytechnic Institute New York, 1984; Ph.D., Purdue Univ., 1989. (1996)

Yih-Fang Huang, *Chair and Professor of Electrical Engineering and Concurrent Professor of Computer Science and Engineering*. B.S.E.E., National Taiwan Univ., 1976; M.S.E.E., Univ. of Notre Dame, 1980; M.A., Princeton Univ., 1981; Ph.D., *ibid.*, 1982. (2003)

Jesús A. Izaguirre, *Assistant Professor*. B.A., ITESM-Mexico, 1991; M.S., Univ. of Illinois Urbana-Champaign, 1996; Ph.D., *ibid.*, 1999. (1999)

Meneloas Karavelas, *Assistant Professor*. Dipl., National Technical Univ. of Athens, 1995; M.S., Stanford Univ., 1997; Ph.D., *ibid.*, 2001. (2003)

Peter M. Kogge, *the Ted H. McCourtney Professor*. B.S., Univ. of Notre Dame, 1968; M.S., Syracuse Univ., 1970; Ph.D., Stanford Univ., 1973. (1994)

Gregory R. Madey, *Director of Graduate Studies, Professional Specialist, and Concurrent Associate Professor*. B.S., Cleveland State Univ., 1974; M.S., *ibid.*, 1975; M.S., Case Western Reserve Univ., 1979; Ph.D., *ibid.*, 1984. (2000)

Maria K. Michael, *Visiting Assistant Professor*. B.S., Southern Illinois Univ., 1996; M.S., *ibid.*, 1998; Ph.D., *ibid.*, 2002. (2002)

Lambert Schaelicke, *Assistant Professor*. Dipl., Tech. Univ. Berlin, 1995; Ph.D., Univ. Utah, 2001. (2001)

Matthias Scheutz, *Assistant Professor*. M.A., Univ. of Vienna, 1989; M.S., *ibid.*, 1993; M.S.E.E., Vienna Univ. of Technology, 1993; Ph.D., Univ. Vienna, 1995; M.S., Indiana Univ., 1996; Ph.D., *ibid.*, 1999. (1999)

Robert Stevenson, *Professor of Electrical Engineering and Concurrent Professor of Computer Science and Engineering*. B.E.E.E., Univ. Delaware, 1986; Ph.D., Purdue Univ., 1990. (2003)

Aaron Striegel, *Assistant Professor*. B.S., Iowa State Univ., 1998; Ph.D., *ibid.*, 2002. (2003)

John J. Uhran Jr., *Senior Associate Dean for Academic Affairs in the College of Engineering, Professor of Computer Science and Engineering, and Professor of Electrical Engineering*. B.S., Manhattan College, 1957; M.S., Purdue Univ., 1963; Ph.D., *ibid.*, 1966. (1966)

## Electrical Engineering

### Chair:

Yih-Fang Huang

### Director of Graduate Studies:

Thomas E. Fuja

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### The Program of Studies

The department offers programs leading to the M.S. and Ph.D. degrees in electrical engineering. Research areas include communications systems; control systems; signal and image processing; solid-state nanoelectronics, microwave electronics, optoelectronic materials and devices, and ultrahigh-speed and microwave-integrated circuits.

A research M.S. degree requires a total of 30 credit hours beyond the B.S., with at least 6 credit hours coming from thesis research. A research M.S. also requires the completion and defense of an M.S. thesis. A nonresearch M.S. degree requires 30 credit hours of course work. All students must take a written qualifying examination at the end of their second semester of graduate study; successful completion of the exam is required to receive an M.S. degree and to continue to the Ph.D. program. Doctoral students must accumulate a minimum of 36 course credits beyond the B.S. degree, pass the qualifying and candidacy examinations at the Ph.D. level, spend at least two years in resident study, and write and defend a Ph.D. dissertation.

### Research Areas

*Electronic Circuits and Systems.* Approximately half of the faculty members have research interests in this area, which includes systems and control, signal and image processing, and communications. Projects are conducted in the following areas: turbo coding and iterative decoding; bandwidth efficient coding and modulation; radio architecture and codes for deep space and satellite communications; multimedia communication-combined source and channel coding and restoration techniques for robust transmission of video/audio; statistical signal processing-array signal processing (radar, sonar) and adaptive interference mitigation in wireless communications; identification and estimation-blind identification, set membership estimation, adaptive equalization, and spectral analysis; digital filtering-analysis and design of multi-

dimensional filters, floating point realizations, robust stability of discrete-time systems, and nonlinear discrete-time systems; digital image processing-data compression for image sequences, video data processing, tomographic image reconstruction, and image restoration/enhancement; control systems-investigations of stability, robust control, restructurable control, zero dynamics, modeling, and nonlinear servomechanism design; control of communication networks; autonomous control systems-theoretical developments for realization of control systems with enhanced operational capabilities; hybrid and discrete event systems; and large-scale dynamic systems-qualitative properties of large-scale dynamical systems addressing Lyapunov stability, input-output properties, and decomposition problems.

*Electronic Materials and Devices.* The other half of the faculty members have research interests in this area, which includes solid-state, nanoelectronics, and optoelectronic materials and devices. Current research projects include quantum device phenomena-optical properties, localization, universal conductance fluctuations, transport, interference, and resonant tunneling; nanoelectronic systems-novel circuits-and-systems architectures for the nanoelectronic regime; experimental nanoelectronics-nanofabrication of quantum dots, cryogenic characterization of single-electron effects, and ultra-small resonant tunneling diodes for ultrahigh-speed digital ICs; nano-spectroscopy-high-spatial, spectral, and temporal resolution investigations of quantum dots via atomic force microscopy and near-field scanning optical microscopy; device degradation-studies of the electromigration behavior of ultrasmall metal interconnects and hot carrier effects in MOS oxide breakdown phenomena; optoelectronic materials-studies of the optical and material properties of compound semiconductor native oxides; optoelectronic devices-fabrication and characterization of waveguides and optical components for integrated photonic ICs, semiconductor lasers, and optical amplifiers; micromachining-fabrication of microelectromechanical devices utilizing Si processing, particularly reactive ion etching; and ultrahigh-speed circuits and devices for digital and microwave circuit applications.

### Research Facilities

Several major research laboratories in the department support the study of electronic and photonic materials and devices and the

analysis and design of communication systems, control systems, and signal and image processing.

The Nanofabrication Facility allows fabrication of ICs and devices with geometries as small as 0.02 microns. The 3600-square-foot cleanroom contains a photomask generator, four contact mask aligners, a wafer stepper, nine furnace tubes, a plasma etcher, PECVD, APCVD, LPCVD, RIE, ICP Deep RIE, five evaporators, and a sputtering system. Inspection systems include an ISI SEM, Hitachi FESEM, a prism coupler, an interferometer, an ellipsometer, a variable-angle spectroscopic ellipsometer, two surface profilers, a four-point probe, and two Zeiss optical microscopes. A 50-kV SEM/EML system is available for nanolithography. Postprocessing equipment includes a wafer-dicing saw, and two wire bonders.

Advanced measurement facilities include low-temperature equipment such as a  $^3\text{He}$  cryostat capable of 300 mK and magnetic fields of 11T and a dilution refrigerator capable of 10mK, with fields up to 11T. A UHV-STM with atomic resolution is available for sample characterizations, along with two AFMs.

The High-Speed Circuits and Devices Laboratory houses a state-of-the-art microwave and high-speed digital device and circuits characterization facility. Full on-wafer testing capability, including analog characterization to 50 GHz and digital testing to 12.5 Gb/s, allow for comprehensive characterization of both analog and digital high-speed microelectronic circuits. In addition, facilities for high-speed optoelectronic characterization of detectors and photoreceiver subsystems for fiber-optic telecommunications are available. State-of-the-art microwave CAD, data collection, and data analysis facilities are also in place for rapid circuit design and characterization. The Semiconductor Optics Lab includes a 15-watt Argon-ion laser, a tunablemode-locked Ti:sapphire laser delivering femtosecond pulses, an He-Cd laser, and He cryostats with high spatial resolution and magnetic fields up to 12 Tesla.

The Laboratory for Image and Signal Analysis (LISA) features a dozen state-of-the-art workstations for development and analysis of digital signal, image, and video processing algorithms; equipment for the acquisition, processing, and real-time display of HDTV sequences; cameras; frame grabbers; a flat-bed scanner; several high-definition, 24-bit color monitors; and specialized printers.

The Control Systems Research Laboratory contains several workstations networked to a set of dSpace miniboxes (microcontrollers) and a network of personal computers (PCs) running QNX (a real-time version of UNIX).

The Communication Systems Research Laboratory and the Wireless at Notre Dame (WAND) lab have a full complement of RF measurement equipment, wide-band digitizers, and connections to roof antennas as well as a full complement of supporting workstations.

The department has its own electronics shop run by a full-time technician, and the Solid-State Laboratories are overseen by a full-time professional specialist and a full-time technician. Another full-time professional specialist manages the department's undergraduate laboratories.

#### *Application*

GRE General Test scores, TOEFL scores for international students, two transcripts showing academic credits and degrees, letters of recommendation from 3 or 4 college faculty members and a statement of intent should be sent to the Graduate Admissions Office, University of Notre Dame, 502 Main Building, Notre Dame, Indiana 46556.

The GRE should be taken no later than January preceding the academic year of enrollment, particularly if financial aid is desired.

The application deadlines are November 1 for the spring semester and February 1 for fall admission.

#### *Course Descriptions*

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

#### *546, 546L. IC Fabrication and Laboratory* (3-0-3) Snider

This course introduces students to the principles of integrated circuit fabrication. Topics covered in the lectures include photolithography, impurity deposition and diffusion, oxidation, thin-film deposition, and dry etching, as well as advanced fabrication

techniques such as chemical-mechanical polishing (CMP) and dual-damascene. In the laboratory, students will apply these methods to fabricate a poly-silicon gate CMOS integrated circuit. The circuits fabricated, such as a sound chip playing the Notre Dame fight song, typically contain more than 5,000 transistors.

#### *550. Linear Systems*

(3-0-3) Bauer

*Prerequisite:* EE 354 or equivalent.

State variable descriptions of linear dynamical systems. Solution of state equations for continuous-time and discrete-time systems. Input-output descriptions: impulse response and transfer function. Controllability, observability, canonical forms, stability. Realizations of input-output descriptions. State feedback and state observers. Polynomial matrix and matrix fraction descriptions of linear, time-invariant systems. (Fall)

#### *551. Mathematical Programming*

(3-0-3) Antsaklis

Theory of constrained optimization complemented by comprehensive computing exercises. Linear programming and convexity. Simplex algorithm. Optimality conditions for nonlinear optimization. Convergence of algorithms. Interior point methods in linear programming. (Alternate spring)

#### *553. Advanced Digital Communications*

(3-0-3) Costello

*Prerequisite:* EE 563 or equivalent.

Review of the signal space approach to communication theory and the derivation of optimum receiver principles. Intersymbol interference and equalization. Modulation and coding for fading and wireless channels. Introduction to spread spectrum communication and digital cellular systems. (Spring)

#### *555. Multivariable Control*

(3-0-3) Lemmon

*Prerequisite:* EE 550 or equivalent.

This course studies the design of robust optimal controllers for linear continuous-time systems. Topics include: normal linear signal/system spaces, matrix fraction descriptions, internal stability, uncertain systems, robust stability, robust performance, SISO/MIMO loopshaping, linear fractional transformations and the generalized regulator problem,  $H_2/H_\infty$  optimal control, algebraic Riccati equation, and balanced model reductions. (Spring)

556. *Fundamentals of Semiconductor Physics*  
(3-0-3) Seabaugh

*Prerequisite:* EE 357, EE 476 or equivalent.  
Treatment of the basic principles of solids. Topics include periodic structures, lattice waves, electron states, static and dynamic properties of solids, electron-electron interaction transport, and optical properties. (Fall)

558, 558L. *Microwave Circuit Design and Measurement*

(3-0-3) Fay  
An introduction to microwave circuit design, analysis, and measurement techniques, with emphasis on computer-aided design and application to modern microwave communication and sensing systems. (Spring)

561. *Multi-Dimensional Signal Processing*  
(3-0-3) Bauer

An introduction to the analysis and design of systems that process multidimensional signals. Emphasis is placed on the study of m-D digital filters and m-D signals. Specific topics include m-D sampling, m-D transforms, analysis and design of FIR and IIR m-D filters, stability, quantization effects, inverse problems, etc. (Alternate spring)

563. *Stochastic Processes*  
(3-0-3) Laneman

*Prerequisites:* MATH 323 and EE 354.  
This course provides a graduate-level introduction to probability, random variables, and distribution functions, including random sequences and probabilistic convergence. It also covers fundamental concepts of stochastic processes such as stationarity, second-order statistics, Gaussian processes, Markov processes, and linear system responses to stochastic processes. More advanced topics include abstract vector space concepts and the vector space of random variables, random sequence representations of random processes, and time averages and ergodicity. (Fall)

566. *Solid-State Devices*  
(3-0-3) Snider

*Prerequisite:* EE 556 or equivalent.  
In-depth analysis of electronic devices with an emphasis on both homojunction and hetero-junction devices. Operation of p-n junctions is analyzed, along with BJTs, MOSFETs, and heterojunction devices such as HBTs and MODFETs. (Spring)

571. *Statistical Signal Processing*  
(3-0-3) Huang

*Prerequisite:* EE 563 or equivalent.  
This course covers essential statistical concepts for signal and image processing. The topics include Bayesian estimation methods such as MMSE and MAP as well as MLE; optimality theory of estimation that includes concepts of sufficiency, consistency, and efficiency; Fisher's information; confidence intervals and basic hypothesis testing; classical Fourier-analysis based spectral analysis methods and modern eigen-decomposition based methods such as MUSIC and ESPRIT; interference suppression for emerging communication technologies such as wireless multiuser communications. (Spring)

576. *Microelectronic Materials*  
(3-0-3) Kosel

*Prerequisite:* EE 486 or equivalent.  
*Prerequisite:* 476 or equivalent introduction to electronic properties of materials. Principles of materials science applied to materials issues in fabrication, operation, and reliability of microelectronic devices. (Spring)

580. *Nonlinear Control Systems*  
(3-0-3) Lemmon

*Prerequisite:* EE 450 or equivalent.  
This course studies the analysis and design of nonlinear feedback control systems. Topics include: Lyapunov stability, Input-Output Stability of Perturbed Systems, Model-reference adaptive control, sliding mode control, Lyapunov redesign methods, back stepping, and feedback linearization. (Alternate fall)

581. *Digital Image Processing*  
(3-0-3) Stevenson

*Prerequisite:* EE 563.  
An introduction to the manipulation and analysis of digital images, intended as a foundation for research in such fields as visual communications, medical imaging, and image analysis. Specific topics include human visual effects, filtering, compression, restoration, and reconstruction. (Alternate fall)

587. *Quantum Mechanics for Electrical Engineers*

(3-0-3) Lent  
The course focuses on those aspects of quantum theory that are of particular relevance to electrical engineering. It is intended to give seniors and first-year graduate students a working knowledge of quantum mechanics at a level sufficient to illuminate the operation of standard and advanced quantum devices. Topics include classical mechanics versus quantum mechanics, early quantum theory,

Schrödinger formulation, time-dependent and time-independent Schrödinger equation, Dirac formulation, Bloch theorem, magnetic effects, open quantum systems, and density matrices.

598. *Special Studies*  
(V-V-V) Staff

Individual or small-group study under the direction of a faculty member in a graduate subject not currently covered by any University course. (Fall and spring)

598A. *Modern Photonics*  
(3-0-3) Hall

*Prerequisite:* EE 347, 556 or equivalent.  
A hands-on overview of the important role of photons alongside electrons in modern electrical engineering. Photonics technologies studied include lasers, optical fibers, integrated optics, optoelectronic devices, and optical modulators. A survey of the properties of light, its interactions with matter, and techniques for generating, guiding, modulating and detecting coherent laser light.

598E. *Optical Characterization of Nanostructures*  
(3-0-3) Merz

*Prerequisites:* Undergraduate quantum mechanics, electricity and magnetism, and solid state physics. Graduate students of chemistry, engineering, materials science, and physics are welcome *with approval of the instructor*. This course treats the optical characterization techniques that are employed to investigate the physical properties of modern semiconducting materials. A brief overview will first be given of the basic science and growth of these materials, and the theory for their optical characterization. A detailed description will then be provided of measurement techniques, illustrated by examples of the application of these techniques to current semiconductor research and technology. Emphasis will be given to the use of these techniques to investigate low dimensional nanostructures such as quantum wells, wires, and dots.

598F. *Analog Integrated Circuit Design*  
(3-0-3) Seabaugh

This course covers bipolar and complementary metal oxide semiconductor (CMOS) amplifier design, including frequency response, noise, feedback, stability, and compensation. Operational amplifiers, bandgap reference circuits, oscillators, and phase lock loops are analyzed. Both analytic and SPICE circuit design methods are developed.

*598G. Robust Stability of Linear Systems*

(3-0-3) Bauer

*Prerequisite:* A good background in linear systems.

This course provides a graduate-level coverage of recent results in robust stability of dynamical systems under structured uncertainties. Since the content is based on various recent publications, there is no textbook required. Topics will include stability of continuous and discrete domain polynomials, continuous and discrete state space systems, and time-variant/nonlinear systems. Fundamental tools such as the principle of argument and the Hermite-Biehler Theorem will be covered early in the course.

*598H. Instrumentation for Nanoelectronics*

(3-0-3) Orlov

*Prerequisite:* EE 342.

This lab course is intended to give students hands-on practice on measurements and applications of nanoelectronics devices combined with development and implementation of interfacing instrumentation. Single-Electron and Nanomagnetic devices are the primary subjects of the course.

*598I. Advanced Instrumentation and Measurement*

(3-0-3) Orlov

*Prerequisite:* EE 342.

This course covers the general information on instrumentation and measurements. It aims to give the broad introduction to electronic instrumentation as well as provide in depth coverage of modern instrumentation systems used in cutting-edge research and applications in microelectronics. Significant attention is paid to cover noise and interference reduction and signal conditioning. Various examples of practical applications are explained in detail.

*598X. Principles of Vacuum Systems for Microelectronics*

(1-0-1) Bernstein

*Prerequisite:* EE 446, EE 546 or consent of instructor.

Fundamentals of vacuum environments and systems for microelectronics applications. A survey of vacuum pumps, gauges, and practices will be presented.

*598Y. SEM and Nanofabrication*

(1-0-1) Bernstein

*Prerequisite:* EE 446, EE 546 or consent of instructor.

A short introduction to fundamentals of scanning electron microscopy and electron beam lithography. SEM fundamentals will be used to illustrate issues in nanofabrication by EBL.

*598Z. Advanced Nanolithography*

(1-0-1) Bernstein

*Prerequisite:* EE 446, EE 546 and EE 598X or consent of instructor.

A short introduction to the wide array of technologies used for performing lithography below 0.1 micron.

*599R. Thesis Direction*

(V-V-V) Staff

Research to satisfy the six credit hours required for the master's degree. (Fall and spring)

*600. Nonresident Thesis Research*

(0-0-1) Staff

Required of nonresident master's students who are completing their theses in absentia and who wish to retain their degree status. (Fall and spring)

*650. Advanced Linear Systems Design*

(3-0-3) Sain

*Prerequisite:* EE 550 or consent of instructor.

Applications of modern algebra to problems of complicated linear system design. Quotients and state variable design; freedom and system-matrix design; tensors and multilinear design. (Alternate fall)

*653. Information Theory*

(3-0-3) Costello

*Prerequisite:* EE 563 or equivalent.

A study of Shannon's measure of information to include: mutual information, entropy, and channel capacity; the noiseless source coding theorem; the noisy channel coding theorem; rate distortion theory and data compression; channel coding and random coding bounds. (Alternate fall)

*654. Coding Theory*

(3-0-3) Costello

*Prerequisite:* EE 563 or equivalent.

Error control coding techniques for digital transmission and storage systems. Linear block codes, cyclic codes, BCH codes, and Reed-Solomon codes. Syndrome decoding. Convolutional codes, maximum likelihood decoding, maximum a posteriori probability decoding, and sequential decoding. Block and trellis coded modulation. Low density parity check codes and turbo codes. Applications to computer memories, data networks, space and satellite transmission, data modems. (Alternate fall)

*655. Digital Control Systems*

(3-0-3) Antsaklis

*Prerequisite:* EE 455 and EE 550 or equivalent.

Analysis and design of discrete-time and sampled-data control systems. State space descriptions and transfer function descriptions using the z-transform. Control design using classical (root-locus, Bode, Nyquist), state space, and polynomial techniques. (Alternate spring)

*665. Control Systems Optimization*

(3-0-3) Sain

*Prerequisite:* EE 555 or consent of instructor.

History of the Optimal Control Problem. Ideas of Jacobi, of Lagrange, of Hamilton, and of Pontryagin. Necessary conditions for solutions; sufficient conditions for solutions. Solution settings in terms of partial differential equations and in terms of two-point boundary value problems. Extensions to the case of competing control players. Introduction to the theory of dynamic games. Two-player, zero-sum games. Stochastic games. Game value as a random variable. Cumulants as a random variable description. Cumulant games. (Alternate fall)

*675. Stochastic Control Theory*

(3-0-3) Sain

*Prerequisite:* EE 555 or consent of instructor.

Optimal control in the presence of process noise. Cost as a random variable. Minimizing average cost over many realizations of a process. Optimal control when the system will operate only a small number of times. Distribution of the cost. Description of stochastic cost by moments or by cumulants. Optimal stochastic control of cost cumulants. Application to the protection of buildings from earthquakes. (Alternate fall)

*698. Special Studies*

(V-V-V) Staff

This number is reserved for specialized and/or experimental graduate courses. Content, credit, and instructor will be announced by department. (Offered as necessary)

*699. Research and Dissertation*

(V-V-V) Staff

Research and dissertation for resident doctoral students. (Fall and spring)

*700. Nonresident Dissertation Research*

(0-0-1) Staff

Required of nonresident doctoral students who are completing their dissertations in absentia and who wish to retain their degree status. (Fall and spring)

### Upper-level Undergraduate Courses

Up to six credits at the 400-499 level may be applied toward the M.S. degree, and up to twelve credits at the 400-499 level may be applied to the Ph.D. The following undergraduate courses, described in the *Bulletin of Information, Undergraduate Programs*, are available for graduate credit:

- 446. IC Fabrication Laboratory
- 453. Communication Systems
- 455. Control Systems
- 456. Data Networks
- 458. Engineering Electromagnetics
- 464. Introduction to Neural Networks
- 466. Topics in Electronic Transport Theory
- 468. Modern Photonics
- 471. Digital Signal Processing
- 472. Analysis of A-C Power Systems
- 476. Electronic Properties of Materials
- 477. Photovoltaics
- 486. Analog Integrated Circuit Design
- 496. Digital Integrated Circuits

### Faculty

Panos J. Antsaklis, *Director of the Center for Applied Mathematics, the H. C. and E. A. Brosey Professor of Electrical Engineering, and Concurrent Professor of Computer Science and Engineering*. Dipl., National Technical Univ. of Athens, 1972; Sc.M., Brown Univ., 1974; Ph.D., *ibid.*, 1977. (1980)

Peter H. Bauer, *Professor*. Diplom. Engineer in Electrical Engineering, Technische Universitaet Muenchen, 1984; Ph.D., Univ. of Miami, 1987. (1988)

Gary H. Bernstein, *Associate Chair and Professor*. B.S.E.E., Univ. of Connecticut, 1979; M.S.E.E., Purdue Univ., 1981; Ph.D., Arizona State Univ., 1987. (1988)

William B. Berry, *Professor Emeritus*. B.S.E.E., Univ. of Notre Dame, 1953; M.S.E.E., *ibid.*, 1957; Ph.D., Purdue Univ., 1963. (1964)

Kevin Bowyer, *Chair and the Schubmehl-Prein Professor of Computer Science and Engineering and Concurrent Professor of Electrical Engineering*. B.S., George Mason Univ., 1976; Ph.D., Duke Univ., 1980. (2001)

Jay B. Brockman, *Associate Professor of Computer Science and Engineering and Concurrent Associate Professor*. Sc.B., Brown Univ., 1982; M.S.E.E., Carnegie Mellon Univ., 1988; Ph.D., *ibid.*, 1992. (2002)

Oliver M. Collins, *Professor*. B.S., California Institute of Technology, 1986; M.S.E.E., *ibid.*, 1987; Ph.D., *ibid.*, 1989. (1995)

Daniel J. Costello, *the Leonard Bettex Professor of Electrical Engineering*. B.S.E.E., Seattle Univ., 1964; M.S.E.E., Univ. of Notre Dame, 1966; Ph.D., *ibid.*, 1969. (1985)

Patrick J. Fay, *Assistant Professor*. B.S.E.E., Univ. of Notre Dame, 1991; M.S.E.E., Univ. of Illinois at Urbana-Champaign, 1993; Ph.D., *ibid.*, 1996. (1997)

Thomas E. Fuja, *Director of Graduate Studies and Professor*. B.S.E.E., Univ. of Michigan, 1981; M.S.E.E., Cornell Univ., 1983; Ph.D., *ibid.*, 1987. (1998)

Martin Haenggi, *Assistant Professor*. Dipl. El.-Ing. ETH, ETH Zurich, 1995; Dipl. NDS ETH, *ibid.*, 1998; Ph.D., *ibid.*, 1999 (2000)

Douglas C. Hall, *Associate Professor*. B.S., Miami Univ., 1985; M.S., Univ. of Illinois at Urbana-Champaign, 1988; Ph.D., *ibid.*, 1991. (1994)

Yih-Fang Huang, *Chair and Professor of Electrical Engineering and Concurrent Professor of Computer Science and Engineering*. B.S.E.E., National Taiwan Univ., 1976; M.S.E.E., Univ. of Notre Dame, 1979; Ph.D., Princeton Univ., 1982. (1982)

Debdeep Jena, *Assistant Professor*. Ph.D., Univ. of California, Santa Barbara, 2002.

Thomas H. Kosel, *Associate Professor*. B.S., Univ. of California, 1967; M.S., *ibid.*, 1970; Ph.D., *ibid.*, 1975. (1978)

J. Nicholas Laneman, *Assistant Professor*. Ph.D., Massachusetts Institute of Technology, 2002. (2002)

Michael D. Lemmon, *Associate Professor*. B.S.E.E., Stanford Univ., 1979; M.S.E.E., Carnegie Mellon Univ., 1987; Ph.D., *ibid.*, 1990. (1990)

Craig S. Lent, *Professor*. A.B., Univ. of California, Berkeley, 1978; Ph.D., Univ. of Minnesota, 1984. (1986)

James L. Merz, *the Frank M. Freimann Professor of Electrical Engineering*. B.S., Univ. of Notre Dame, 1959; M.A., Harvard Univ., 1961; Ph.D., *ibid.*, 1967. (1994)

Anthony N. Michel, *the Frank M. Freimann Professor Emeritus of Engineering*. B.S.E.E., Marquette Univ., 1958; M.S., *ibid.*, 1964; Ph.D., *ibid.*, 1968; D.Sc., Tech. Univ., Graz, 1973. (1984)

Alexander Mintairov, *Research Associate Professor*. Ph.D., Ioffe Physical Technical Institute, Russia, 1987. (2003)

Alexei Orlov, *Research Associate Professor*. Ph.D., Russian Academy of Science, 1990.

John Ott, *Assistant Professional Specialist*. M.S.E.E., Univ. of Notre Dame, 1998.

Wolfgang Porod, *Director of the Center for Nano Science and Technology and the Frank M. Freimann Professor of Electrical Engineering*. M.S., Univ. of Graz, 1979; Ph.D., *ibid.*, 1981. (1986)

Joachim J. Rosenthal, *Professor of Mathematics and Concurrent Professor of Electrical Engineering*. Vordiplom, Univ. Basel, 1983; Diplom, *ibid.*, 1986; Ph.D., Arizona State Univ., 1990. (1990)

Michael K. Sain, *the Frank M. Freimann Professor of Electrical Engineering*. B.S., St. Louis Univ., 1959; M.S., *ibid.*, 1962; Ph.D., Univ. Illinois, 1965. (1965)

Ken D. Sauer, *Associate Professor*. B.S.E.E., Purdue Univ., 1984; M.S.E.E., *ibid.*, 1985; M.A., Princeton Univ., 1987; Ph.D., *ibid.*, 1989. (1989)

R. Michael Schafer, *Professional Specialist*. B.S.E.E., Univ. of Notre Dame, 1975; M.S.E.E., *ibid.*, 1977; Ph.D., *ibid.*, 1980. (1996)

Alan C. Seabaugh, *Professor*. B.S.E.E., Univ. of Virginia, 1977; M.S.E.E., *ibid.*, 1979; Ph.D., *ibid.*, 1985. (1999)

Gregory Snider, *Associate Professor*. B.S.E.E., California State Polytechnic Univ., 1983; M.S.E.E., Univ. of California, Santa Barbara, 1987; Ph.D., *ibid.*, 1991. (1994)

Robert L. Stevenson, *Professor of Electrical Engineering and Concurrent Professor of Computer Science and Engineering*. B.E.E., Univ. of Delaware, 1986; Ph.D., Purdue Univ., 1990. (1990)

Paulo Tabuada, *Assistant Professor*. Ph.D., Univ. Tecnica de Lisboa, Lisbon, Portugal, 2002. (2003)

John J. Uhran Jr., *Senior Associate Dean for Academic Affairs in the College of Engineering, Professor of Computer Science and Engineering, and Professor of Electrical Engineering*. B.S., Manhattan College, 1957; M.S., Purdue Univ., 1963; Ph.D., *ibid.*, 1966. (1966)

## Engineering and Law Dual Degree Program

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The dual degree program in engineering and law is designed for law students who are interested in pursuing careers in areas such as patent, environmental, telecommunications, or similar law specialties. To be eligible for the master of engineering degree, the candidate must also be a candidate for the juris doctor degree in the Notre Dame Law School. The master's of engineering program is not available as an individual degree program.

To be awarded both degrees, the candidate must complete a minimum of 99 credit hours, 75 in law and 24 in the engineering program. The engineering degree awarded will be the master of engineering with a concentration in one of the engineering disciplines offered in Notre Dame's Division of Engineering. The course work-only master's program requires the completion of 24 credit hours of engineering, mathematics, or science courses acceptable to the appropriate engineering department; six credit hours of appropriate law courses; and a master's examination. Courses for the M.Eng. will be chosen in consultation with an adviser in the student's engineering department. The recommended distribution of engineering courses in the Law School curriculum is one each semester during the first and third years of study and two each semester during the second year.

### *Admission*

Admission to the program requires a separate application to each school. Admissions decisions will be made independently by the Law School and by the Graduate School.

Law School applications may be obtained from the Director of Admissions, P.O. Box 959, University of Notre Dame, Notre Dame, IN 46556-0959, telephone (574) 631-6626.

For further information about the engineering program, contact the Office of Graduate Admissions.



# The Division of Humanities

The Division of Humanities offers graduate programs extending to the doctoral level in English, history, history and philosophy of science, literature, medieval studies, philosophy, and theology. The division also offers master's degree programs in art, creative writing, early Christian studies, music, and German and Romance languages and literatures. Because of the increasingly interdisciplinary nature of research in all fields, joint Ph.D. programs (e.g. in mathematics and philosophy, or history and philosophy of science and physics) are available as well. It is also possible for exceptional students to design their own one-of-a-kind (OAK) doctoral program in fields in which the University does not offer a regular Ph.D. All of these programs are directed toward preparing students for a life of teaching and scholarship.

Several centers and institutes provide a framework for multidisciplinary research in the humanities. The Medieval Institute, for instance, coordinates the teaching and research of the largest contingent of medievalists of any North American university. The Nanovic Institute provides a forum for the discussion of key issues in Europe across all fields. The Erasmus Institute brings resources from two millennia of Catholic thought to bear on problems in the humanities, social sciences, and arts. The Notre Dame Center for Ethics and Culture supports scholarly research in ethics and its dissemination in the classroom and the broader culture. The Center for Philosophy of Religion promotes, supports, and disseminates scholarly work in the philosophy of religion and Christian philosophy. Descriptions of these and other University research institutes and centers may be found elsewhere in this Bulletin.

The John A. Kaneb Center for Teaching and Learning offers many workshops and provides services to support graduate students in their teaching roles.

## Art, Art History, and Design

### *Chair:*

Dennis Doordan, *Professor of Architecture and Concurrent Professor of Art, Art History, and Design*

### *Director of Graduate Studies:*

Jean A. Dibble

Telephone: (574) 631-7602

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Location: 306 Riley Hall

E-mail: art@nd.edu

Web site: <http://www.nd.edu/~art>

### *The Program of Studies*

The Department of Art, Art History, and Design offers the master of fine arts (M.F.A.) degree in studio art and design and the master of arts (M.A.) degree in art history. In studio art and design, the department also awards the M.A. degree, but only to students who are not accepted to degree candidacy in the M.F.A. program.

The aim of the graduate program is to educate qualified, promising students in various aspects of creative activity and art history. Studio and design students may concentrate in ceramics, design, painting, photography, printmaking, and sculpture, or in a combination of these disciplines. Art history students select from a range of course offerings to fulfill their professional interests. In addition

to specific courses, graduate students may pursue an area of interest through a system of independent study with a faculty adviser and a graduate committee selected by the student. Students are expected to develop a personal direction that culminates in a professional exhibition of visual work or a research project in art history.

### *The Master of Fine Arts Degree*

The master of fine arts degree (M.F.A.) at Notre Dame is for artists and designers with exceptional talent and strong academic skills. The program combines studio work with academic studies in art history and criticism. The College Art Association and most other professional institutions of higher education recognize the M.F.A. as the terminal degree for artists and designers. This degree has become the standard prerequisite for those who intend to teach at the college level. It is also appropriate for individuals seeking to further develop their professional careers as artists and designers.

The M.F.A. degree is a studio and research degree that requires three years or six semesters of study and 60 graduate credit hours with a B (3.0) or better average, including nine credit hours of art history, three credit hours in ARHI 681 (Graduate Seminar) and 10 credit hours of ARST 697 (Thesis Direction). Additional requirements include:

- Successful completion of ARST 595 (Teaching Methods) each year.
- Successful completion of ARST 545 (Area Seminar) each semester.
- Admission to the third year of the M.F.A. program (M.F.A. candidacy).
- The successful completion of a written thesis approved by the student's thesis committee.
- The completion of a thesis project, an exhibition of creative work that is approved by the entire art and design faculty.

Students who are not in residence but still in the process of finishing an M.F.A. degree must be enrolled for a minimum of one credit hour of ARST 600 (Nonresident Thesis Research) each semester.

### *Admission*

Prerequisites for admission ordinarily include the B.F.A. degree in studio art or design, including courses in art and art history. However, students of exceptional merit who have earned the B.A. or B.S. degree in studio art or design or the equivalent will be considered. All applicants must have a B (3.0) or better average in undergraduate major courses. Graduate Record Examination (GRE) scores are not required for admission.

Art and design majors are evaluated primarily on the basis of a portfolio of 20 slides of

recent work and three letters of recommendation. All applicants must write a statement of intent indicating their goals for the M.F.A. degree and their expectations for graduate studies.

CD Portfolio Submissions: A CD-ROM is an optional method for submitting a portfolio. Submissions however must follow these guidelines to be considered.

- The digital portfolio should be developed cross-platform or there should be both Apple Macintosh and PC computer versions of the portfolio submitted. Suggested development applications include Apple QuickTime, Microsoft PowerPoint, Macromind Director, Macromind Flash, or it can be a Web site on a CD-ROM.
- Still images should be organized in a straight-forward slide show arrangement.
- The file size of the images should not exceed 700 pixels in height or 1000 pixels in width at a resolution of 72 dpi.
- The CD and its case or envelope must be labeled with the applicant's name, contact information, software needed for launching the files, and viewing directions.

To be considered for tuition and stipend scholarships, applications should be received by February 1.

#### *The Master of Arts Degree: Art History*

The M.A. prepares the student for more advanced graduate work by providing him or her with the opportunity to solidify general and specialized art historical knowledge and to hone research skills. The degree may also serve as a foundation for employment or further study in fields such as museology, visual image management, and art dealing and investment. The M.A. in art history is not a terminal degree. A doctorate is normally required to teach at the collegiate level.

The M.A. in art history requires the completion of 36 credit hours of graduate study, including six credit hours of thesis research, with a B (3.0) or better average. A normal course load is from nine to 12 credit hours per semester. The successful completion of ARHI 596 (Art History Methods) is required. Students must also successfully complete four seminars in addition to ARHI 596, and take at least one course or seminar from each of the core art history faculty. Students who are not in residence but still in the process of

finishing an M.A. degree must be enrolled for a minimum of one credit hour of ARHI 600 Non-Resident Thesis each semester.

Additional requirements include:

- The successful completion of a comprehensive examination. This examination is taken at the beginning of the fall semester of the second year of study.
- The successful completion of a written thesis. The student will be expected to select a thesis topic and adviser by the end of the first year of study. The finished thesis must be read and approved by the adviser and two other readers.
- Evidence of reading ability in one foreign language, either German, French, or another language approved by the graduate adviser. Reading ability is normally demonstrated by obtaining a passing grade on the appropriate Graduate Reading Examination administered by the University. This requirement must be fulfilled during the first year of graduate study.

#### *Admission*

Admission to the art history program is based on Graduate Record Examination scores, evaluation of undergraduate transcripts, a writing sample, and letters of recommendation. Successful applicants are normally expected to hold a B.A. in art history or its equivalent (20 to 30 credit hours in art history). Students with insufficient undergraduate art history credits may be provisionally admitted to the program with the stipulation that they make up any deficiencies before being admitted to regular candidacy. Undergraduate courses taken to rectify deficiencies will not count toward the 36-credit-hour degree requirement.

To be considered for tuition and stipend scholarships, applications should be received by February 1.

#### *The Master of Arts Degree: Studio Art and Design*

The non-research master of arts degree (M.A.) program in studio art and design is granted to M.F.A. students who either are not admitted to M.F.A. candidacy or choose to leave the M.F.A. program with an M.A. degree. The department does not regularly admit students to this program. The non-research M.A. degree requires 40 graduate credits, including six credit hours in art history and three credit hours in ARHI 681 (Graduate Seminar). Students who are not in residence but still in the process of finishing

an M.A. degree must be enrolled for a minimum of one credit hour of ARST 600 (Non-resident Thesis Direction) each semester.

#### *Studio Art and Design Course*

##### *Descriptions*

Graduate instruction in studio and design is done primarily on an independent study basis. Students take credit hours each semester with faculty in their chosen media area. The program fosters an interdisciplinary environment that allows students to also study with faculty from other areas of the department to meet their creative objectives. Students meet regularly with faculty and graduate students for critiques and seminars. Course listings below reflect the various media areas in which a student can take credits.

##### *Course Descriptions*

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

#### STUDIO ART PROGRAM COURSES

##### *509S, 510S. Ceramics Studio*

(0-V-V) (0-V-V) Staff

Studio projects and research in ceramics. (Every semester)

##### *511S, 512S. Ceramic Sculpture*

(0-V-V) (0-V-V) Staff

Clay is the primary medium for this advanced course in sculpture. (Every semester)

##### *533S, 534S. Painting Studio*

(0-V-V) (0-V-V) Staff

Studio projects and research in painting. (Every semester)

##### *541S, 542S. Sculpture Studio*

(0-V-V) (0-V-V) Staff

Studio projects and research in three-dimensional media. (Every semester)

##### *545A. Sculpture/Ceramics Seminar*

(0-V-1) (0-V-1) Sculpture/Ceramics Staff

A team-taught seminar/critique that brings together all the ceramics and sculpture faculty and graduate students in a weekly dialogue focusing on issues in contemporary art as they relate to student research. This course is required of all ceramic and sculpture candidates each semester leading to and including the M.F.A. thesis year.

*545B. Photography Seminar*

(0-V-1) (0-V-1) Photography Staff

A team-taught seminar/critique that brings together all the photography faculty and graduate students in a weekly dialogue focusing on issues in contemporary art as they relate to student research. This course is required of all photography candidates each semester leading to and including the M.F.A. thesis year.

*545C. Painting/Printmaking Seminar*

(0-V-1) (0-V-1) Painting/Printmaking Staff

A team-taught seminar/critique that brings together all the painting and printmaking faculty and graduate students in a weekly dialogue focusing on issues in contemporary art as they relate to student research. This course is required of all painting and printmaking candidates each semester leading to and including the M.F.A. thesis year.

*585S, 586S. Photography Studio*

(0-V-V) (0-V-V) Staff

Studio projects and research in photography and photo-related media. (Every semester)

*593S, 594S. Printmaking Studio*

(0-V-V) (0-V-V) Staff

Studio projects and research in printmaking. (Every semester)

*595. Teaching Methods*

(0-0-1) Graduate Director/Staff

This seminar prepares graduate student instructors for teaching undergraduate courses in the department. Course development, assignment preparation, time management skills, student evaluations, grading, and student/instructor dynamics are covered.

Required for M.F.A. students in studio and design. (Every fall)

## DESIGN PROGRAM COURSES

*515S, 516S. Graphic Design Research*

(0-V-V) (0-V-V) Staff

Special projects in visual communications for students of graphic design. (Every semester)

*517S, 518S. Product Design Research*

(0-V-V) (0-V-V) Staff

Special projects in product and systems design. (Every semester)

*545D. Design Seminar*

(0-V-1) (0-V-1) Design Staff

A team-taught seminar/critique that brings together all the design faculty and graduate students in a weekly dialogue focusing on issues in contemporary art as they relate to student research. This course is required of all design candidates each semester leading to and including the M.F.A. thesis year.

*582S. Digital Studies*

(0-V-V) Staff

*Prerequisite:* Permission of instructor.

An advanced computer course to give the design student the opportunity to pursue research and development in digital image making. (Every semester)

*591S. Advanced Design Research*

(0-V-V) Staff

An advanced course in the conceptual development and implementation of professional level graphic or industrial design problems. Design graduate students only. (Every semester)

## ART HISTORY PROGRAM COURSES

*503. Anthropology of Art*

(3-0-3) Bellis

This course is an examination of art as a functional part of culture from the anthropological point of view. Attention will be given to both the evolution of art as part of human culture and to the evolution of the study of art by anthropologists.

*521. Classical Greek Art*

(3-0-3) Rhodes

This course analyzes and traces the development of Greek architecture, painting, and sculpture from the beginning of the fifth century B.C.E. through the death of Alexander the Great in 323 B.C.E. Particular emphasis is placed upon the monumental arts, their historical and cultural contexts, and how they reflect changing attitudes toward the gods, human achievement, and the relationship between the divine and the human.

*522. Hellenistic Art*

(3-0-3) Rhodes

This course examines the complex artistic production of the Greek world in the three centuries following the death of Alexander the Great in 323 B.C.E. and the division of the immense empire into separately administered kingdoms. The relationship of Hellenistic art and culture to their classical forebears, the development of an artistic and cultural koine in the Hellenistic world, and the hellenization of Republican Rome will be considered.

*523. Greek Architecture*

(3-0-3) Rhodes

In this course the development of Greek monumental architecture and the major problems that define it will be traced from the eighth through the second centuries B.C.E.,

from the late Geometric through the Archaic, Classical, and Hellenistic periods. Among themes to be treated are the relationship between the landscape and religious architecture, the humanization of temple divinities, the architectural expression of religious tradition and even specific history, architectural procession and hieratic direction, emblem and narration in architectural sculpture, symbolism and allusion through architectural order, religious revival and archaism, and the breaking of the architectural and religious canon. (Alternate spring)

*524. Etruscan and Roman Art and Architecture*

(3-0-3) Rhodes

Roman art of the Republic and the Empire is one focus of this course, but other early cultures of the Italian peninsula and their rich artistic productions are also considered. In particular, the arts of the Villanovans and the Etruscans are examined and evaluated both as unique expressions of discrete cultures and as ancestors of and influences on Rome. The origins and development of monumental architecture, painting, portraiture, and historical relief sculpture are isolated and traced from the early first millennium B.C.E. through the early fourth century of the modern era.

*525. Roman Architecture*

(3-0-3) Rhodes

The content of this course spans 11 centuries, from the eighth century B.C.E. to the fourth century of the modern era, and traces the development of Roman architecture from its origins in Iron Age huts on the Palatine Hill and Etruscan temples and tombs; through the Roman colonization of the Italian peninsula and the establishment of basic tenets of town planning; through the conquest of Greece and the consequent hellenization of Rome; through the invention of Roman concrete and the gradual exploitation of its practical properties and its potential for spatial manipulation; through the architectural expression of propaganda and ideal in the great building programs of the emperors; to the creation of a specifically Christian architecture from the combined architectural forms and spirit of Greece and Rome.

*533. Byzantine Art*

(3-0-3) Barber

Byzantine art has often been opposed to the traditions of western naturalism, and as such has been an undervalued or little known adjunct to the story of medieval art. In order to develop a more sophisticated understanding of this material we will examine the art produced in Byzantium in the period from the

ninth to the 12th century, a period that marks the high point of Byzantine artistic production and influence. Stress will be placed upon the function of this art within the broader setting of this society. Art theory, the notions of empire and holiness, the burdens of the past, and the realities of contemporary praxis will be brought to bear upon our various analyses of material from all media. How we, as art historians, can write the history of this rich culture will be a central issue of this course.

*541. Trecento: Giotto to the Duomo*

(3-0-3) Gill

Beginning with Giotto's Scrovegni Chapel in Padua, we examine the arts in Italy in the 1400s, concluding with Brunelleschi's revolutionary design for the dome of the Florence Cathedral of 1436. We consider the regional traditions of the city-states, including Siena, Venice, Florence, and Pisa, as well as Rome, and as expressed in narrative fresco programs, altarpieces, sculpture, and architecture.

Among our subjects are the royal tombs in Naples and Milan, the evolution of the equestrian monument, St. Mark's in Venice, the character of Gothic expression in Italy, and the impact of the Black Death.

*542. 15th-Century Italian Renaissance Art*

(3-0-3) Rosenberg

This course investigates the century most fully identified with the Early Renaissance in Italy. Individual works by artists such as Brunelleschi, Donatello, Ghiberti, Botticelli, and Alberti are set into their social, political, and religious contexts. Special attention is paid to topics such as the origins of art theory, art and audience, portraiture and the definition of self, Medician patronage, and art for the Renaissance courts of northern Italy and Naples. (Alternate fall)

*543. Northern Renaissance Art*

(3-0-3) Rosenberg

This course traces the development of painting in Northern Europe (France, Germany, and Flanders) from approximately 1300 to 1500. Special attention is given to the art of Jan van Eyck, Hieronymus Bosch, Albrecht Dürer, and Rogier VanderWeyden. In tracing the evolution of manuscript and oil painting and the graphic media, students become conscious of the special wedding of nature, art, and spirituality that defines the achievement of the Northern Renaissance. (Alternate fall)

*544. The High Renaissance in Rome and Florence*

(3-0-3) Staff

It was Leonardo's synthetic achievement that changed the course of history painting, and Bramante who adapted and made universal ancient Roman monumental architecture for a new generation of princely patrons. The vocabulary of this new modern style became the visual language of the fledgling Florentine Republic, the "imperial" Rome of Pope Julius II, and the humanistic court of Pope Leo X. This course will investigate the formulation of the High Renaissance in Milan and Central Italy as begun by Leonardo and Bramante, and its formulation in the hands of a younger generation of artists, most notably, Michelangelo, Raphael, Fra Bartolommeo, and Andrea del Sarto.

*546. Venetian and Northern Italian Renaissance Art*

(3-0-3) Coleman

This course focuses on significant artistic developments of the 16th century in Venice, with brief excursions into Lombardy and Piedmont. Giorgione, Titian, and Palladio, the formulators of the High Renaissance style in Venice, and subsequent artists such as Tintoretto and Veronese are examined. An investigation of the art produced in important provincial and urban centers such as Brescia, Cremona, Milan, Parma, Varallo, and Vercelli also provide insight into the unique traditions of the local schools and their patronage. (Alternate fall)

*547. Italian Baroque Art*

(3-0-3) Coleman, Rosenberg

The focus of this course is on Roman art of the 17th century. The evolution of the style and content of painting, sculpture, and architecture in Baroque Italy is considered in light of the social, political, and religious climate of the period. Among the artists considered are Caravaggio, the Bolognese Carracci and their followers, Guercino, Artemisia Gentileschi, Bernini, Borromini, and the French expatriates Poussin and Claude Lorrain. (Alternate spring)

*548. The Age of Rembrandt: Northern Baroque Painting*

(3-0-3) Rosenberg

Epitomized by the self-conscious art of Rembrandt, Northern Baroque painting and printmaking not only became a domestic commodity sold in a more modern-looking marketplace, it also continued to serve its traditional political, moral, and spiritual functions. This course will concentrate on

paintings and prints produced in Flanders, Spain, and the Dutch Republics during the 17th century, an era of extraordinary invention. The work of artists such as Rubens, Van Dyck, Valázquez, Zurbarán, Leyster, Hals, and Rembrandt will be considered in the context of a number of interrelated themes including the business of art, the status of the artist, art in service of the state, the rise of genre, gender stereotypes, allegory, and art, religion, and spirituality. (Alternate fall)

*549. Eighteenth-Century European Art*

(3-0-3) Coleman

Profound and universal inquiry into all aspects of knowledge marked the history of the century of the Enlightenment and the Grand Tour. The rise of the collective idea of nature; the study and instrumentality of the antique; the foundations of religion, the state, morality and reason; the relationship of the arts to the state; and the philosophy of aesthetic—these were all critically analyzed and questioned.

This course investigates various stylistic trends in 18th-century art in Italy, France, and England with a focus on the institutionalization of art through the academies. Discussion also centers on classical art theory and its relationship to the academies in light of the social, political, and religious climate of the period. We will also consider the aesthetic, art historical, and social consequences of the writings of Kant, Burke, and Winckelmann. The course begins with the late baroque paintings of Carlo Maratti and his followers, and then moves to subsequent stylistic trends as neoclassicism, Egyptian revival, and the rococo. Attention is also given to the vedute painters and such diverse personalities as Piranesi, Mengs, Kauffmann, Tiepolo, Watteau, and Chardin. (Alternate spring)

*551. American Art*

(3-0-3) Pyne

This course treats American painting, architecture, and sculpture from the Puritan culture through the advent of early 20th-century Modernism. It examines the development of a cultural tradition that was produced by the northeastern Anglo-American elite classes. Among the major themes of the course are: the struggle for an American identity; Protestant and Catholic forms in American art; nature and American identity; the ambivalent relationship of American artists to European art; the impact of evolutionary thought on American art; the representation of race and gender; imperialist agendas in American art; and the experimentation of American artists and architects with artistic Modernism.

*552. British Art*

(3-0-3) Pyne

This course focuses on the crucial period, from 1760 to 1870, in which a modern national identity was formed in England. The course explores the ways in which artists and architects responded to the baffling social problems created by the Industrial Revolution, and the various routes of engagement and escape these artists took in confronting modern England. The themes to emerge throughout the course are: science, industrialism, and the development of landscape painting; representations of the rural and urban poor; landscape and the sublime; the “gothic” imagination and the cult of sensibility; the revival of medievalism; the image of the modern industrial city; the regulation of sexuality in domestic genre painting; the problem of femininity in pre-Raphaelite painting; evolutionary science and nature; and William Morris, design, and socialism.

*553. 19th-Century European Art*

(3-0-3) Pyne

This survey of 19th-century painting treats the major figures of the period within the context of the social, political, and intellectual ferment that shaped the culture—primarily, the numerous political revolutions and the rise of industrial capitalism and the middle class in France, England, and Germany. Among the artistic movements discussed are neoclassicism, romanticism, realism, pre-Raphaelitism, impressionism, and symbolism. Some of the major themes addressed are the relationships between tradition and innovation, between the artist and public, and between gender and representation, as well as the multiple meanings of “modern” and “modernism.” The class will visit the Snite Museum of Art on occasion to discuss special exhibitions related to topics in the course. (Alternate spring)

*563. History of Design: Form, Values, and Technology*

(3-0-3) Doordan

This course will provide a historical perspective on the development of industrial, product and graphic design in the 19th and 20th centuries. More than the aesthetic styling of products, design mediates the intersection of technology and cultural values in the modern era. The role of the modern designer as both a facilitator and a critic of industrial technology will be examined. Open to all students. (Alternate fall)

*569. The Art of Mythology*

(3-0-3) Gill, McLaren

This cross-disciplinary class is an exploration of the representation of classical myth in Western art and literature, ranging from the seventh century B.C.E. to the 18th century C.E. Beginning with mythological subjects in the political and religious sculpture, temple architecture, and vase decoration of Ancient Greece, we will move on to study Roman painting and sculpture, medieval Ovidian allegory, the Renaissance reinvention of classical types, and 18th-century neo-classicism. We will compare literary and visual narratives, evaluating the discursive modes of each, and analyzing how and why poets, philosophers, artists, sculptors, and architects selected and adapted the episodes that they did. Primary readings will include selections from Greek and Roman epic, lyric and dramatic poetry, Greek and Roman philosophical mythology, and early analyses of the relationship between art and myth such as Philostratus’ *Eikones*. Among the artistic works that we will examine will be Raphael’s Roman cycles, Bellini and Titian’s poesie, and Bernini’s sculpted dramas. We will consider the erudite contexts for such works, including gardens, drawing rooms, princely residences, and civic institutions. We will discuss the connection between political power and myth, and concepts such as heroism, metamorphosis, and earthly and divine love. One aim of this class will be to identify the explanatory character of myth, and of story-telling within culture, as means of historical self-understanding, self-revelation, and catharsis.

*571. Topics in Greek and/or Roman Art*

(3-0-3) Staff

Topics course on special areas of Greek and/or Roman art.

*572. Topics in Byzantine Art*

(3-0-3) Barber

*Prerequisite:* A 200- or 300-level Art History course or permission.

The content of this course will change from year to year. Intended for senior undergraduates and graduate students, it will examine narrow themes. Readings and discussion will be central to this class. Topics that might be addressed include: gender and sexuality, court culture, monasticism and spirituality, and colonialism.

*573. Topics in Renaissance Art*

(3-0-3) Staff

Topics course on special areas of Renaissance art. (Alternate fall)

*574. Topics in Baroque Art*

(3-0-3) Staff

Topics course on special areas of baroque art. (Alternate spring)

*575. Topics in American Art*

(3-0-3) Staff

Topics course on special areas of American art. (Alternate spring)

*576. Topics of British Art*

(3-0-3) Staff

Topics course on special areas of British art. (Alternate fall)

*577. Topics in Modern European Art*

(3-0-3) Staff

Topics course on special areas of 19th-century and 20th-century European art. (Alternate spring)

*578. Topics in Contemporary Art*

(3-0-3) Staff

Topics course on special areas of contemporary art. (Alternate spring)

*581. Seminar in Greek and/or Roman Art*

(3-0-3) Staff

Seminar on specific subjects in Greek and/or Roman art. (Alternate spring)

*582. Seminar in Byzantine Art*

(3-0-3) Barber

*Prerequisite:* Permission required.

Seminar on specific subjects in Byzantine art. (Alternate fall)

*583. Seminar in Renaissance Art*

(3-0-3) Staff

Seminar on specific subjects in Renaissance art. (Alternate fall)

*584. Seminar in Baroque Art*

(3-0-3) Staff

Seminar on specific subjects in baroque art. (Alternate spring)

*585. Seminar in American Art*

(3-0-3) Staff

Seminar on specific subjects in American art. (Alternate spring)

*586. Seminar in British Art*

(3-0-3) Staff

Seminar on specific subjects in British art. (Alternate fall)

587. *Seminar in Modern European Art*

(3-0-3) Staff

Seminar on specific subjects in 19th-century and 20th-century European art. (Alternate spring)

588. *Seminar in Contemporary Art*

(3-0-3) Staff

Seminar on specific subjects in contemporary art. (Alternate spring)

596. *Art History Methods*

(3-0-3) Rosenberg

A survey of the historiography of art history with special attention paid to the various types of methodology that have been applied to the analysis of art. Special attention is given to 19th-century and 20th-century art historical methods. Required of all art history graduate students. (Fall)

681. *Graduate Seminar*

(3-0-3) Haywood, Pyne

Discussions in this course center on contemporary movements, styles, artists, aesthetic philosophies, and critical theories. Required of all studio/design and art history graduate students. (Fall)

## SPECIAL COURSES

For students with advanced standing in art, art history, and design.

598. *Special Studies*

(0-V-V) Staff

This is an independent study course for students taking credit hours with faculty outside their media area. Due to the interdisciplinary nature of the program, students often study with faculty across media boundaries. (Every semester)

599. *Thesis Direction*

(V-V-V) Staff

Independent research and writing on an approved subject under the direction of a faculty member. Required of candidates for the research M.A. in art history and for the M.F.A.

600. *Nonresident Thesis Research*

(0-0-1) Staff

Required of all nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.

*Faculty*Charles E. Barber, *the Michael P. Grace Professor of Arts and Letters and Associate Professor*. B.A., Courtauld Inst. of Art, London, 1986; Ph.D., *ibid.*, 1989. (1996)Frederick S. Beckman, *Professor Emeritus*. B.F.A., Univ. of Notre Dame, 1942; M.A., Columbia Univ., 1949. (1946)Nyame Brown, *Assistant Professor*. B.F.A. School of the Art Inst. of Chicago, 1992; M.F.A. Yale Univ., 1997. (2002)John Caruso, *Assistant Professor*. B.F.A., Center for Creative Studies, 1987; M.F.A., Univ. of Illinois-Chicago, 1996. (1999)Derek Chalfant, *Assistant Professional Specialist*. B.F.A., Herron School of Art, 1990; M.F.A., Univ. of Notre Dame, 1994. (1997)Robert R. Coleman, *Associate Professor and Research Specialist in the Medieval Institute*. B.A., State Univ. College at New Paltz, 1970; M.A., Univ. of Chicago, 1973; Ph.D., *ibid.*, 1988. (1982, 1990)Rev. Austin I. Collins, C.S.C., *Associate Professor*. B.A., Univ. of Notre Dame, 1977; M.Div., Graduate Theological Union, 1981; M.F.A., Claremont Graduate School, 1985. (1985)Jean A. Dibble, *Director of Graduate Studies and Associate Professor*. B.S., Univ. of Wisconsin, 1979; M.A., Univ. of New Mexico, 1981; M.F.A., Univ. of Wisconsin, 1988. (1989)Dennis P. Doordan, *Chair and Concurrent Professor of Art, Art History, and Design and Professor of Architecture*. B.A., Stanford Univ., 1973; M.A., Columbia Univ., 1976; M.Phil., *ibid.*, 1978; Ph.D., *ibid.*, 1983. (1990)Paul A. Down, *Associate Professor*. B.S., Andrews Univ., 1969; M.F.A., Univ. of Notre Dame, 1982. (1983)Rev. James F. Flanigan, C.S.C., *Associate Professor*. A.B., Univ. of Notre Dame, 1958; M.A., *ibid.*, 1962; M.F.A., George Washington Univ., 1965. (1965)Meredith Gill, *Assistant Professor*. B.A., Univ. of Melbourne, 1981; M.A., Princeton Univ., 1986; Ph.D., *ibid.*, 1992. (1998)Richard Gray, *Associate Professor*. B.S., Illinois State Univ., 1976; M.F.A., Rochester Inst. of Technology, 1982. (1982)Robert Haywood, *Assistant Professor*. B.A., Univ. of South Carolina, 1981; M.A., Univ. of Michigan, 1988; Ph.D., *ibid.*, 1993. (1995)Douglas Kinsey, *Professor Emeritus*. B.A., Oberlin College, 1957; M.F.A., Univ. of Minnesota, 1960. (1968)Martina Lopez, *Associate Professor*. B.F.A., Univ. of Washington, 1985; M.F.A., The School of the Art Inst. of Chicago, 1990. (1993)Martin L. Nguyen, C.S.C., *Associate Professor*. B.A., Univ. of Portland, 1982; M.Div., Univ. of Notre Dame, 1988; M.A., Univ. of California, Berkeley, 1993; M.F.A., *ibid.*, 1995. (1995)Dean A. Porter, *Director Emeritus of the Snite Museum of Art and Professor*. B.A., Harpur College, 1961; M.A., State Univ. of New York at Binghamton, 1966; Ph.D., *ibid.*, 1974. (1966)Kathleen A. Pyne, *Associate Professor and Director, Program in Gender Studies*. B.A., Univ. of Michigan, 1971; M.A., *ibid.*, 1975; Ph.D., *ibid.*, 1988. (1988)Robin F. Rhodes, *Associate Professor and Concurrent Associate Professor of Classics*. B.A., Univ. of North Carolina, 1974; Ph.D., *ibid.*, 1984. (1996)Charles M. Rosenberg, *Professor*. B.A., Swarthmore College, 1967; M.A., Univ. of Michigan, 1969; Ph.D., *ibid.*, 1974. (1980)Robert Sedlack, *Assistant Professor*. B.F.A., Univ. of Notre Dame, 1989; M.F.A., Indiana Univ. Bloomington, 1993. (1998)John F. Sherman, *Associate Professional Specialist*. B.S., Ball State Univ., 1979; M.F.A., Indiana Univ., 1981. (1986)Maria Tomasula, *Associate Professor*. B.F.A., Univ. of Illinois at Chicago, 1987; M.F.A., Northwestern Univ., 1989. (1994)

## Classics

### Chair:

Keith Bradley

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The Department of Classics offers instruction in classical studies and is the administrative home to the programs in Arabic and Irish. The department cosponsors a master's degree program in early Christian studies with the Department of Theology. The following courses are available to graduate students. Graduate students who intend to begin or renew their study of Greek, Latin, Arabic, Syriac, or Irish are invited to contact the department for advice.

### Course Descriptions

Each course listing includes:

- Course Number
- Title
- (Lecture hours per week–laboratory or tutorial hours per week–credits per semester)
- Instructor
- Course Description
- (Semester normally offered)

### Classical Literature and Civilization

#### 515. *Romans and Christians*

(3-0-3) Bradley

This course will examine the early development of the Christian religion in its historical Roman context. It will begin with a survey of the political, social, and administrative structures of the Roman Empire in the period from Augustus to Constantine, move to a study of the complexity and diversity of Roman religious life and culture (with special attention to Mystery Cults, e.g., that of Isis), and then examine the development of the Jesus movement and Rome's reaction to it. Particular topics to be studied will include miracle working and the practice of magic, the problem of the historical Jesus, the sectarian and subversive character of early Christianity, the issue of how persecution and martyrdom are to be historically understood, and the meaning of religious conversion in the polytheistic Roman world. Above all the course will concentrate on the questions of how and why in historical terms a new religious system came to have such appeal that Constantine chose to make himself the first Christian emperor of Rome.

#### 531A. *Late Antiquel/Early Christian Art*

(3-0-3) Barber

Art in late antiquity has traditionally been characterized as an art in decline, but this judgment is relative, relying on standards formulated for art of other periods.

Challenging this assumption, we will examine the distinct and powerful transformations within the visual culture of the period between the third and the eighth centuries AD. This period witnesses the mutation of the institutions of the Roman Empire into those of the Christian Byzantine Empire.

The fundamental change in religious identity that was the basis for this development had a direct impact upon the visual material that survives from this period, such that the eighth century witnesses extensive and elaborate debates about the status and value of religious art in Jewish, Moslem, Byzantine, and Carolingian society. This course will examine the underlying conditions that made images so central to cultural identity at this period.

### Greek Language and Literature

#### 501, 502. *Graduate Greek IIII*

(3-0-3) (3-0-3) Staff

This is a two-semester introductory course for beginning language students. The course aims at developing a reading knowledge of Attic prose. Plato and Xenophon are the primary authors.

#### 503. *Intermediate Greek*

(3-0-3) McLaren

Intermediate Greek combines a thorough review of the first year's work with extensive reading of the unabridged text of a classical author. This course is also offered in the summer.

#### 550. *Age of Herodotus*

(3-0-3) Mazurek

*Prerequisite:* 525 or equivalent

Reading in Greek of events and personalities of the Persian War: Aeschylus' tragedy *The Persians*, selections from Herodotus, and from Plutarch's *Life of Themistocles*.

#### 597. *Directed Readings*

(V-V-V) Staff

Permission of department required.

### Latin Language and Literature

#### 501, 502. *Graduate Latin IIII*

(3-0-3) (3-0-3) Staff

Beginning Latin. Graduate students have a number of options for beginning study of Latin; please contact the department for advice.

#### 503. *Intermediate Latin*

(3-0-3) Wood, Wouters

This course introduces all the fundamentals of Latin grammar necessary for reading classical Latin of medium difficulty. This course is also offered in the summer.

#### 520. *Roman Epic: Vergil*

(3-0-3) Schlegel

An introduction to the poetry of Vergil covering selections from the *Georgics* and the *Aeneid*.

#### 550. *The Age of Cicero*

(3-0-3) Ladouceur

Readings in literary and historical texts of the Late Roman Republic including the speeches and letters of Cicero, Sallust's *Catilinarian Conspiracy*, and the poems of Catullus.

#### 575. *Intro to Christian Latin*

(4-0-4) Sheerin

Permission Required.

"Introduction to Christian Latin Texts" (Medieval Latin I) has two goals: to improve the student's all-around facility in dealing with Latin texts and to introduce the student to the varieties of Christian Latin texts. Medieval Latin II, a survey of medieval Latin texts, will follow this course in the spring term.

### Middle Eastern Languages

#### Arabic

#### 501, 502. *Beginning Arabic IIII*

(3-0-3) (3-0-3) Saadi

This is a two-semester introductory course to modern standard Arabic.

#### 503. *Continuing Arabic*

(3-0-3) Afsaruddin

The third (intermediate) course in standard Arabic.

#### 504. *Continuing Arabic*

(3-0-3) Guo

This course is a continuation of third semester Arabic. Emphasis will be on the acquisition of reading, writing, and speaking skills.

#### 505B. *Advanced Arabic*

(3-0-3) Saadi

Commences study of formal Arabic literary texts with additional emphasis on classroom discussion in Arabic.

#### 506. *Advanced Arabic*

(3-0-3) Saadi

A continuation of the study of formal Arabic literary texts with additional emphasis on classroom discussion in Arabic.

**Syriac***500. Introduction to Syriac Grammar*

(3-0-0) Amar

Introduction to the Syriac language. (Summer only)

*500A. Introduction to Syriac Literature*

(3-0-0) Amar

Beginning readings in Syriac literature. (Summer only)

*500B. Intermediate Syriac Reading*

(3-0-0) Amar

This is a new offering designed as a “refresher course.” Emphasis will be on reading a variety of prose and poetic texts drawn mainly from the writings of St. Ephrem as the basis for review of grammar and basic structures. (Summer only)

**Hebrew***481, 482. Elementary Biblical Hebrew I/II*

(3-0-3) (3-0-3) Staff

This is a two-semester introductory course in biblical Hebrew; under normal circumstances, the student must complete the first in order to enroll in the second.

**Irish Language***501, 502. Beginning Irish III*

(3-0-3) (3-0-3) Staff

An introduction to modern spoken and written Irish: basic principles of grammar and sentence structure, as well as core vocabulary. Emphasis is placed on the application of these principles in everyday situations. Students learn how to conduct simple conversations: talking about oneself and asking information of others; talking about family and home; describing the weather and daily activities. Second semester of instruction in the Irish Language is a continuation of 501. More emphasis will be placed on reading simple texts in Irish.

*503. Intermediate Irish*

(3-0-3) McQuillan

A continuation of Irish 501 and 502 with increased emphasis on the ability to read 20th-century literary works in the original Irish.

*525. Irish Poetry in Translation*

(3-0-3) McKibben

An examination of poetry written in Irish from the early days of the Gaelic Revival up to the very recent past.

*538. Poetry and Politics, 1541–1688*

(3-0-3) Ó Buachalla

The political poetry of the period 1541-1688 will be discussed and analyzed against the historical background. The primary focus will be the mentalité of the native intelligentsia as it is reflected in the poetry and as it responded to the momentous changes of the period. The origins and rise of the cult of the Stuarts will be examined and the historiography of the period will be assessed.

*598. Special Studies*

(V-V-V) Staff

Permission of department required.

*597. Directed Readings*

(V-V-V) Staff

Permission of department required.

**Faculty**Asma Afsaruddin, *Associate Professor and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Oberlin College, 1982; M.A., The Johns Hopkins Univ., 1985; Ph.D., *ibid.*, 1993. (1996)Joseph P. Amar, *Associate Professor and Concurrent Associate Professor of Theology*. B.A., Catholic Univ. of America, 1970; S.T.B., *ibid.*, 1973; S.T.L., *ibid.*, 1974; M.A., *ibid.*, 1983; Ph.D., *ibid.*, 1988. (1988)W. Martin Bloomer, *Associate Professor*. B.A., Yale Univ., 1982; M.A., *ibid.*, 1983; M.Phil., *ibid.*, 1984; Ph.D., *ibid.*, 1987. (1998)Keith Bradley, *Chair and the Eli J. Shaheen Professor of Classics, and Concurrent Professor of History*. B.A., Sheffield Univ., 1967; M.A., *ibid.*, 1968; B. Litt., Oxford Univ., 1975; Litt. D., Sheffield Univ., 1997. (2001)Li Guo, *Assistant Professor*. B.A., Shanghai International Studies Univ., China, 1979; M.A., Alexandria Univ., Egypt, 1984; Ph.D., Yale Univ., 1994. (1999)Brian A. Krostenko, *Associate Professor*. A.B., Princeton Univ., 1986; M.A. Harvard Univ., 1989; Ph.D. *ibid.*, 1993 (2001)David J. Ladouceur, *Associate Professor*. A.B., Cornell Univ., 1970; Ph.D., Brown Univ., 1977. (1976)Sabine G. MacCormack, *the Rev. Theodore M. Hesburgh, C.S.C., Professor of Arts and Letters*. B.A., Oxford Univ., 1964; Ph.D., *ibid.*, 1974. (2003)Elizabeth Forbis Mazurek, *Associate Professor*. B.A., Oberlin College, 1980; M.A., Univ. of North Carolina at Chapel Hill, 1985; Ph.D., *ibid.*, 1988 (1990)Sarah McKibben, *Assistant Professor*. B.A., Univ. of California at Berkeley, 1993; M.Phil., National Univ. of Ireland, Dublin, 1997; M.A., Cornell Univ., 2000; Ph.D., *ibid.*, 2003 (2002)Chris McLaren, *Assistant Professor*. B.A., Reed College, 1989; Ph.D., Stanford Univ., 2003 (2000)Peter T. G. McQuillan, *Associate Professor and Concurrent Associate Professor in the Keough Institute for Irish Studies*. B.A., Univ. College, Dublin, 1981; M.A., *ibid.*, 1983; Ph.D., Harvard Univ., 1991. (1994)Breandán Ó Buachalla, *the Thomas and Kathleen O'Donnell Professor of Irish Language and Literature*. B.A., National Univ. of Ireland, 1958; M.A., *ibid.*, 1959; Ph.D., *ibid.*, 1970. (2003)Catherine M. Schlegel, *Assistant Professor*. B.A., Univ. of Chicago, 1978; M.A., *ibid.*, 1983; Univ. of California at Los Angeles, Ph.D., 1994 (1996)Daniel J. Sheerin, *Professor and Concurrent Professor of Theology*. B.A., St. Louis Univ., 1965; Ph.D., Univ. of North Carolina, 1969. (1985)Robert A. Vacca, *Assistant Professor*. B.A., Marquette Univ., 1962; Ph.D., Univ. of Chicago, 1973. (1969)Heather A. Wood, *Assistant Professor*. A.B., Princeton Univ., 1990; Ph.D., Univ. California-Berkeley, 2002. (2003)



## Early Christian Studies

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Director of Graduate Studies:

Brian E. Daley, S.J.

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The two-year interdisciplinary M.A. program in early Christian studies is sponsored jointly by the Departments of Classics and Theology, with the participation of faculty in several other departments (see listing below). It offers beginning graduate students basic training in philology, theology, history, liturgy, art history, and philosophy. Each student develops a curriculum to meet individual needs in consultation with a committee of faculty advisers. But all curricula are designed to ensure that students are equipped with the necessary language skills (at least two ancient Christian languages and literatures [Latin and/or Greek and/or Syriac] and one or more contemporary research languages) and with a sturdy grasp of the intellectual, historical, and social contexts of the early church and the methods and resources for studying them.

New disciplinary and critical approaches to late antiquity, as well as a growing awareness of the importance of Christian origins for the present life of the churches, have made early Christian studies a vibrant and rapidly expanding field. Traditional expertise in philology, history, and theology remains fundamental, but these skills must now be supplemented by a broad range of interdisciplinary approaches. An unusually strong faculty presence makes Notre Dame the ideal place for pursuing this area. Students who come with a keen interest in the field, but limited formal training in it, may acquire the basic skills and knowledge necessary for advanced study. Those already adequately prepared in the basics can broaden their competency by studying the language and culture of Middle Eastern, Egyptian, and Byzantine Christianity, and of Rabbinic Judaism and early Islam.

This is a demanding, extended (two academic years plus summers) M.A. program that prepares students to enter the best doctoral programs in theology, religious studies, history, art history, and literary studies, already proficient in language study and basic training in the multiple fields of early Christian studies.

A limited number of tuition scholarships and stipends are available.

### Contributing Faculty

Joseph P. Amar, *Associate Professor of Classics and Concurrent Associate Professor of Theology*. Syriac and Christian Arabic literature.

Charles E. Barber, *the Michael P. Grace Professor of Arts and Letters and Associate Professor of Art, Art History, and Design*. Early Christian and Byzantine art.

Keith R. Bradley, *Chair and the Shaheen Professor of Classics, and Concurrent Professor of History*. Roman social and cultural history.

John C. Cavadini, *Chair and Associate Professor of Theology, and Executive Director of the Institute for Church Life*. Patristic theology.

Brian E. Daley, S.J., *Director of Graduate Studies in Early Christian Studies and the Catherine F. Huisking Professor of Theology*. Patristic theology.

Blake Leyerle, *Associate Professor of Theology and Concurrent Associate Professor of Classics*. Social history of early Christianity.

Daniel J. Sheerin, *Professor of Classics and Concurrent Professor of Theology*. Christian Latin literature.

### Associated Faculty

Asma Afsaruddin, *Assistant Professor of Classics and Fellow in the Joan B. Kroc Institute for International Peace Studies*. Islam.

David E. Aune, *Professor of Theology*. New Testament.

W. Martin Bloomer, *Associate Professor of Classics*. Classics, Ancient education.

Paul M. Cobb, *Assistant Professor of History*. Islamic history.

Mary Rose D'Angelo, *Associate Professor of Theology*. Gender in early Christianity.

Stephen E. Gersh, *Professor of Medieval Studies*. Late antique philosophy.

David T. Jenkins, *Assistant Librarian*. Byzantine librarian.

Maxwell E. Johnson, *Professor of Theology*. Early Christian liturgy.

Mary M. Keys, *Assistant Professor of Political Science*. Early Christian political thought.

Brian Krostenko, *Associate Professor of Classics*. Latin literature and sociolinguistics.

David Ladouceur, *Associate Professor of Classics*. Latin language.

John P. Meier, *the William K. Warren Professor of Catholic Theology*. New Testament.

Hindy Najman, *the Jordan Kapson Professor of Jewish Studies and Assistant Professor of Theology*. Rabbinics, Hebrew language.

Jerome H. Neyrey, S.J., *Professor of Theology*. Biblical/literary studies.

David K. O'Connor, *Associate Professor of Philosophy and Concurrent Associate Professor of Classics*.

Gretchen J. Reydam-Schils, *Associate Professor in the Program of Liberal Studies and Fellow in the Nanovic Institute for European Studies*. Late antique philosophy.

Michael A. Signer, *the Abrams Professor of Jewish Thought and Culture (Theology) and Fellow in the Nanovic Institute for European Studies*. Rabbinic Judaism.

Gregory E. Sterling, *Associate Dean of Arts and Letters and Professor of Theology*. Biblical and post-biblical Greek, Coptic.

Robert Vacca, *Assistant Professor of Classics*. Greek language.

## East Asian Languages and Literatures

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Chair:

Lionel M. Jensen

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The University of Notre Dame does not offer a graduate degree in Chinese or Japanese. Graduate students who wish to audit a Chinese or Japanese language class must receive permission from the instructor.

### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

*Chinese Language Courses*

101, 102, 103. *Beginning Chinese I, II, and III* (3-0-3) (3-0-3) (3-0-3) Yang/Yin

For students with no background in Chinese. A three-semester sequence of three-credit courses covering the same material as 111-112 and designed to prepare students to enter 211. 101 and 103 are offered only in the spring semester, 102 only in the fall. Equal emphasis on the basic skills of listening, speaking, reading, and writing. Students may expect to master a spoken vocabulary of about 1,000 words and a written vocabulary of 500 characters.

111, 112. *First-Year Chinese I and II*

(5-0-5) (5-0-5) Ge

For students with no background in Chinese. Introduction to Mandarin Chinese, using traditional characters. Equal emphasis on the basic skills of speaking, listening, reading, and writing. Students may expect to master a spoken vocabulary of about 1,000 words and a written vocabulary of 500 characters.

211, 212. *Second-Year Chinese I and II*

(5-0-5) (5-0-5) Lin

*Prerequisite:* 112 or instructor's permission. Grammar review and training in the four basic skills to higher levels of sophistication: oral-aural skills for fluency in communication, reading for critical understanding, and the ability to write simple compositions.

311, 312. *Third Year Chinese I and II*

(3-0-3) (3-0-3) Yin

*Prerequisite:* 212 or instructor's permission. Development of advanced conversational, reading, and writing skills, using a wide range of authentic materials, including material from news media.

411, 412. *Fourth-Year Chinese I and II*

(3-0-3) (3-0-3) Ge

*Prerequisite:* 312 or instructor's permission. Practice in advanced conversational, reading, and writing skills, using newspapers, short fiction, videotapes, and other authentic materials.

*Japanese Language Courses*

101, 102, 103. *Beginning Japanese I, II, and III*

(3-0-3) (3-0-3) (3-0-3) Hanabusa/Shiga

A three-semester sequence of three-credit courses covering the same material as 111-112 and designed to prepare students to enter

211. Courses 101 and 103 are offered only in the spring semester, 102 only in the fall. Introduction to the fundamentals of modern Japanese. Equal emphasis on speaking, listening, reading, and writing. Introduction of the hiragana and katakana syllabaries, and 200 kanji.

111, 112. *First-Year Japanese I and II*

(5-0-5) (5-0-5) Hanabusa

Introduction to the fundamentals of Japanese. Equal emphasis on the four skills: speaking, listening, reading, and writing. Introduction of the hiragana and katakana syllabaries, and 200 kanji.

211, 212. *Second-Year Japanese I and II*

(5-0-5) (5-0-5) Shiga

*Prerequisite:* 112 or instructor's permission. Continued training in the fundamentals of the modern language. Equal emphasis on the four skills: speaking, listening, reading, and writing. Introduction to approximately 200 kanji.

311, 312. *Third-Year Japanese I and II*

(3-0-3) (3-0-3) Hanabusa

*Prerequisite:* 212 or instructor's permission. The first in a sequence of intermediate courses offered for those students who did not participate in the Year-in-Japan Program. Development of oral-aural skills with an emphasis on typical conversational situations. Improvement of reading and writing skills.

411, 412. *Fourth-Year Japanese I and II*

(3-0-3) (3-0-3) Shiga

*Prerequisite:* 312 or instructor's permission. The second in a sequence of intermediate courses for those students who did not participate in the Year-in-Japan Program. Aimed at achieving a high proficiency in the four skills: speaking, listening, reading, and writing.

498. *Special Studies*

(V-V-V) Selden

*Prerequisite:* Instructor's permission, based on student's performance on a placement exam and oral interview at the beginning of the semester.

Basic command of Japanese grammar is assumed. This course takes students beyond textbook Japanese by introducing original materials created for Japanese audiences (literature, current events, and video materials, etc.) Emphasis is on grammar and syntax, vocabulary building, speaking, reading, and writing.

*Faculty*

Michael C. Brownstein, *Associate Professor*. B.A., California State Univ., Northridge, 1972; B.A., Monterey Inst. of International Studies, 1973; M.A., Columbia Univ., 1978; Ph.D., *ibid.*, 1981. (1982)

Liangyan Ge, *Associate Professor*. B.A., Hefei Polytechnic, China, 1982; M.A., Nanjing Univ., China, 1984; Ph.D., Indiana Univ., 1995. (1995)

Howard Goldblatt, *Research Professor*. B.A., Long Beach State College, 1961; M.A., San Francisco State Univ., 1970; Ph.D., Indiana Univ., 1974.

Noriko Hanabusa, *Associate Professional Specialist*. B.A., Keio Univ., Japan, 1988; M.A., Univ. of Wisconsin, Madison, 1994. (1994)

Lionel M. Jensen, *Chair and Associate Professor, Concurrent Associate Professor of History, and Fellow in the Helen Kellogg Institute for International Studies*. B.A., Williams College, 1976; M.A., Washington Univ., 1980; Ph.D., Univ. of California, Berkeley, 1992. (2000)

Sylvia Li-Chun Lin, *Assistant Professor*. B.A., Tamkang Univ., 1984; M.A., *ibid.*, 1987; St. John's Univ., 1988.; Univ. of Oregon, 1991; Ph.D., Univ. of California, Berkeley, 1998. (2002)

Lili I. Selden, *Assistant Professor*. B.A., Ithaca College, 1989; M.A., Univ. of Michigan, 1993; Ph.D., *ibid.*, 2001. (1999)

Setsuko Shiga, *Assistant Professional Specialist*. B.A., Nanzan Univ., Japan, 1987; M.A., Univ. of Iowa, 1992. (1997)

Xiaoshan Yang, *Assistant Professor*. B.A., Anhui Univ., China, 1982; M.A., Peking Univ., China, 1985; Ph.D. Harvard Univ., 1994. (1997)

Chengxu Yin, *Assistant Professional Specialist*. B.A., Peking Univ., 1984; M.A., Univ. of Massachusetts, 1990; Ph.D., Brandeis Univ., 1994. (2000)

## English

### Chair:

Stephen Fredman

### Director of Graduate Studies:

Sandra Gustafson

### Director of Creative Writing:

Valerie Sayers

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### The Program of Studies

The Department of English at the University of Notre Dame is distinguished by its extraordinary diversity. In addition to study in the traditional fields of medieval, Renaissance, Restoration and 18th-century, Romantic, Victorian, early American, modern British, and modern American literature, it offers opportunities to work in interdisciplinary fields and programs such as Irish studies, literature and philosophy, religion and literature, the history of science, gender studies, and the Medieval Institute. The intellectual life of the department is further enlivened by sponsorship of conferences, colloquia, and lectures, most notably the annual Ward Phillips and Philosophy and Literature lectures which have brought a series of distinguished literary critics to our campus. The graduate programs in English seek to combine a formal course of study with encouragement to develop intellectual independence. Students in the Ph.D. program, for example, begin with intensive course work and move toward independent and specialized study. We also seek to train students not only in the history of literature but also in the traditions of critical inquiry, and we have made the study of literary theory as well as literary history an integral part of the program.

### Admission

Applicants to both the M.A. and the Ph.D. programs are expected to have completed eight or more upper-division English courses. They must also take the Graduate Record Examination general and subject tests. In addition to other materials required by the Graduate School, the applicant should submit a writing sample, preferably a critical literary essay of 10-15 pages. Special conditions apply for applicants to the creative writing M.F.A. program. Creative writing applicants need not take the GRE subject test and they need not have taken eight English courses. As a writing

sample, they should provide 25-30 pages of fiction or nonfiction, or 20 pages of poetry.

### Master's Program

#### English and American Literature

This is a 30-credit-hour program, requiring either 30 credit hours of course work or 24 credit hours of course work and six credit hours of thesis research. Students must take one course in literary criticism or theory. Those seeking the research degree must also demonstrate proficiency in a language appropriate to their area of research. Near the conclusion of the program, the student takes a written examination covering three major literary texts and selected criticism; this examination is designed to test the student's capacity for critical study.

#### Master's Program in English and Law

This is a program open only to students already admitted to the Notre Dame Law School who also wish to obtain an M.A. in English. A student would typically take 18 hours of English courses and 12 hours of law courses. The course on "Law and Literature," offered in the Law School, can be counted towards the 18 hours of English. Students would normally pursue the nonresearch degree; those wishing to complete the research degree would need to complete an additional six hours of thesis research. Admission is through the normal procedures of the Graduate School and the Department of English.

#### M.F.A. in Creative Writing

The graduate creative writing program includes workshops with nationally acclaimed writers and literature classes with a distinguished English Department faculty. Students participate fully in the intellectual life of the department, which includes regular visits from prominent writers. Students may also choose to work as editorial assistants on our national literary magazine, *The Notre Dame Review*. Throughout the four semesters, all students work closely with an adviser on the thesis, which will ultimately be a publishable novel, collection of stories, volume of poetry, or work of literary nonfiction. Course work includes 36 credit hours of writing workshops, thesis preparation tutorials, and literature classes.

### Ph.D. Program

#### Course Requirements

The Ph.D. program requires 48 credit hours of course work. Students must take the

Introduction to Graduate Study, a historical distribution of courses, and at least one course in literary theory. In keeping with its policy of encouraging interdisciplinary study, the program permits the student to take up to 12 credit hours of course work in a field other than English.

#### Foreign Language Requirement

The student must demonstrate proficiency in one language verifiably appropriate to the student's area of research by the end of the second year of full-time residency.

#### Three-Field Examination

The student takes examinations in one historical period selected from among old English, medieval, Renaissance, Restoration and 18th-century, 19th-century British, 20th-century British, early American literature (to 1865), middle American literature from the Civil War to 1930, and post-1930 American literature; either a second historical period or a genre (poetry, fiction, drama, nonfiction prose); and one examination in literary criticism and theory. One of these three fields, ordinarily the field in which the student intends to write his or her dissertation, is designated the major field. These examinations are intended to determine whether the student possesses the theoretical skills and specialized knowledge necessary for writing a dissertation and for teaching in his or her field. Special reading courses enable students to dedicate the majority of their last two semesters of course work to preparation for these examinations.

#### Candidacy Examination

The student is examined on a dissertation proposal prepared in consultation with the dissertation director. At this time, the student is expected to demonstrate that the proposal is viable and he or she is suitably prepared to complete the proposed project.

#### Dissertation

Upon receiving approval of the proposal, the student proceeds with the dissertation under continuing supervision of the dissertation director. The dissertation is intended to demonstrate the student's readiness to participate fully in the profession as a scholar and literary critic.

Further information about financial aid opportunities, the department's many programs and activities, and the faculty is contained in a brochure, obtainable by writing to the Graduate School.

## CONCENTRATIONS

*Literature and Continental Philosophy*

The special field of studies in literature and continental thought is designed to take advantage of the interdisciplinary resources in continental thought existing at Notre Dame. In addition to the resources of the English department, this specialty track draws upon other areas in the humanities that have been influenced by continental thought: philosophy, government, sociology, and theology. In many of these areas researchers at Notre Dame have achieved national and international recognition for their scholarly work. The setting of this program provides students with a unique opportunity to pursue a Ph.D. in English specializing in the area of literature and continental philosophy.

The following rules apply to students pursuing studies in the field of literature and continental thought: Students will complete the traditional course sequence, Introduction to Graduate Study, and all course distribution requirements. Students will take a minimum of four courses in the area of literature and continental philosophy, chosen in consultation with their adviser, for a combined total of at least six courses in the special field of study. With the permission of the graduate director, up to three courses could be taken outside of the English Department.

*Early Studies*

The concentration in early studies makes it possible for the student to draw on the department's strengths in English literature before 1700 and in contemporary theory. A concentration in early studies complements the disciplinary and intellectual challenges specific to the student's area of specialization (old English, middle English, or Renaissance literature). Characteristic questions include problematizing traditional models of literary history and period boundaries, or foregrounding the construction of subjectivity across those boundaries. For this reason, the concentration requires the student to develop a particular theoretical approach, chosen in consultation with his or her director. Dissertation projects will normally require joint direction. Students will complete the traditional course sequence. In addition, students will take at least four other courses from the seventh to the 17th century, based on close consultation and advising with the faculty members in these fields. With the permission of the graduate director and the student's adviser, students may take up to three courses

outside the English Department. When the student begins dissertation work, he or she will participate in a dissertation seminar devoted specifically to work in early studies.

*Irish Studies*

The concentration in Irish studies draws upon the existing resources in the Keough Institute for Irish studies, the English department, the Medieval Institute, Notre Dame's Dublin Program, the Irish Summer Seminar in Dublin, and other Notre Dame departments, such as History, actively participating in Irish studies. The ongoing development of Irish studies at Notre Dame provides a unique opportunity for students to specialize in this area. Students must take three courses in Irish language and literature, as follows: 101, 102, and 103 or, in place of 103, a course in Irish literature translation. Students will complete the traditional course sequence.

In addition, students must take four courses in Irish studies with the English department; two of those courses taken from the Irish studies offerings in any one or combination of the following departments: History, Political Science, Irish language or literature.

*Publications*

The Department of English publishes several scholarly journals, *Religion and Literature*, *The Spenser Newsletter*, and *Nineteenth-Century Contexts*, and a literary quarterly, *The Notre Dame Review*. All of these publications provide graduate students with the opportunity to learn about the process of editing and production.

*Financial Assistance and Funding for Professional Activity*

The full range of financial assistance, including fellowships (University Presidential Fellowships, first-year fellowships, ethnic minority fellowships, and others), teaching assistantships, and tuition scholarships, described in the general Graduate Studies brochure, is available to students in the English programs. All students admitted into the Ph.D. program receive full funding, which continues to be provided throughout course work and dissertation work. The English Department is also committed to supporting students' involvement in professional activities. Funding is provided for research travel and participation in academic conferences. All students admitted into the M.F.A. program are awarded full tuition scholarships and are also considered for teaching and editorial assistantships. All current M.F.A. students are eligible to apply for the Nicholas

Sparks Summer Fellows Programs, which offers internships in publishing and author representation, and all second-year M.F.A. students are eligible to apply for the Sparks Prize, a \$20,000 annual award to one graduating writer each year. Please note that the request to be considered for financial support is made on the application for admission. No separate application is needed.

*Preparation for the Profession: Teaching and Scholarship*

The English Department offers all graduate students a variety of teaching opportunities and professional preparation activities, all designed to provide students with important professional experience and to place them in a highly competitive position for entering the job market. All beginning students enroll in a semester workshop on "Teaching Literature and Writing," followed by two intensive orientation meetings on teaching First-Year Writing. Students then typically teach four semesters of "First-Year Writing," never more than one class a semester and with class enrollments kept to 17. More advanced students have opportunities to teach upper-level literature courses. We also have instituted a predoctoral teaching fellowship that enables students to teach literature at a neighboring university, such as the University of Illinois-Chicago. Postdoctoral teaching fellowships are also available. Students entering the dissertation phase of the program all participate in a semester workshop on producing a dissertation proposal in a timely fashion. Students enroll later in a "Preparing for the Profession" seminar, which concentrates on preparing papers for academic conferences, submitting essays for publication to academic journals, and developing strategies for entering the job market. Our job placement apparatus consists of practice job interviews and facilitates students generally in their searches for academic employment.

*Course Descriptions*

Course offerings are designed for a two-year sequence so that most courses will be offered every other year. Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

- 501. Graduate Fiction Writing Workshop*  
(3-0-3) Gernes, O'Rourke, Sayers, Tomasula  
For students enrolled in the M.F.A. program.
- 502. Graduate Poetry Writing Workshop*  
(3-0-3) Gernes, Menes, Matthias  
For students enrolled in the M.F.A. program.
- 505. English for Non-native Speakers*  
(3-0-3) Deane-Moran  
A course designed to improve spoken English of non-native speakers, at the intermediate level, with a specific goal of increasing communication skills for teaching, research, and discussion purposes.
- 506. Introduction to Graduate Study*  
(3-0-3) Staff  
Introduces students to research techniques, literary theory, and the scholarly profession of literature. Frequent guest lectures by the English faculty will enable students to become acquainted with research activities taking place in the department.
- 508. Current Issues in Critical Theory*  
(3-0-3) Bruns, Buttigieg, E. Ziarek, K. Ziarek  
An examination of a major critical issue or area of critical theory such as structuralism/poststructuralism, semiotics, Marxism, or feminism.
- 510. Introduction to Critical Theory*  
(3-0-3) Bruns, Buttigieg, Hendler, E. Ziarek, K. Ziarek, Hammill  
Investigation of the principal figures and approaches to literary criticism that developed in the modern era.
- 513A. Feminist Critical Theory*  
(3-0-3) Baldwin  
An introduction to major theorists and schools of feminism.
- 513B. Theories of Postmodern Culture*  
(3-0-3) Collins  
An examination of theories of the cultural production of literature, art, and mass media.
- 515B. The Ancient Novel*  
(3-0-3) Doody  
A study of the novel in late antiquity and its relation to the modern fiction of Cervantes and Richardson.
- 530. Old English Language and Readings*  
(3-0-3) Lapidge, O'Brien-O'Keeffe  
Grammar and literary readings in old English, designed to give the student an adequate knowledge of the language for more advanced study of old English literature.
- 530C. Latin Literature of Anglo-Saxon England*  
(3-0-3) Lapidge  
A close study of the principal Anglo-Latin authors and texts.
- 530F. Old Norse*  
(3-0-3) Lapidge  
A study of the surviving Norse and Icelandic literature, both in prose and verse, through the medium of the old Norse language.
- 531. Beowulf*  
(3-0-3) O'Brien-O'Keeffe, Lapidge  
An intensive study of the epic, in its original language, and its place in English literature.
- 533B. Allegory and Symbol*  
(3-0-3) Mann  
A course on different ways of reading medieval allegory and modern critical theories of allegory.
- 538A. Chaucer and Langland*  
(3-0-3) Frese, Mann  
A thorough study of Chaucer's works with special attention to the major works in the canon.
- 539A. Studies in Middle English Literature*  
(3-0-3) Frese, Mann, Nolan  
An in-depth study of works in the original middle English language. Previous study of ME language or literature is not a prerequisite.
- 539B. Arthurian Literature*  
(3-0-3) Frese  
A study of the Arthurian tradition from Mallory to Tennyson.
- 544. Shakespeare*  
(3-0-3) Lander, Holland  
A study of the plays and their literary relationships.
- 545. Studies in 16th-Century British Literature*  
(3-0-3) Hammill, T. Krier, Lander  
Specialized studies in the various genres of 16th-century British literature and their historical contexts. Readings in poetry, drama, fiction, and nonfictional prose of the period.
- 546. Studies in 17th-Century British Literature*  
(3-0-3) Hammill, T. Krier, Lander  
Specialized studies in the major dramatic works of the 17th century by Shakespeare and others, as well as detailed readings in lyric poetry, and religious and political writings.
- 549. Republican Aesthetics*  
(3-0-3) Hammill  
A study of the relations between political thought and aesthetic practice in early modern discourses of republicanism.
- 550. Studies in 18th-Century Literature*  
(3-0-3) Doody, Fox, Gibbons, Jemielity, Walton  
A study of the poetic tradition in Britain stretching from Dryden to Johnson.
- 553. Aesthetic Theory and the Enlightenment*  
(3-0-3) Doody  
An examination of the rise of the British novel in the 18th century and its important historical roots in earlier periods.
- 554A. Psychology and Literature in the 18th Century*  
(3-0-3) Fox  
An examination of the development of 18th-century British psychological writing and its relation to the literature of the period.
- 559B. Reading the French Revolution*  
(3-0-3) Deane  
An analysis of the ways in which readings of the French Revolution in the period from 1790-1830 helped to produce early versions of modernity and of the aesthetic practices that accompanied it.
- 562. Romantic Era Drama and the Public Theater*  
(3-0-3) Kucich  
A seminar on dramatic writing of the romantic era and the cultural role of stage performance.
- 562A. Romanticism, Gender, and Colonialism*  
(3-0-3) Kucich  
A study of the interplay of gender and colonial culture in romantic-era writing.
- 564. Nineteenth-Century British Novel*  
(3-0-3) Vanden Bossche  
A study of major British 19th-century novels in relation to changing class, gender, and social relations during the Victorian period.

565. *Victorian Poetry and Poetics*  
(3-0-3) Sniegowski  
A study of the major Victorian poets and Victorian poetic theory.
- 565B. *Victorian Literature: Sexuality and Empire*  
(3-0-3) Psomiades  
A seminar on the linked topics of sexuality and Empire in Victorian literature.
567. *Gender and Power in Victorian Literature*  
(3-0-3) Psomiades  
A historical analysis of forms of power in Victorian literature.
568. *Nineteenth-Century Novel*  
(3-0-3) Vanden Bossche  
A study of the major fiction writers of the 19th century.
570. *Modern British Poetry*  
(3-0-3) Matthias  
A study of the major British poets of the 20th century.
571. *Modern Irish Drama and Revolutionary Politics*  
(3-0-3) Harris  
A course on the drama of the Abbey Theater and revolutionary politics during the first decades of the 20th century.
- 571B. *From Brecht to Performance Art: Drama and Dramatic Theory, 1930–2000*  
(3-0-3) Bruns  
A seminar on the world of British and European theater during the last half-century.
- 571E. *Contemporary British Drama*  
(3-0-3) Harris  
An investigation of the major authors, developments, and crises that emerge in British drama throughout the 20th century.
572. *Liberalism and Modernism: Newman, Arnold, Acton, and Joyce*  
(3-0-3) Deane  
A study of principal figures in the development of cultural and religious debates during the 19th and early 20th centuries.
- 573A. *Modern British Novel*  
(3-0-3) Buttigieg, Green  
A study of the major fiction writers of the modern period.
- 573C. *History of Modern Aesthetics*  
(3-0-3) E. Ziarek  
A study of the history of aesthetics from the 18th to the 20th century, this course traces the genealogy of the main debates about the social functions of art in modernity.
574. *Studies in Modern British Literature*  
(3-0-3) Bruns, Buttigieg, Green, E. Ziarek  
A study of British poetry, drama, and fiction of the 20th century.
576. *Irish Literary Modernism*  
(3-0-3) Deane  
A study of Irish revival literature, 1880-1930.
- 577B. *Representing Ireland*  
(3-0-3) Gibbons  
A study of the politics of representation in Irish culture in terms of contemporary theories of romanticism, modernity, and postcolonialism.
- 579A. *African Literature*  
(3-0-3) Sniegowski  
Introduction to the field of African literature with a special focus on the issues of independence and nation building as well as the relationship between race and gender.
- 579B. *Postcolonial Literature*  
(3-0-3) Johnson-Roullier  
An introduction to the literary and theoretical developments brought about by the decline of the period of European imperial domination.
- 581A. *Early American Literature*  
(3-0-3) Gustafson  
A study of the texts and contexts of literature written in America between 1500 and 1800.
- 584B. *Puritan Imagination in American Literature*  
(3-0-3) Werge  
The Puritan tradition in the writings of Emerson, Hawthorne, Melville, Dickinson, and Stowe.
586. *Fictions of the Public Sphere*  
(3-0-3) Hendler  
The relation between private and public spheres in American fiction of the late 19th and early 20th centuries.
590. *Poetics and Politics in Early 20th-Century Poetry*  
(3-0-3) Brogan  
A study of Wallace Stevens and his contemporaries.
- 590A. *Postmodern American Poetry*  
(3-0-3) Fredman  
Study of major schools and trends in American poetry after World War II.
- 592B. *American Fiction: 1945–1970*  
(3-0-3) W. Krier  
A study of American fiction during the decades after World War II.
- 593B. *Latino Poetry*  
(3-0-3) Menes  
A study of prominent contemporary Latino/a poets whose work has enriched and diversified the canon of American poetry in the last 20 years.
594. *American Film and Culture*  
(3-0-3) W. Krier  
A study of film in relation to American popular culture.
- 594A. *Black Feminist Criticism*  
(3-0-3) Irving  
An examination of the ways in which race, gender, and sexuality and their interrelationships structure the discourse of black women writers since the 1970s.
- 596A. *Afro-American Literature: Major Works and Periods*  
(3-0-3) Brogan, Irving  
A chronological examination of the most significant periods, writers, themes, and forms of Afro-American literature.
598. *Special Studies*  
(3-0-3) Staff  
Topics vary by semester.
599. *Thesis Direction*  
(V-V-V) Staff  
Research and writing on an approved subject under the direction of a faculty member.
600. *Nonresident Thesis Research*  
(0-0-1) Staff  
Required of nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.
603. *Small Press Literature and Publishing*  
(V-V-V) Staff  
The literature, philosophy and practice of literary magazines.
697. *Directed Readings*  
(3-0-3) Staff  
Directed readings for examinations in the doctoral program.

699. *Research and Dissertation*

(V-V-V) Staff

Independent research and writing on an approved subject under the direction of a faculty member.

700. *Nonresident Dissertation Research*

(0-0-1) Staff

Required of nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.

701A, 701B. *Teaching Seminar*

(1-0-1) (1-0-1) Greene, Kucich, Sayers

Classroom techniques and methodology for teaching composition, literature, and creative writing. An analysis of teacher preparation, classroom presentation, and student consultation and work.

702A. *Practicum: Preparing for the Profession*

(1.5) Hammill

A workshop on professional publication, conference activity, and job search procedures.

**Faculty**

Kate Baldwin, *Assistant Professor*. B.A., Amherst College, 1988; M.A., Yale Univ., 1992; Ph.D., *ibid.*, 1995. (1997)

Rev. Paul E. Beichner, C.S.C., *Professor Emeritus*. A.B., Univ. of Notre Dame, 1935; M.A., *ibid.*, 1941; Ph.D., Yale Univ., 1944. (1945)

Joseph X. Brennan, *Professor Emeritus*. A.B., Providence College, 1945; M.A., Brown Univ., 1949; Ph.D., Univ. of Illinois, 1953. (1955)

Jacqueline V. Brogan, *Professor*. B.A., Southern Methodist Univ., 1974; M.A., *ibid.*, 1975; Ph.D., Univ. of Texas, 1982. (1986)

Gerald L. Bruns, *the William P. and Hazel B. White Professor of English*. B.A., Marquette Univ., 1960; M.A., *ibid.*, 1962; Ph.D., Univ. of Virginia, 1966. (1984)

Joseph A. Buttigieg, *the William R. Kenan Jr. Professor of English and Fellow in the Nanovic Institute for European Studies*. B.A., Univ. of Malta, 1968; Ph.D., State Univ. of New York at Binghamton, 1976. (1980)

James M. Collins, *Associate Professor of Film, Television, and Theatre and Concurrent Associate Professor of English*. B.A., Univ. of Iowa, 1975; Centres des Etudes Cinematographiques, France, 1977; Ph.D., Univ. of Iowa, 1984. (1985)

Donald P. Costello, *Professor Emeritus*. A.B., De Paul Univ., 1955; M.A., Univ. of Chicago, 1956; Ph.D., *ibid.*, 1962. (1960)

Seamus Deane, *the Donald and Marilyn Keough Professor of Irish Studies and Professor of English*. B.A., Queen's Univ., Belfast, 1961; M.A., *ibid.*, 1963; Ph.D., Cambridge Univ., 1966. (1993)

Margaret Doody, *Director of the Ph.D. Program in Literature and the John and Barbara Glynn Family Professor of Literature*. B.A., Dalhousie Univ., 1960; B.A., Oxford Univ., 1962; M.A., *ibid.*, 1967; D.Phil., *ibid.*, 1968. (2000)

James P. Dougherty, *Professor*. A.B., St. Louis Univ., 1959; M.A., Univ. of Pennsylvania, 1960; Ph.D., *ibid.*, 1962. (1966)

John Duffy, *Assistant Professor and Director, University Writing Center*. B.A., Boston College, 1977; M.A., Univ. College, Dublin, 1979; M.A., Columbia Univ., 1982; Ph.D., Univ. of Wisconsin, 2000. (1998)

Stephen M. Fallon, *Associate Professor of Liberal Studies and Concurrent Associate Professor of English*. A.B., Princeton Univ., 1976; M.A., McGill Univ., 1978; Ph.D., Univ. of Virginia, 1985. (1985)

Christopher B. Fox, *Professor and Director of the Keough Institute for Irish Studies*. B.A., Cleveland State Univ., 1971; M.A., State Univ. of New York at Binghamton, 1974; Ph.D., *ibid.*, 1978. (1986)

Stephen A. Fredman, *Chair and Professor*. B.F.A., California Inst. of the Arts, 1971; M.A., California State College, 1976; Ph.D., Stanford Univ., 1980. (1980)

Dolores Warwick Frese, *Professor*. B.A., College of Notre Dame of Maryland, 1958; M.A., Univ. of Iowa, 1961; Ph.D., *ibid.*, 1972. (1973)

Sonia G. Gernes, *Professor*. B.A., St. Teresa College, 1966; M.A., Univ. of Washington, 1971; Ph.D., *ibid.*, 1975. (1975)

Luke Gibbons, *the Grace Director of Irish Studies, Professor of English, and Concurrent Professor of Film, Television, and Theatre*. B.A., Univ. College, Galway, 1972; M.A., *ibid.*, 1976; Ph.D., Trinity College, Dublin, 1989. (2000)

Barbara J. Green, *Associate Professor*. B.A., Univ. of Chicago, 1983; M.A., Univ. of Virginia, 1985; Ph.D., *ibid.*, 1991. (1991)

Stuart Greene, *the O'Malley Director of the First-Year Composition Program and Associate Professor of English*. B.A., State Univ. of New York at Binghamton, 1978; M.A., *ibid.*, 1980; Ph.D., Carnegie Mellon Univ., 1990. (1997)

Sandra Gustafson, *Director of Graduate Studies and Associate Professor*. B.A., Cornell Univ., 1985; Ph.D., Univ. of California, Berkeley, 1993. (1993)

Graham Hammill, *Associate Professor*. B.A., Louisiana State Univ., 1986; Ph.D., Duke Univ., 1992. (1995)

Susan Cannon Harris, *Assistant Professor and Concurrent Assistant Professor in the Keough Institute for Irish Studies*. B.A., Yale Univ., 1991; M.A., Univ. of North Carolina, 1993; Ph.D., Univ. of Texas, 1998. (1998)

Kevin Hart, *Professor*. B.A., Australian National Univ., 1976; Ph.D., Univ. of Melbourne, 1986. (2002)

Glenn Hendler, *Associate Professor*. B.A., Brown Univ., 1984; Ph.D., Northwestern Univ., 1991. (1994)

Peter Holland, *Chair of Film, Television, and Theatre and the McMeel Professor in Shakespeare Studies*. B.A., Trinity Hall, Cambridge, 1972; Ph.D., *ibid.*, 1977. (2002)

Romana Huk, *Associate Professor*. B.A., College of William and Mary, 1981; M.A., Univ. of Notre Dame, 1984; Ph.D., *ibid.*, 1987. (2002)

Antonette K. Irving, *Assistant Professor*. B.A., Univ. of Virginia, 1992; M.A., Univ. of Kent, 1996; Ph.D., New York Univ., 2001. (2000)

Thomas J. Jemielity, *Professor*. M.A., John Carroll Univ., 1958; Ph.D., Cornell Univ., 1965. (1963)

Cyraina Johnson-Roullier, *Associate Professor*. B.S.J., Ohio Univ., 1982; M.A., Ohio State Univ., 1985; M.A., State Univ. of New York at Buffalo, 1990; Ph.D., *ibid.*, 1991. (1991)

Edward A. Kline, *Professor Emeritus*. A.B., Muhlenberg College, 1961; Ph.D., St. Louis Univ., 1966. (1966)

Theresa M. Krier, *Associate Professor*. B.A., Western Michigan Univ., 1977; M.A., Univ. of Michigan, 1978; Ph.D., *ibid.*, 1983. (1985)

William J. Krier, *Associate Professor*. B.A., Univ. of Notre Dame, 1965; M.A., Univ. of Michigan, 1966; Ph.D., Indiana Univ., 1973. (1969)

Greg P. Kucich, *Associate Professor*. B.A., San Francisco State Univ., 1978; M.A., Univ. of Michigan, 1979; Ph.D., *ibid.*, 1983. (1983)

Jesse M. Lander, *Assistant Professor*. B.A., Columbia College, 1988; B.A., Univ. College, Oxford, 1991; M.A., Columbia Univ., 1992; M. Phil., *ibid.*, 1994; Ph.D., *ibid.*, 1998. (1999)

Michael Lapidge, *the Notre Dame Professor of English*. B.A., Univ. of Calgary, 1962; M.A., Univ. of Alberta, 1965; Ph.D., Univ. of Toronto, 1971. (1998)

Robert J. Lordi, *Professor Emeritus*. A.B., Holy Cross College, 1950; M.A., Boston College, 1955; Ph.D., Univ. of Illinois, 1958. (1958)

Jill Mann, *the Notre Dame Professor of English*. B.A., Oxford Univ., 1964; Ph.D., Cambridge Univ., 1971. (1999)

John E. Matthias, *Professor*. B.S., Ohio State Univ., 1963; M.A., Stanford Univ., 1966. (1967)

Orlando Menes, *Assistant Professor*. B.A., Univ. of Florida, 1980; M.A., *ibid.*, 1982; Ph.D., Univ. of Illinois at Chicago, 1998. (2000)

Lewis E. Nicholson, *Associate Professor Emeritus*. B.A., Univ. of Iowa, 1947; M.A., *ibid.*, 1948; M.A., Harvard Univ., 1951; Ph.D., *ibid.*, 1958. (1958)

Maura Bridget Nolan, *Assistant Professor*. A.B., Dartmouth College, 1988; A.M., Duke Univ., 1992; Ph.D., *ibid.*, 1998. (1996)

Katherine O'Brien-O'Keeffe, *the Notre Dame Professor of English*. A.B., Fordham College, 1970; Ph.D., Univ. of Pennsylvania, 1975. (1992)

William A. O'Rourke, *Professor*. A.B., Univ. of Missouri, Kansas City, 1968; M.F.A., Columbia Univ., 1970. (1981)

Kathy A. Psomiades, *Associate Professor*. A.B., Bryn Mawr College, 1983; M.A., Yale Univ., 1984; M.Phil., *ibid.*, 1987; Ph.D., *ibid.*, 1990. (1990)

Paul A. Rathburn, *Associate Professor Emeritus*. B.A., Holy Cross College, 1956; M.A., St. Mary's Seminary, 1958; M.A., Marquette Univ., 1961; Ph.D., Univ. of Wisconsin, 1966. (1965)

Jamie Javier Rodriguez, *Assistant Professor*. B.A., North Texas State Univ., 1981; A.M., Harvard Univ., 1994; Ph.D., Harvard Univ., 2000. (2002)

Valerie Sayers, *Director of Creative Writing and Professor*. B.A., Fordham Univ., 1973; M.F.A., Columbia Univ., 1976. (1993)

Donald C. Sniegowski, *Associate Professor Emeritus*. B.A., Univ. of Notre Dame, 1956; B.A., Oxford Univ., 1958; M.A., Yale Univ., 1960; Ph.D., *ibid.*, 1966. (1961)

Steve Tomasula, *Assistant Professor*. B.S., Purdue Univ., 1976; M.A., Univ. of Illinois at Chicago, 1982; Ph.D., *ibid.*, 1995. (1997)

Chris R. Vanden Bossche, *Professor*. A.B., Univ. of Notre Dame, 1972; Ph.D., Univ. of California, Santa Cruz, 1982. (1984)

Edward Vasta, *Professor Emeritus*. B.A., Univ. of Notre Dame, 1952; M.A., Univ. of Michigan, 1954; Ph.D., Stanford Univ., 1963. (1958)

James H. Walton, *Professor*. A.B., Univ. of Notre Dame, 1959; M.A., Northwestern Univ., 1960; Ph.D., *ibid.*, 1966. (1963)

Thomas A. Werge, *Professor and Concurrent Professor in the Master of Education Program*. B.A., Hope College, 1963; M.A., Cornell Univ., 1964; Ph.D., *ibid.*, 1967. (1967)

Ivy Glenn Wilson, *Instructor*. B.A., Stanford Univ., 1995; M.A., Yale Univ., 1998; Ph.D., Yale Univ., 2002. (2002)

Ewa Ziarek, *Professor and Fellow in the Nanovic Institute for European Studies*. B.A., Warsaw Univ., 1984; M.A., State Univ. of New York at Buffalo, 1988; Ph.D., *ibid.*, 1989. (1989)

Krzysztof Ziarek, *Associate Professor and Fellow in the Nanovic Institute for European Studies*. B.A., Warsaw Univ., 1985; M.A., State Univ. of New York at Buffalo, 1988; Ph.D., *ibid.*, 1990. (1990)

## German Language and Literature

### Chair:

Robert E. Norton

### Director of Graduate Studies:

Albert Wimmer

Telephone: (574) 631-5572

Location: 318 O'Shaughnessy

E-mail: [grrl@nd.edu](mailto:grrl@nd.edu)

Web: <http://www.nd.edu/~grrl>

### The Program of Studies

The Department of German and Russian Languages and Literatures offers an M.A. degree in German. The primary aim of the master's program is to provide students with a comprehensive background in the literary and cultural achievements of the German-speaking countries. The courses of study provided will, in most instances, lead to a career in teaching and scholarship, but they may also serve as fundamental training for those who plan to enter professions based on international relations or where an advanced knowledge of German plays an auxiliary role.

### General Requirements

Graduate study in German assumes a prior undergraduate major in German or its equivalent. The graduate adviser, in conjunction with the department chair, will help to determine the individual course of study for each student once on campus. All candidates for the M.A. degree in German are expected to take a minimum of 30 credit hours in their specialized area or related fields. The master's program combines intensive literary studies with advanced courses in related areas of other disciplines, such as other foreign languages, art, English, government, history, international studies, music, philosophy, psychology, and theology. The goal of advanced studies in the department is the critical understanding and articulation of the culture of other nations as reflected primarily in their literatures. It is assumed that applicants for admission to the M.A. program in German are already fluent in the language, especially if they also apply for a teaching assistantship.

Upon their arrival on campus, graduate students will be advised of their course of studies and given detailed instruction on how to plan their four semesters of graduate work. Besides taking advanced courses, students are also responsible for the reading list that covers the various periods of German literature. During the first year of study, an oral proficiency examination in German will determine candidacy for the master's degree. Furthermore,



incoming graduate students are required to attend a week-long orientation prior to the beginning of classes, enroll in GE 503 (SLA Theory and Practice: Understanding the Profession) and GE 504 (Development of Multi-Media Material for Language Teaching), and work closely with a faculty (or the German Supervisor) on departmental matters of teaching, learning, and testing German for proficiency.

The master's program is concluded by a comprehensive written examination designed to test satisfactory knowledge of two areas of concentration and sufficient competency in four other fields of the German literary tradition. The precise areas of concentration on the examination will be determined by the graduate adviser, in consultation with the department chair, and is based on the interests of the individual student. To the extent possible, graduate students will be given the opportunity to participate in the elementary language teaching of the department. Students in the master's research program may earn up to six of their required 30 credit hours in researching and composing the thesis required of all research students.

#### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

Not all courses are offered every year.

#### Graduate Reading Courses

##### 500. *German Graduate Reading*

(3-0-3) Liontas, Weber

Intended as review for graduate students who wish to take the GRE in German. The final examination of the course, if passed, fulfills the requirements of the GRE.

##### 503. *SLA Theory and Practice: Understanding the Profession*

(3-0-3) Liontas

This methodology course for pre- and in-service secondary teachers and graduate teaching assistants recognizes the vital need for second language learning in the curriculum of the future, pursues new directions in second language acquisition (SLA) research, and develops creative ways to enhance teaching,

learning, and testing in the classroom. Participants are challenged to ask new questions that research efforts have only begun to address and to make explicit their own theories and hypotheses of how SLA occurs. The goal is for participants to understand, clarify, and articulate their beliefs and practices about language teaching and learning, including various theoretical and practical insights into what it means to be proficient in a language. It is also hoped that participants will gain a new perspective on how adult learners develop proficiency in a second language (from empiricist to rationalist views), become familiar with past and current methodological approaches and practices, reexamine current assumptions and language teaching practices, and achieve an integrated perspective of the issues surrounding contextualization of the four skills and culture, proficiency-oriented classroom testing, lesson and curriculum planning, and, finally, use of authentic materials and emerging digital technologies for second language learning.

##### 504. *Development of Multi-Media Material for Language Teaching*

(3-0-3) Liontas

This course investigates the parameters involved with multimedia materials development, explores second language acquisition (SLA) research and its impact on language teaching, and analyzes and critiques textbooks and other teaching materials. Participants are asked to write a prospectus, including rationale, audience, methodology, and sample materials.

#### Courses in German Literature

##### 515. *Medieval German Literature*

(3-0-3) Wimmer

A survey of the developments in literature and art of the Middle Ages. (Fall)

##### 520. *Love and Violence in Medieval German Literature*

(3-0-3) Christensen (in German)

This course will investigate the interplay of love and violence in a variety of secular and religious texts by both women and men from the German Middle Ages. Knowledge of Middle High German is not required, but, where available, students will read modern German with facing medieval text.

##### 526. *The Baroque Period*

(3-0-3) Staff

A survey of the development of baroque forms in literature and art during the 17th century. (Offered as Directed Readings)

##### 530. *The Age of Enlightenment*

(3-0-3) Staff

A study of the impact of the new physical sciences and rationalistic philosophy upon the life and belles lettres of 18th-century England, France, Germany, Spain, and Italy. (Offered as Directed Readings)

##### 541. *Goethe and His Age*

(3-0-3) Norton

An intensive study of Goethe's major works of poetry, prose, and drama within the cultural framework of his times.

##### 548. *German Cinema in the Weimar Republic (1918–1933)*

(3-0-3) Hagens (in English)

The years between 1918 and 1933 are the Golden Age of German film. In its development from expressionism to social realism, this German cinema produced works of great variety, many of them in the international avant garde. The seminar will give an overview of the silent movies and sound films made during the Weimar Republic and situate them in their artistic, cultural, social, and political context. The *oeuvre* of Fritz Lang, the greatest German director, will receive special attention. Should we interpret Lang's disquieting visual style as a highly individual phenomenon independent of its environment, or can we read his obsessive themes (world conspiracies and terrorized masses, compulsive violence and revenge, entrapment and guilt) as a *Widerspiegelung* (mirror image) of the historical period? Might his films, as some critics have suggested, even illustrate how a national psyche gets enmeshed in fascist ideology?

The seminar will introduce students to basic categories of film analysis, survey the history of German cinema during the Weimar Republic (1918–1933), and provide a closer look at the works of Fritz Lang.

Films subtitled, dubbed, or English language; readings, lectures, and discussions in English.

##### 550. *The Nazi Past in Postwar German Film*

(3-0-3) Hagens

How have German films since 1945 been trying to deal with the Nazi past? How do Germans picture their memories of the Third Reich? How do they define themselves within and against their country's history? And how do they live with their remembrances now? Primarily, this class aims at issues in the realm of ethics—perpetrators, victims, and passive accomplices; stereotypes; courage and cowardice; personal and national guilt; revisionism, coming-to-terms, and productive memory;

responsibility and the (im)possibility of reconciliation. Some central questions about German history during the Third Reich and the postwar era will be considered. The course will also develop basic categories of film analysis and ask questions about the special capacity of film to help a nation work through its past. Films subtitled, dubbed, or English language.

555. *German Drama 1750 to the Present*  
(3-0-3) Hagens (in German)

We will read and discuss some of the greatest plays in the German dramatic tradition, by authors such as Lessing, Goethe, Schiller, Kleist, Grillparzer, Nestroy, Freitag, Hauptmann, Hofmannsthal, Brecht, and Werfel. By interpreting classic German-language plays in the original, students will learn how to approach drama analysis, and develop a sense for the history of drama throughout the past 250 years. In addition, we will study a few short, and often English-language, texts in the theory of drama (Aristotle, Schelling, Carrière, and Cavell, as well as our department's own Hösele and Roche), which will allow students to differentiate between the basic genres of drama (tragedy, comedy, and drama of reconciliation) and understand better the nature of conflict and reconciliation. Students interested in other national literatures will have the opportunity to draw comparisons with plays by authors such as Aeschylus, Sophocles, Shakespeare, Calderón, Corneille, Racine, and Ibsen; and those interested in film may branch out into analyzing works by directors such as Hitchcock, Renoir, Ford, Capra, Curtiz, Hawks, Chaplin, and Kurosawa.

566. *Nineteenth-Century German Literature*  
(3-0-3) Norton (in German)

The 70 years that separate the death of Goethe in 1832 and the end of the 19th century are rich in examples of literary and cultural achievement. This diversity and complexity has given rise to a variety of epochal designations—Biedermeier,—"Vormärz," Realism, Naturalism, Symbolism, to name the most prominent—which have served to categorize each successive generation's literary, political, and social agenda. In this course, we will consider the main outlines of 19th-century German literature (including in Austria and Switzerland) by studying representative works of all major genres—prose, poetry, drama—and by some of the greatest writers of their day: Mörike, Heine, Grillparzer, Hebbel, Keller, Meyer, Raabe, Fontane, and George.

570. *Modern Lyric Poetry*

(3-0-3) Profit  
A close reading and analysis of 19th- and 20th-century German poetry with particular emphasis on George, Rilke, Brecht, Lehmann, Krolow, and Piontek. (Every two years)

571. *20th Century Prose and Poetry*  
(3-0-3) Profit (in German)

In order to acquaint the student with the rich diversity characteristic of 20th-century German literature, a wide variety of materials will be studied. They will not only encompass various genres: the short story, the drama and the poem, but will also represent various time periods: from the beginnings of the 20th century to the 1970s. Among others, readings will include: Franz Kafka, *Der Landarzt*; Wolfgang Borchert, *Draussen vor der Tür*; and Rainer Maria Rilke, *Die Weise von Liebe und Tod des Cornets Christoph Rilke*. An oral report, two papers, and a two-hour final will supplement thorough and engaging class discussions based upon close readings of the selected texts.

572. *Modern German Short Story*

(3-0-3) Wimmer (in German)  
Post-1945 short stories/*Kurzgeschichten* to the 1990s, covering a wide range of themes and issues. Among the authors discussed will be Bichsel, Borchert, Böll, Brecht, Kusenberg, von der Grün, Kaschnitz, Wallraff, Grass, and others. Teaching method: Introductory lectures, student presentations, and discussions. In German. Requirements: Three papers of approximately 10 pages in length, two exams, one final examination.

575. *The World as Theater*

(3-0-3) Hagens  
"All the world's a stage"—this insight has been dramatized by many playwrights. While the core of this idea seems to have remained the same (namely, the world is like a theater, human existence like a play, and we are like actors), the form of the idea has gone through many telling variations. By observing these changes, we will not only learn about the history of drama and theater over the past 350 years, but also about the relation between a stage play and the rest of reality; and most importantly, we will find out what the foremost dramatists advocated our proper role in life should be. We will read, discuss, and write about some of the greatest dramas in the German-language tradition by authors such as Weise, Tieck, Hofmannsthal, Brecht, Weiss, Handke, Dürrenmatt, and Tabori.

577. *The Holocaust in German Theater and Film*

(3-0-3) Hagens (in German)  
We will study German, Austrian, and Swiss stage plays and films that have the Holocaust for their central issue. Our close analyses will be framed by broader questions: How can the (re-)presentation of evil on stage or screen become meaningful—or is such an endeavor beyond the limits of (re-)presentation? What are the respective weaknesses and strengths of theatre and cinema when confronted with this challenging topic? How do German and Austrian plays and films about the Holocaust differ from the ones produced in other countries?

579. *Aesthetics, Aestheticism, Aestheticization*  
(3-0-3) Norton

One of the persistent clichés of modern German culture was that Germany was the land of "poets and thinkers," with politics largely falling outside the equation. Obviously, this disregard for politics is itself a deeply political gesture, with potentially—and in Germany's case, verifiably—disastrous consequences. In this class, we explore the relationship between art, theories of art, and politics, with an emphasis on the peculiarly German desire to envision a political utopia based on aesthetic principles. Spanning nearly two centuries, the texts we study trace a development that began in the Enlightenment and reached a conclusion during the middle of the last century. Readings may include works by Herder, Schiller, Hegel, Heine, Marx, Nietzsche, Thomas Mann, Walter Benjamin, Heidegger, Georg Lukacs, and Adorno.

582. *The Literature of Unified Germany (1989–2000)*

(3-0-3) Christensen (in German)  
How has German identity changed since 1989? In what ways has the status quo of divided Germany been maintained, even fortified, by unification? Is the literature written in Germany since 1989 merely reflecting or is it influencing societal, cultural, or political change? Or is it indeed independent of such changes? In order to begin to answer these questions, we will read a variety of texts written in Germany since late 1989. To facilitate deep exploration and discussion, we will read a relatively small number of texts that will nonetheless represent a wide range of genres (novel, short story, drama, poetry, and reportage). Authors will likely include Christa Wolf, Günther Grass, Durs Grünbein, Holger Teschke, Ingo Schulze, Luise Endlich, and Doris Dörrie. To illuminate the literary works we will read, we will also read and debate

what some German authors have written and are writing about their own social and historical role—and the role of their writings—in Germany today. The course will include a number of films (documentary and dramatic) produced since 1989. Students will also regularly read (on the Web) and report on news of Germany, especially as it relates to the German literary and cultural scene.

583. *Seminar on German Women Writers*  
(3-0-3) Christensen (in German)

Participants in this seminar will explore the rich literary history of women writers from German-speaking Europe. We will read works of many different genres (drama, short story, novella, novel, letter) by women from the early Middle Ages to the present. In the process, we will encounter Europe's first playwright, one of the 21st-century's brightest young literary stars, and an array of intriguing women who came between them. We will scrutinize and apply various theoretical and critical approaches to (women's) literature, both in writing and in lively debates.

584. *Overcoming Political Tragedy: An Interdisciplinary Course in Drama and Peace Studies*  
(3-0-3) Hagens (in English)

Drama is a potentially fascinating topic for Peace Studies because, at the heart of traditional drama and theatre, there is conflict—and the question whether it can be resolved. Moreover, just as politics often is dramatic, drama often is political: there is, for example, a very extensive tradition of plays that thematize political revolution, usually in the form of either tragedy or comedy. Students will read classic political dramas that are neither tragedies nor comedies but, rather, bring potentially tragic public conflict to positive yet non-trivial resolution.

The class will proceed as follows: Having discussed definitions of tragedy and comedy, and what might be the advantages of aesthetic renditions of conflict, we will then read some of the following dramas of political reconciliation: Aeschylus, *Oresteia/Eumenides*; Shakespeare, *Measure for Measure*; Calderón, *The Mayor of Zalamea*; Corneille, *Cinna*; Lessing, *Nathan the Wise*; Schiller, *William Tell*; Kleist, *The Prince of Homburg*; Brecht, *The Caucasian Chalk Circle*; Lan, *Desire*; and Fugard, *Valley Song*. (We may include selected films, such as *Meet John Doe*, *On the Waterfront*, or *Twelve Angry Men*.) We will examine these plays through the categories both of drama analysis and of theories of conflict resolution, mediation, and transformation. The expectation is that this approach will enable us to

achieve greater depth in our interpretations of the dramatic texts as well as in our understanding of the theories of conflict resolution.

Students of Peace Studies and Political Science who are familiar with these pieces of world literature will have acquired a new kind of resource for their ability to think through, and to work in, conflict resolution. Being able to draw on such artistically crafted illustrations of political mediation opens up historically diverse, cross-cultural, and emotionally nuanced perspectives onto the topic of their studies. Conversely, students of drama and theatre will acquire more sophisticated technical instruments for the analysis of aesthetic conflict.

Arrangements are being made to invite guest speakers from other departments. All discussions, texts, and papers in English; special arrangements can be made for students of German.

585. *Religious Themes in Modern German Literature and Thought*

(3-0-3) Roche

This course addresses a variety of religious issues, ranging from 18th-century secularization and discussions of the theodicy to the 19th century's various critiques of religion and 20th-century discussions of religion and intellectuals and of the responsibility of the church. The course addresses both the literary embodiment of religious themes and essayistic analyses of religious issues. Authors to be read and discussed include Lessing, Novalis, Hölderlin, Büchner, Grillparzer, Feuerbach, Marx, Nietzsche, Freud, and Hochhuth.

586. *Der Artusroman — Arthurian Epic*

(3-0-3) Christensen (in German)

Come explore the enduring legend of King Arthur and his court as interpreted by German authors of the high Middle Ages (late 12th and 13th centuries). We will spend the majority of the semester on the three best-known and most complete Arthurian epics in the German tradition: Erec and Iwein by Hartmann von Aue, and Wolfram von Eschenbach's *Parzival*, as well as other later German adaptations they influenced. These tales are among the most imaginative and fascinating in the German canon, full of the adventures and exploits of knights and ladies. Our exploration of these texts will focus on their relationship to their French and English predecessors, on the many twists and turns in story line and character development that each individual author creates, and on the information they suggest about "real" life in the

medieval world. We will also take a look at some of the most interesting modern literary and film adaptations of the Arthurian legend.

591. *Evil and the Lie*

(3-0-3) Profit

By closely examining (among others) such works as Dürrenmatt's *Der Verdacht*, Wilde's *The Picture of Dorian Gray*, and Gide's *The Immoralist*, this seminar will hope to come to an understanding of the nature of evil and its relationship to lying, to self esteem, and to self love, among other aspects.

592. *Schopenhauer*

(3-0-3) Hösle

Schopenhauer's philosophy signifies a great break in the history of Western philosophy: no longer Reason, but the Will becomes the grounding principle; Schopenhauer claims furthermore to integrate in a productive way Buddhism into his pessimistic world-view. His influence on the philosophy, and also on the arts of the 19th and 20th centuries, has been enormous, not least of all because of his original aesthetics. We will read his main work, *The World as Will and Representation*.

594. *Thomas Mann*

(3-0-3) Hösle

Thomas Mann is certainly the most influential German novelist of the 20th century. Rooted in the *Bildungsbürgertum* of the 19th century, influenced by Richard Wagner and the philosophies of Arthur Schopenhauer and Friedrich Nietzsche, he is at the same time a profoundly modern writer with remarkable innovations in narrative techniques. We shall read three of his novels that deal with general cultural (and sometimes also very specific German) issues—the humanizing power of myth (*Joseph and his Brothers*), the greatness of an outstanding individual and its unhealthy impact on his environment (*Lotte in Weimar*), and the development of modern art at the price of the dissolution of its bonds with morality and its political consequences (*Doktor Faustus*).

595. *Nietzsche*

(3-0-3) Hösle

Nietzsche's philosophy represents one of the greatest interruptive moments in the history of philosophy: no one has destroyed as many assumptions as radically as Nietzsche. At the same time, his work represents a challenge to the literary mind in as much as Nietzsche discovered new forms of expression for philosophical thought. Everyone interested in German intellectual history as well as in the philosophy of the 20th century should

study his work, even if he or she comes to the conclusion that Nietzsche's arguments for this break in the tradition are not convincing.

597. *Directed Readings*  
(V-V-V) Staff

An individual reading or research course for German language degree candidates only.

### Faculty

Kirsten M. Christensen, *Assistant Professor*. B.A., Arizona State Univ., 1984; M.A., Brigham Young Univ., 1991; Ph.D., Univ of Texas, Austin, 1998. (1999)

Jan-Lüder Hagens, *Assistant Professor and Fellow in the Nanovic Institute for European Studies*. M.A., Univ. of Virginia, 1983; Staatsexamen, Univ. of Tübingen, 1988; M.A., Princeton, 1989; Ph.D., *ibid.*, 1993. (1997)

Vittorio Hösle, *the Paul Kimball Professor of Arts and Letters, Concurrent Professor of Philosophy, Concurrent Professor of Political Science, and Fellow in the Nanovic Institute for European Studies*. Ph.D., Univ. of Tübingen, 1982; Dr. habil., *ibid.*, 1985. (1999)

John I. Liontas, *Assistant Professor*. B.A., Univ. of Siegen, Germany, 1985; M.Ed., Univ. of South Carolina, 1989; Ph.D., Univ. of Arizona, 1999. (2000)

Robert E. Norton, *Chair of German and Russian Languages and Literatures, Professor of German, and Fellow in the Nanovic Institute for European Studies*. B.A., Univ. of California at Santa Barbara, 1982; M.A., Princeton Univ., 1985; Ph.D., *ibid.*, 1988. (1998)

Vera B. Profit, *Professor*. B.A., Alverno College, 1967; M.A., Univ. of Rochester, 1969; Ph.D., *ibid.*, 1974. (1975)

Mark W. Roche, *the I. A. O'Shaughnessy Dean of Arts and Letters, the Rev. Edmund P. Joyce, C.S.C., Professor of German Language and Literature, and Concurrent Professor of Philosophy*. B.A., Williams College, 1978; M.A., Univ. Tübingen, 1980; M.A., Princeton Univ., 1982; Ph.D., *ibid.*, 1984. (1996)

Albert K. Wimmer, *Director of Graduate Studies and Associate Professor, and Fellow in the Nanovic Institute for European Studies and the Medieval Institute*. B.A., Univ. of Munich; M.A., Univ. of Notre Dame, 1964; M.A., *ibid.*, 1967; Ph.D., Indiana Univ., 1975. (1964)

## History

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### The Program of Studies

The graduate programs in history permit students to deepen their knowledge and understanding of selected historical specializations and to nourish the historical perspective that marks the educated citizen. Advanced work in history may prepare students for careers in scholarship and teaching, for certain public service careers, or for careers in research.

The history programs accept only students planning to pursue the Ph.D. degree. These students are normally awarded a master's degree in the course of pursuing their doctorates.

### Admission

An applicant ordinarily should have completed at least 24 credit hours of undergraduate work in history. Language preparation is highly desirable; prospective medievalists must know Latin, and prospective modern Europeanists must know at least one modern European language. Both medievalists and those pursuing studies in other fields will be required to demonstrate proficiency in reading relevant foreign languages.

Incoming graduate students in the history programs begin studies in the fall semester. Students applying to enter in the fall should have complete dossiers (application, transcripts, writing sample, recommendations, and GRE scores) on file with Notre Dame's Office of Graduate Admissions no later than the preceding January 15. The "Statement of Intent" accompanying the application should describe the student's areas of interest as explicitly as possible and should list the departmental faculty members with whom they wish to study. (Please note that professors designated "emeritus" are retired.) The writing sample should demonstrate the applicant's skills in writing, analysis, and (if possible) historical research.

Fall applicants who wish to begin studies at Notre Dame the preceding summer should meet fall application requirements and also summer session admissions requirements stipulated in Notre Dame's Summer Session Bulletin of Information.

### General Requirements

Before completing their doctorates, students must satisfy the departmental requirements for the master's degree. Doctoral students receive their master's after completing 33 credit hours of study including one graduate-level seminar in history and 24 credit hours of graduate-level work (seminars, colloquia, directed readings, supplemental research, and readings) in history or related disciplines. The master's degree demands satisfactory completion of course work with a GPA of no less than 3.0. Students must also pass an M.A. exam (normally the candidacy exams count in place of a separate M.A. exam), see also language requirement below. In order to enter the doctoral program, students must satisfy the foreign language requirement and receive the approval of the departmental faculty. Students entering Notre Dame with a master's degree in history from another institution normally have the same course work, writing, and examination requirements as those entering without such a degree, but holders of the master's degree may be able to transfer as many as 24 credits into the history Ph.D. program, upon approval of the director of graduate studies. Normally, no more than six credits may be transferred and used to replace required courses in history.

In order to receive a Ph.D., a student must complete a total of 72 credit hours of study, including at least three graduate-level seminars in history (two for students in American history). Work must be in graduate-level courses (seminars, colloquia, directed readings, supplemental research and reading, dissertation research) in history or related disciplines.

In addition to completing prescribed course work, doctoral students must also pass Ph.D. candidacy examinations in their specialties. The candidacy examination will normally be taken sometime in the student's third year of residence. Students wishing to take candidacy examinations earlier than the third year of residence may do so with the consent of their academic advisers and the director of graduate studies. To be eligible to take the candidacy examination, students must satisfy the foreign language requirement and complete the required course work in their specialization.

Before being advanced to Ph.D. candidacy, students must submit to the department an approved dissertation proposal (see procedures outlined below). Within eight years of enrollment into the history graduate program, students must complete a satisfactory doctoral dissertation or risk the loss of their candidacy status. A student may appeal to the Graduate School for extension of candidacy status; granting of extensions may occur for compelling reasons but in no case may that candidacy be extended beyond seven years following passage of the candidacy examination.

### *Language Requirement*

One basic requirement for all candidates for the doctorate in history is a reading knowledge of one modern foreign language. In each field additional languages or an appropriate skill are prescribed as the faculty in that field consider necessary. The following provisions are in force. Candidates in the field of medieval history must demonstrate competence in Latin and two modern foreign languages, one of which is normally French or German. Competence in Latin is demonstrated by a student's passing the examination in medieval Latin administered by the Medieval Institute. Candidates in modern European history must demonstrate competence in reading two foreign languages, one of which must be French or German. Candidates in American history must demonstrate competence in one modern foreign language. In all fields, language and skill requirements must have been completed by the student before the student will be permitted to take Ph.D. candidacy examinations.

To receive the M.A., doctoral students must demonstrate a reading knowledge of one modern foreign language. Students must demonstrate their knowledge of this language by the end of their third semester in residence.

### *Examinations*

First-year examinations in modern European history are oral examinations administered near the end of the student's second semester of residence. The examination board will consist, whenever possible, of three faculty members who have worked with the student during the year. Each faculty member may pose questions based on student course work during the year. The first-year examination must be no less than 90 minutes and no more than two hours in length. When Europeanist students have completed other M.A. requirements, the first-year exam may count in place of a separate master's exam.

Students in American history will normally take their master's examination at the same time that they take the written part of their Ph.D. candidacy examinations. In order to receive the master's degree earlier, a student, upon completion of at least a year of course work, may take and must pass a written two-hour examination, administered by three history professors, normally with whom the student has taken course work. Students in medieval history follow the same procedures as their Americanist counterparts.

Ph.D. candidacy boards will consist of four or five faculty members chosen by the student and his/her advisor, and approve by the director of graduate studies. The written exam shall consist of four or five two-hour essays on topics selected by the examination board within fields chosen by the student; the oral exam shall involve questioning by the board for not less than 90 minutes and not more than three hours. There must be a gap of at least five working days between the final written exam and the oral exam.

Students who fail a Ph.D. candidacy examination may appeal to the director of graduate studies to retake the failed portion one time.

### *Advancement to Candidacy for the Ph.D.*

While preparing for the Ph.D. candidacy examinations, all students should take a one-semester scheduled course or directed reading course with their academic adviser on a prospective dissertation topic. After successfully passing the written and oral candidacy exam, the student will consult with the director of graduate studies about a thesis director and other members of a dissertation committee. The director of graduate studies, after consulting with those colleagues, will create that committee. The student will then present a dissertation proposal to the committee. The proposal should include a statement of the subject to be addressed; a survey of the relevant sources, where they are located, and how the student expects to get to them; how this dissertation would contribute significantly to knowledge in the field; what languages or quantitative skills are required and how the student proposes to gain them; and the timetable and financial resources required. The proposal should be concise; normally 5-10 pages plus bibliography. The committee may accept, reject, or modify the proposal. If and when a proposal is accepted, the committee will notify the director of graduate studies who will, in turn, nominate the student to the Graduate School as a Ph.D. candidate.

### *Writing and Defense of the Dissertation*

After advancement to Ph.D. candidacy, students must complete a doctoral dissertation, which the department understands to be a substantial piece of research based on primary sources that makes an original contribution to historical knowledge. Departmental procedures for approval of the dissertation are as follows:

1. The dissertation must be read and approved by the student's adviser.
2. The student then furnishes the department with three copies of the thesis. Copies must be furnished to the department at least six weeks before the date of the defense. These copies are to be read and approved within 30 days by three readers from the graduate faculty. Students are responsible for incorporating into the dissertation whatever changes the readers find necessary. At this time, the student submits a complete copy of the dissertation to the Graduate School for a preliminary formatting review.
3. Normally the student defends the doctoral dissertation by delivering a brief lecture that any member of the graduate faculty may attend. The academic adviser, three readers, and an outside chair appointed by the Graduate School must also attend. After the lecture and a period for questions and discussion, the committee must vote as to whether the dissertation defense has been satisfactory.
4. Two clean, corrected, unbound copies of the dissertation must be delivered to the Graduate School by the appropriate due date.

### *Distribution Fields*

Students in American and modern European history will be required to take Ph.D. candidacy examinations in four or five fields, at least three of which will be in their major area of concentration (e.g., American or modern European). One of the fields chosen must be from an area other than that of the student's area of concentration. It might be taken either within the History Department, or from another department (e.g., Political Science or Theology).

Students in medieval history will be required to take examinations in four or five fields. These fields must include one medieval chronological field, one medieval subject field, one field specifically focused on the area of the dissertation, and one outside field.

The following fields serve as guidelines. A field might be modified after appropriate

consultation between a faculty examiner and student. Additional fields might be arranged by a student with faculty members with the approval of the director of graduate studies.

### *United States*

Colonial/Revolutionary (1600 to 1800)  
National Period/Civil War and  
Reconstruction (1800 to 1877)  
Gilded Age/Progressive Era  
(1877 to 1920)  
Recent America (1920 to the present)  
History of American Religion  
American Intellectual History  
U.S. Diplomatic History  
African American History  
Native American History  
Woman's History/Gender  
History of Science and Technology

### *Modern European*

Renaissance/Reformation/  
Counter Reformation  
England (17th and 18th centuries)  
England (19th and 20th centuries)  
Ireland (18th to 20th century)  
France (1789 to 1914)  
Germany and Austria (1815 to 1914)  
Germany and Austria (1914 to the present)  
East-Central Europe (19th and  
20th centuries)  
Russia (19th century)  
Russia and Soviet Union (20th century)  
European Intellectual History (19th and  
20th centuries)  
European Social History (19th and  
20th centuries)  
European Religious History (19th and  
20th centuries)  
European Diplomatic History (19th and  
20th centuries)

### *Medieval*

Early Middle Ages (500 to 1050)  
High Middle Ages (1050 to 1300)  
Later Middle Ages (1300 to 1500)  
Medieval Social and Economic History  
Medieval Intellectual and Cultural History  
Medieval Ecclesiastical and  
Religious History  
Medieval Islam  
Medieval Judaism  
History of Science  
History of Gender  
Dissertation field (required)

### *Other*

Latin America  
Modern East Asia (China and Japan)  
Africa

### *Specialization*

The department offers three fields of study: United States History, Medieval History, and Modern European History. Incoming students must select one of these fields at the time of admission. The faculty prescribes course requirements in each field. In the first year of study a student must write a substantial original paper, which will figure in the department's screening of the student for the Ph.D. program. At present the following requirements exist:

#### *A. United States History*

By the time a student takes the Ph.D. candidacy examination, the student should have completed the following:

1. At least six graduate-level colloquia/directed readings in United States history. The colloquia must include three of the following four pro-seminars: Europe and the Americas 1450-1680, America 1680-1790, U.S. 1790 to 1890, and U.S. Since 1890.
2. A minimum of two colloquia in fields of history other than United States history.
3. At least two research seminars, one of which must be taken in the first year.

#### *B. Medieval History*

The requirements for medieval specialists are as follows:

1. Students must take a total of eight graduate colloquia/directed readings courses plus three research seminars, one of which must be taken in the first year. The colloquia/directed readings must include the two proseminars in medieval history.
2. First-year students must also take at least one course with extensive reading in Latin sources, and the two-semester Introduction to Medieval Studies.

#### *C. Modern European History*

Course requirements for modern Europeanists are as follows:

1. Before taking their candidacy examinations, students must take a total of three research seminars and at least eight other graduate colloquia/directed readings courses. As many as two of the colloquia/directed readings courses may be taken outside the History Department.
2. First-year students must complete at least one seminar using sources in a modern European language other than English. First-year students must also take whatever prescribed introductory courses in their chosen field the department may offer that year.

### *Concentration in Religious History*

There is no formal degree program in religious history; however, students may choose religious history as an area of concentration while fulfilling the normal requirements of one of the three degree fields. Requirements for a religious history concentration are as follows:

1. Completion of graduate-level courses in two distinct fields of religious history (for example, medieval and modern European).
2. Compilation of a reading list on religious history with the assistance of a faculty member in the student's specialization. This reading list would serve as a basis of questioning on one portion of the Ph.D. candidacy examination.

Once accepted in the doctoral program, students will write dissertations in their respective areas of specialization, but the topics they choose may be in religious history.

### *Financial Aid and Other Information*

Financial aid is allocated to the department by the University each spring. A portion of this aid is available for incoming first-year graduate students and is assigned on the basis of merit after review of application dossiers. Students already in residence are assigned aid by faculty vote, after an annual general review of student performance. All available aid is reassigned annually for the term of one academic year. Students whose performance falls below University minima stipulated in the general regulations of this Bulletin or who do not satisfy other published requirements for aid will have their aid withdrawn. Graduate assistantships are ordinarily reserved for students who have already completed a year of graduate work.

For general information concerning admissions procedures, course and hour requirements, grades, financial aid, procedures pertaining to graduate research, and other matters, consult the Graduate School regulations that introduce this Bulletin. Note that certain departmental degree requirements (for instance, foreign language proficiency) are more demanding than the Graduate School's general rules. Application forms and information concerning noncurricular aspects of graduate study at Notre Dame may be obtained by writing the University of Notre Dame, Graduate Admissions, 502 Main Building, Notre Dame, IN 46556.

*Course Descriptions*

Each course listing includes:

- Course number
- Title
- (Lecture hours per week–laboratory or tutorial hours per week–credits per semester)
- Instructor
- Course description
- (Semester normally offered)

Except in the case of “required” courses for students in certain degree programs, courses offered for historians by other University departments are not shown.

*Graduate Lecture Courses*

*500. Reference Bibliography Workshop*  
(3-0-0) Library Staff

An introduction to research resources for historians at Notre Dame. Required for first-year students in United States and modern European history; optional for other students. (12 to 14 sessions). (Annual)

*501, 502. Introduction to Medieval Studies I, II*  
(1-0-1) (1-0-1) History and Medieval Institute Staff

An introduction to the substance, research materials, and methodologies of medieval studies. Required of all first-year students in medieval history. (Annual)

*505, 506, 507. Colloquia in American History: to 1790, 1790 to 1890, since 1890*  
(V-V-V) History Staff

Introductions to the substance and bibliography of British Colonial and United States history. All three are required. (Rotating series)

*511, 512. Proseminars in the Early and Late Middle Ages*  
(3-0-3) (3-0-3) (3-0-3) Staff

A chronological proseminar in substance and bibliography required of all students in medieval history. (Rotating series)

*514. Diplomatics*  
(3-0-3) Staff

*517. Paleography*  
(3-0-3) Staff

*518, 520. Other Courses in Medieval Methodology*  
(3-0-3) History and Medieval Institute Staff

*531–539. Courses in American History*  
(3-0-3) Staff  
Variable themes in the history of the Americas. (Occasional)

*541–549, 588. Variable Courses in Medieval History*  
(3-0-3) Medieval History Staff

*551. Readings in African-American History*  
(3-0-3) Pierce

*554, 568, 569, 570, 574. Courses in United States History*  
(3-0-3) U.S. History Staff  
Variable themes in United States history. (Occasional)

*566. History of Modern Astronomy*  
(3-0-3) Crowe

This course will treat a number of topics in the history of astronomy in the period from 1700 to the present. Half the course will be devoted to the development of galactic and extragalactic astronomy from the creation of the “island universe” theory in the 18th century to the expanding universe theory of the present century. Another topic that will definitely be treated, although on a more limited scale, is ideas of extraterrestrial life. Other areas that may be included are the rise of astrophysics, planetary discoveries from Uranus to Pluto, astronomical instruments and observatories, radio astronomy, American astronomy, and Southern Hemisphere astronomy. Special attention will be given to philosophically and religiously significant aspects of the history of astronomy. Persons interested in philosophy of science, history of science, astronomy, physics, or the relations of astronomy to religion and literature may find this course of value. No specific background is assumed. Instructor’s permission required for undergraduates wishing to enroll.

*597. Directed Readings*  
(3-0-3) Staff

Independent study of special topics under the direction of a faculty member. Agreement by the faculty member and approval by the director of graduate studies required. (Annual)

*The Seminar Series*

Graduate work culminates in the production of original scholarship. Seminars ordinarily are offered each semester in United States, modern European, and medieval history. All doctoral students must successfully complete at least three history seminars. Specific themes, topics, and/or periods addressed by each seminar are determined from semester to semester by participating faculty and by student needs. Seminars frequently build upon work done in related colloquia.

Seminars in medieval, modern European, and United States history are listed according to the following numbering scheme. Occasional seminars in other fields are suitable for Ph.D. “minor” course work. Seminars are all (3-0-3) and taught by the staff.

*The Colloquium Series*

The bulk of elective graduate course work in history at Notre Dame is accomplished in colloquia. Colloquia provide intensive reviews of the substance and bibliography pertinent to various historical periods, regions, topics, and/or themes. They comprise readings in, reports on, and discussion of the scholarly literature, classic historiographical issues, interpretive trends, methods, etc. Many colloquia are scheduled according to a repeating cycle; a few occur frequently and others are taught occasionally. Some colloquia are followed by related seminars. In some cases, a professor will permit a student to write a research paper (equal to a seminar paper) in the context of the colloquium.

*601. Medieval Research Seminar*  
(3-0-3) Staff

*602. Canon Law in High Middle Ages*  
(3-0-3) Van Engen

*604. History in the Contact Zone*  
(3-0-3) Biddick

*605. Commercial Revolution of the Middle Ages*  
(3-0-3) Constable

*606. Medieval Cities*  
(3-0-3) Constable

*609. Merovingian Franks 450–750*  
(3-0-3) Noble

*617. History of Conservative Thought*  
(3-0-3) Sullivan

*623. Early Modern Europe*  
(3-0-3) Staff

*625. Hildegard of Bingen*  
(3-0-3) Van Engen

*626. Devotion and Dissent in the late Middle Ages*  
(3-0-3) Van Engen

*634. Protestant and Catholic Reformation*  
(3-0-3) Staff

*636. Gender in Modern European History*  
(3-0-3) Bergen

637. *Europe between the Two World Wars*  
(3-0-3) Bergen
639. *Seminar: Fin de Siècle Europe*  
(3-0-3) Wegs
640. *Soviet Russia*  
(3-0-3) Hamburg
641. *Sources and Resources in Polish History*  
(3-0-3) Crago
642. *Sources and Resources in Irish History*  
(3-0-3) Whelan
643. *Religion and Society in Europe*  
(3-0-3) Kselman
644. *Religious Conversion as a Historical Problem*  
(3-0-3) Kselman
645. *Historiography: Problem of Evil*  
(3-0-3) Bergen
646. *Nineteenth- and Twentieth-Century European Intellectual History*  
(3-0-3) Hamburg
647. *Cultures in Contact*  
(3-0-3) Constable
648. *Late Imperial Russia*  
(3-0-3) Hamburg
650. *Problems and Themes in History of Technology*  
(3-0-3) Hamlin
651. *Late Medieval Reform Councils*  
(3-0-3) Van Engen
653. *Seminar: Church and Society Around 1200*  
(3-0-3) Van Engen
658. *American Cultural History, 1895 to Present*  
(3-0-3) Bederman
663. *Seminar: American Puritan Thought and Culture*  
(3-0-3) Marsden
664. *Seminar: Comparative Religious Fundamentalisms*  
(3-0-3) Appleby
665. *Seminar/Colloquia: American Evangelicalism and Fundamentalism*  
(3-0-3) Marsden
667. *Christianity, Thought, and Culture in the U.S.*  
(3-0-3) Marsden
668. *Colloquium in Anglo-American Intellectual History I*  
(3-0-3) Turner
669. *Colloquium in Anglo-American Intellectual History II*  
(3-0-3) Turner
670. *Seminar in Anglo-American Intellectual History*  
(3-0-3) Turner
- Doctoral Program Service Courses**
690. *Supplemental Research and Reading*  
(0-3-3) Staff  
Independent study under the direction of the student's graduate adviser. May be taken each semester.
695. *Candidacy Semester Readings*  
(V-V-V) Staff  
A special reading course in which the student may enroll only in the semester in which he or she takes the Ph.D. candidacy examination. It permits the student to devote full time to preparation for the examination and, after its completion, to write a dissertation proposal. Regular graduate course work may also be pursued during the candidacy semester. (Annual)
696. *Examination Preparation*  
(V-V-V) Staff
697. *Directed Readings*  
(0-3-3) Staff  
Independent study of special topics under direction of a faculty member. Agreement by the faculty member and approval by the director of graduate studies required. (Annual)
699. *Research and Dissertation*  
(V-V-V) Staff  
Individual conferences and consultation between the doctoral student writing the dissertation and the dissertation director. Required of students pursuing dissertation research in residence. (Annual)
700. *Nonresident Dissertation Research*  
(0-0-1) Staff  
Continuing registration for the doctorate beyond 72 credits; required of students not in residence. (Annual)
701. *Graduate Teaching Practicum*  
(3-0-3) Director of Graduate Studies  
Study, discussion, and exercises in teaching history. Required of students in their first year of graduate assistantship regardless of years in residence; optional for other graduate students. (Annual)
- Additional Courses**
1. Doctoral students are automatically authorized to enroll for nine graduate credits (500- or 600-level) in ancillary or "minor" courses offered by other graduate departments in the divisions of humanities and social sciences.
  2. Doctoral students may enroll for graduate credit in other divisions and schools of the University in accordance with University regulations and with prior approval of the director of graduate studies.
  3. All graduate students may earn degree credit during the Notre Dame summer session, in accordance with provisions of the current Summer Session Bulletin of Information.
  4. Graduate students may take up to two 400-level history lecture courses for degree credit.
- Faculty**
- R. Scott Appleby, *the John M. Regan Jr. Director of the Joan B. Kroc Institute for International Peace Studies, Professor of History, and Fellow in the Helen Kellogg Institute for International Studies*. B.A., Univ. of Notre Dame, 1978; M.A., Univ. of Chicago, 1979; Ph.D., *ibid.*, 1985. (1994)
- Edward N. Beatty, *Assistant Professor*. B.A., Princeton Univ., 1983; M.A., Univ. of New Mexico, 1992; Ph.D., Stanford Univ., 1996. (2000)
- Gail Bederman, *Associate Professor*. B.F.A., New York Univ., 1978; M.A., Brown Univ., 1984; Ph.D., *ibid.*, 1992. (1992)
- Doris Bergen, *Associate Professor, Fellow in the Nanovic Institute for European Studies, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Univ. of Saskatchewan, 1982; M.A., Univ. of Alberta, 1984; Ph.D., Univ. of North Carolina, Chapel Hill, 1991. (1996)
- Kathleen A. Biddick, *Professor and Fellow in the Nanovic Institute for European Studies*. A.B., Barnard College, 1971; M.A., Univ. of Toronto, 1973; Ph.D., *ibid.*, 1982. (1983)



- Rev. Thomas E. Blantz, C.S.C., *Director of Undergraduate Studies and Professor*. A.B., Univ. of Notre Dame, 1957; S.T.L., Gregorian Univ., Rome, 1961; M.A., Univ. of Notre Dame, 1963; Ph.D., Columbia Univ., 1968. (1968)
- D'Arcy Jonathan Dacre Boulton, *Professional Specialist in the Medieval Institute and Concurrent Associate Professor of History*. B.A., Univ. of Toronto, 1969; M.A., Univ. of Pennsylvania, 1970; Ph.D., *ibid.*, 1978; D.Phil., Univ. of Oxford, 1976. (1990)
- Robert E. Burns, *Professor Emeritus*. B.A., Northeastern Univ., 1951; A.M., Harvard Univ., 1953; Ph.D., *ibid.*, 1961. (1957)
- Paul Cobb, *Assistant Professor*. B.A., Univ. of Massachusetts, 1989; M.A., Univ. of Chicago, 1991; Ph.D., *ibid.*, 1997. (1999)
- Olivia R. Constable, *Director of Graduate Studies and Associate Professor*. B.A., Yale Univ., 1983; Ph.D., Princeton Univ., 1989. (1995)
- Laura A. Crago, *Assistant Professor and Fellow in the Nanovic Institute for European Studies*. B.A., Wesleyan Univ., 1983; M.A., Yale Univ., 1990; Ph.D., *ibid.*, 1993. (1991)
- Michael J. Crowe, *the Rev. John J. Cavanaugh, C.S.C., Professor Emeritus of the Humanities and Concurrent Professor Emeritus of History*. B.A., Univ. of Notre Dame, 1958; Ph.D., Univ. of Wisconsin, 1965. (1961)
- Jay P. Dolan, *Professor Emeritus*. A.B., St. John's Seminary, 1958; S.T.L., Gregorian Univ., 1962; M.A., Univ. of Chicago, 1968; Ph.D., *ibid.*, 1970. (1971)
- Philip Gleason, *Professor Emeritus*. B.S., Univ. of Dayton, 1951; M.A., Univ. of Notre Dame, 1955; Ph.D., *ibid.*, 1960. (1959)
- Daniel Graff, *Assistant Professional Specialist*. B.A. Univ. of Illinois, 1990; M.A., Univ. of Wisconsin, 1993. (2001)
- Gary M. Hamburg, *Professor and Fellow in the Nanovic Institute for European Studies*. A.B., Stanford Univ., 1972; A.M., *ibid.*, 1974; Ph.D., *ibid.*, 1978. (1979)
- Christopher S. Hamlin, *Professor and Fellow in the Nanovic Institute for European Studies*. B.A., Antioch College, 1974; M.A., Univ. of Wisconsin, 1977; Ph.D., *ibid.*, 1982. (1985)
- Nathan O. Hatch, *Provost of the University and Andrew V. Tackes Professor of History*. B.A., Wheaton College, 1968; M.A., Washington Univ., 1972; Ph.D., *ibid.*, 1974. (1975)
- Ivan A. Jaksic, *Professor*. B.A., Univ. de Chile, 1975; M.A., State Univ. of New York at Buffalo, 1978; Ph.D., *ibid.*, 1981. (1994)
- Rev. Robert Lee Kerby, *Associate Professor Emeritus*. A.B., Univ. of Notre Dame, 1955; M.A., *ibid.*, 1956; Ph.D., Columbia Univ., 1969. (1972)
- Thomas A. Kselman, *Professor and Fellow in the Nanovic Institute for European Studies*. B.A., St. Joseph College, 1970; M.A., Univ. of Michigan, 1972; Ph.D., *ibid.*, 1978. (1979)
- Semion Lyandres, *Assistant Professor and Fellow in the Nanovic Institute for European Studies*. B.A., St. Petersburg State Pedagogical Univ., 1980; M.A., Boston Univ., 1987; Ph.D., Stanford Univ., 1992. (2000)
- George M. Marsden, *the Francis A. McAnaney Professor of History*. B.A., Haverford College, 1959; B.D., Westminster Theological Seminary, 1963; M.A., Ph.D., Yale Univ., 1965. (1992)
- John McGreevy, *Chair and the Rev. John A. O'Brien Associate Professor of History*. B.A., Univ. of Notre Dame, 1986; M.A., Stanford Univ., 1987; Ph.D., *ibid.*, 1992. (1997)
- Rev. Wilson D. Miscamble, C.S.C., *Associate Professor*. B.A., Univ. of Queensland, 1973; M.A., *ibid.*, 1976; M.A., Univ. of Notre Dame, 1978; Ph.D., *ibid.*, 1980. (1986)
- Dian Hechtner Murray, *Professor*. B.A., Cornell College, 1971; M.A., Cornell Univ., 1974; Ph.D., *ibid.*, 1979. (1984)
- Thomas F. X. Noble, *the Robert M. Conway Director of the Medieval Institute and Professor*. B.A., Ohio Univ., 1969; M.A., Michigan State Univ., 1971; Ph.D., *ibid.*, 1974. (2000)
- Bernard P. Norling, *the Andrew V. Tackes Professor Emeritus*. B.A., Gonzaga Univ., 1948; M.A., Univ. of Notre Dame, 1949; Ph.D., *ibid.*, 1955. (1952)
- Walter Nugent, *the Andrew V. Tackes Professor Emeritus*. A.B., St. Benedict's College, 1954; M.A., Georgetown Univ., 1956; Ph.D., Univ. of Chicago, 1961. (1984)
- Rev. Marvin R. O'Connell, *Professor Emeritus*. B.A., St. Paul Seminary, 1952; M.A., *ibid.*, 1955; Ph.D., Univ. of Notre Dame, 1959. (1972)
- Aideen O'Leary, *Assistant Professor*. B.A., Trinity College–Dublin, 1990; M.A., *ibid.*, 1993; Ph.D., Univ. of Cambridge, 1997. (2000)
- Emily L. Osborn, *Assistant Professor and Fellow in the Kellogg Institute for International Studies*. B.A., Univ. of California–Berkeley, 1993; Ph.D., Stanford Univ., 2000. (2001)
- Richard B. Pierce, *the Carl E. Koch Assistant Professor*. B.A., Valparaiso Univ., 1985; M.A., Univ. of Wisconsin, Milwaukee, 1988; Ph.D., Indiana Univ., Bloomington, 1996. (1996)
- Thomas J. Schlereth, *Professor of American Studies and Concurrent Professor of History*. B.A., Univ. of Notre Dame, 1963; M.A., Univ. of Wisconsin, 1965; Ph.D., Univ. of Iowa, 1969. (1972)
- Thomas P. Slaughter, *the Andrew V. Tackes Professor of History*. B.A., Univ. of Maryland, College Park, 1976; M.A., *ibid.*, 1978; M.A., Princeton Univ., 1980; Ph.D., *ibid.*, 1983. (2001)
- Phillip R. Sloan, *Professor in the Program of Liberal Studies and Concurrent Professor of History*. B.S., Univ. of Utah, 1960; M.S., Scripps Inst. of Oceanography, 1964; M.A., Univ. of California, San Diego, 1967; Ph.D., *ibid.*, 1970. (1974)
- James Smyth, *Professor*. B.A., Trinity College, Dublin, 1985; Ph.D., Cambridge Univ., 1989. (1995)
- Robert E. Sullivan, *Director of the Erasmus Institute and Concurrent Associate Professor of History*. B.A., Oakland Univ., 1968; M.Div., St. John's Seminary, 1980; Ph.D., Harvard Univ., 1977. (1998)
- Julia Thomas, *Associate Professor*. A.B., Princeton Univ., 1981; M.A., Univ. of Chicago, 1984; Ph.D., *ibid.*, 1993. (2001)
- James Turner, *the Rev. John J. Cavanaugh, C.S.C., Professor of the Humanities and Fellow in the Nanovic Institute for European Studies*. B.A., Harvard Univ., 1968; A.M., *ibid.*, 1971; Ph.D., *ibid.*, 1975. (1995)
- John H. Van Engen, *Andrew V. Tackes Professor of History*. A.B., Calvin College, 1969; Ph.D., Univ. of California, Los Angeles, 1976. (1977)
- David Waldstreicher, *Associate Professor*. B.A., Univ. of Virginia, 1988; M.A., Yale Univ., 1990; Ph.D., *ibid.*, 1994. (1999)
- Andrzej S. Walicki, *Professor Emeritus*. M.S., Univ. of Warsaw, 1953; Ph.D., *ibid.*, 1958. (1986)
- J. Robert Wegs, *Professor and Fellow in the Kellogg Institute for International Studies*. B.A., Western Illinois Univ., 1963; M.A., Northern Illinois Univ., 1966; Ph.D., Univ. of Illinois, 1970. (1977)

## History and Philosophy of Science

### *Program Director:*

Don A. Howard

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### *The Program of Studies*

The History and Philosophy of Science (HPS) Program at the University of Notre Dame is one of a handful of programs in the United States that offers graduate-level instruction up to the Ph.D. in the field of the history and philosophy of science. The organization of the Notre Dame HPS program is that of an interdepartmental "committee," leading to a degree satisfying a combination of requirements determined jointly by the HPS program and the relevant disciplinary departmental graduate program, either philosophy or history.

Because the Ph.D. in HPS incorporates the requirements for a doctorate in a standard disciplinary department, the HPS degree program leads to a doctoral degree inclusive of, but broader in scope than, the departmental degree. For this reason it is defined as a five-year program, rather than the normal four. Thus students who take the doctoral degree in the HPS program can claim to have satisfied both the disciplinary degree requirements and also those of an HPS degree. This allows Notre Dame graduates to situate their work within traditional disciplinary contexts and enables them to qualify for academic positions in regular disciplinary departments.

All designated HPS faculty members with appointments to the graduate faculty may serve as graduate student advisers, take part in examination committees, and act as the primary directors of dissertation research.

Courses are offered over a wide range of topics in the history of science, from medieval natural philosophy to the physics, biology, medicine, and technology of the 19th and 20th centuries. Particular emphases can be pursued in medieval natural philosophy and medicine, the scientific revolution of the 17th century, the history of astronomy, physics, and mathematics, 19th-century European and American science, technology and medicine, the history and philosophy of economic thought, and the history of life and physical science in the 20th century.

Course work in the philosophy of science draws upon the resources of the University's departmental strengths in philosophy of science, ethics, the history of philosophy, and analytic philosophy. The field itself tends to divide into four parts, all of which are dealt with at Notre Dame. The first is concerned with such themes as explanation, theory-evaluation, theory-change and rationality, and recent continental approaches to the philosophy of science. The second considers the philosophical issues raised by developments in specific fields of science, such as quantum mechanics, relativity, space and time, evolutionary biology, cognitive neuroscience, sociology of scientific knowledge, and the methodology of economics. The third concerns the history of the philosophy of science. The fourth considers the ethics of science and technology. The program offers a broad covering in its courses and seminars in more specialized topics.

An important feature of the program is its attention to the broader relationships between science and culture; science, technology, and values; and the interrelations of science and religion. The ability to conduct historical and philosophical examination of these issues in the Notre Dame program forms an important feature of the course of instruction.

Through a regular faculty-student reading and discussion seminar held each semester, coupled with a visiting speaker series, the discussions of the broad range of current issues in the history, sociology, and philosophy of science are actively pursued by the combined group.

The program draws upon the resources of three important research centers at the University of Notre Dame: the Reilly Center for Science, Technology, and Values; the Center for Philosophy of Religion; and the Medieval Institute, all of which organize regular seminars, speaker series, and major conferences on current topics.

### *Admissions*

There are no "standard" requirements for students entering a field as diverse as history and philosophy of science. Ideally students will have had dual training in a relevant humanistic academic discipline and in some area of science. The extent of the background preparation in a science expected of a student will depend on the area of doctoral research chosen. Someone who elects to specialize in ancient or medieval natural philosophy will require other special skills (in language, for

example) but need not have the kind of competence in a science expected of a student intent on studying the philosophy of quantum mechanics. Sufficient preparation is expected in a humanistic discipline, typically history or philosophy, to permit the disciplinary department to make a judgment concerning admission at the time of application. Admission to the doctoral program thus requires a joint admission decision by the HPS program and the disciplinary department.

Since financial support is given by the HPS program, initial application materials should be directed to HPS and not to the disciplinary department unless an applicant wishes to be considered independently for admission to some other program of the University.

### *Financial Aid*

The Notre Dame program offers a limited number of fellowship-assistantships to entering students each year that include full-tuition scholarships. These provide a duty-free fellowship for the first year, with services expected for stipend continuation in the second, third, and fourth years. A fifth-year dissertation fellowship is awarded to students making satisfactory progress toward the degree. Duties will normally include teaching assistantship work in the selected disciplinary department (history or philosophy); in the undergraduate science, technology, and values concentration; or in the undergraduate Program of Liberal Studies.

Applicants are urged to apply for the competitive NSF and Andrew Mellon predoctoral fellowships in the history and philosophy of science. Deadlines for these applications are in November of the year preceding admission but may also be applied for in the first year of the program.

### *Master's Program*

Because HPS is a doctoral program, applicants interested only in receiving a terminal M.A. degree will not be accepted. However, this rule does not apply to individuals concurrently enrolled in other doctoral graduate programs of the University who seek to earn a nonresearch HPS master's degree in order to complement their doctoral studies. Students whose primary enrollment is in HPS will be entitled to receive a master's degree once they have completed the written and oral examination for Ph.D. candidacy. In addition, in the event that an admitted HPS student decides to leave the program or is subsequently discontinued by the HPS program or the disciplinary department, the student may pursue a research (or thesis) terminal M.A. degree.

The nonresearch HPS M.A. degree requires the completion of 36 credit hours of course work. Three courses in history of science and three courses in philosophy of science form the core of this requirement. The student, in consultation with the HPS program director, selects the remaining courses. To be eligible for HPS credit, these courses must bear in significant ways on the concerns of history and philosophy of science. Students taking the nonresearch HPS M.A. concurrently with a Ph.D. in another Notre Dame program may count up to nine hours of course work toward both degree programs, subject to approval by the director of HPS and the director of graduate studies in the other program. Reading knowledge in one foreign language (ordinarily French or German) will be required. A one-hour oral examination, based on course work, will complete the requirements for the nonresearch degree. Students taking the terminal HPS research M.A. will prepare an extended research paper or formal M.A. thesis under the direction of a faculty member, for which six hours of thesis credit will be awarded. A one-hour oral comprehensive examination completes the requirements for this research M.A. degree.

#### *Doctoral Program*

HPS students pursue the Ph.D. degree in either a philosophy track or a history track.

#### *Philosophy Track*

Those who elect the philosophy track toward the Ph.D. in history and philosophy of science must satisfy the following course distribution requirements. In HPS, they will take a minimum of three courses in the general area of philosophy of science and four courses in history of science, plus the HPS 560 Proseminar. Courses in the history of science will be selected from offerings designated as satisfying the examination fields for the history of science M.A. comprehensive. In addition, students will satisfy a slightly modified form of the philosophy graduate program's requirements, namely, the philosophy proseminar and a minimum of one course in each of the following areas: logic, history of ancient philosophy, history of medieval philosophy or science, and history of modern philosophy, and in two of the following three areas: ethics, metaphysics, and epistemology. Students may also be advised to take some extra work in one of the sciences, if this seems necessary for the specialized research they are planning. The language requirement for Ph.D. candidates in the philosophy track is a reading knowledge of two foreign languages.

#### *Ethics of Science and Technology Concentration*

Students on the philosophy track who elect the ethics of science and technology concentration will satisfy the philosophy-track course requirements, but with the following exceptions: (1) the student will take at least four courses in ethics or science and ethics; (2) PHI 569 (20th Century Ethics) will be taken as one of the three required philosophy core courses; (3) one of the four required history of science courses will be selected from a specified list of courses in the area of science, technology, and values; and (4) an additional course in ethics will be chosen from a specified list of philosophy courses.

In late summer after his or her second year, the student will take a written qualifying examination in the history of philosophy administered by the Philosophy Department. In the late summer after the third year, the student will take a written M.A. comprehensive examination in history of science. This will include examinations in the four following areas in the history of science: (1) ancient, medieval, and early-modern natural philosophy; (2) history of physical science 1700 to 1910; (3) history of life science 1700 to present; and (4) science, technology, and society (including history of medicine and technology). Students will also be expected to turn in at the end of the summer an advanced paper in philosophy normally expected of philosophy majors after the second year (see philosophy doctoral requirements). In the first semester of the fourth year, the student will take an oral qualifying examination in the philosophy of science, with a special focus on the problem area in which he or she intends to write a dissertation. The five members of the examination board will be appointed jointly by the HPS program director and the director of graduate studies in philosophy.

Once Ph.D. candidacy requirements have been completed, the student will begin preparation of a dissertation proposal under the guidance of a research director of his or her choice. The proposal will be presented to a thesis evaluation committee, consisting of five faculty chosen jointly by the HPS program director and the director of graduate studies in philosophy. The committee can approve, reject, or request modifications in the candidate's proposal. When the proposal is approved, the student will work under the direction of his or her thesis director to prepare a dissertation that must be approved by the director and three readers appointed by the HPS program director. Readers are

normally drawn from the committee that approved the original proposal, but one outside member of the committee may be substituted if deemed desirable for expert judgment of the dissertation. If the readers accept the dissertation, the HPS program director arranges for a dissertation defense. The defense committee is composed of at least the dissertation director, the three dissertation readers, and an outside chairperson appointed by the Graduate School. After the defense and ensuing discussion, the committee decides by majority vote whether the defense of the dissertation project has been satisfactory and determines whether any revisions of the dissertation are required as a result of weaknesses revealed in the oral defense.

#### *History Track*

Those who elect the history track toward the Ph.D. in history and philosophy of science will take a minimum of four courses in history of science, plus the HPS 560 Proseminar, and three courses in the general area of philosophy of science. In addition, a student will take at least eight more courses (three of which must be research seminars) in two of these fields: American, Modern European, or Medieval History. These eight courses can include the history of science and technology.

The basic language requirement for Ph.D. candidates on the history track is a reading knowledge of one modern foreign language. In addition, competence has to be shown either in a second language or in a technical discipline bearing on the student's research work, such as one of the natural sciences.

In the late summer after the second year, the student will take a written M.A. comprehensive examination in history of science. This will include examinations in the four following areas in the history of science: (1) ancient, medieval, and early-modern natural philosophy; (2) history of physical science 1700 to 1910; (3) history of life science, 1700 to present; and (4) science, technology, and society (including history of medicine and technology). This will replace the long paper and examination requirements normally expected for certain tracks within the History Department (medieval, modern European) (see history doctoral requirements). In the spring of the third year, the student will prepare for the Ph.D. candidacy examination, taken in the late summer. This will consist of two parts, written and oral. The examination board will consist of five faculty members appointed jointly by the HPS program director and the director of graduate studies in

history. Each examiner will set a two-hour written examination in one of five fields, two of which will be in specialized areas in the history of science and technology, two in other history fields, and one in the philosophy of science. The oral examination will be given shortly after the written and will involve the same five examiners.

Once Ph.D. candidacy requirements have been completed, the student will begin preparation of a dissertation proposal under the guidance of a research director of his or her choice. The proposal will be presented to a thesis evaluation committee, consisting of three faculty chosen by the HPS program director and the director of graduate studies in history, plus the student's research director. The committee can approve, reject, or request modifications in the candidate's proposal. When the proposal is approved, the student will work under the direction of his or her thesis director to prepare a dissertation that must be approved by the director and three readers appointed by the HPS program director, normally drawn from the committee that approved the original proposal. Substitution of one outside expert may be elected if deemed necessary for the student's dissertation work. If the readers accept the dissertation, the program director arranges for a dissertation defense. The defense committee is composed of at least the dissertation director, the three dissertation readers, and an outside chairperson appointed by the Graduate School. After the defense and ensuing discussion, the committee decides by majority vote whether the defense of the dissertation project has been satisfactory and determines whether any revisions of the dissertation are required as a result of weaknesses revealed in the oral defense.

#### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

The listing includes courses that were offered in the past three academic years.

#### 500. HPS Colloquium

(1-0-1) Staff

Discussion of a prominent recent work in the field of HPS, and research presentations by visiting scholars. Required course for HPS students in the first and second years of the program. (Every semester)

#### 513. *The Computer as a Social Phenomenon*

(3-0-3) Mirowski

Approaches to understanding the computer have until recently tended toward one of two extremes: either as a natural-technical object, generally the province of electrical engineering and/or the computer science departments; or else on the most superficial level, with texts on the "information society" or postmodernist riffs on cyberspace. It is beginning to be the case that individual disciplines are being forced to confront how computational themes might transform their previous research agendas; and some have even begun to worry about how the Internet might transform the traditional university education. In this class we begin with the question of technological determinism, proceed through a combined social/technical history of the computer and the Internet, and then consider some ways in which computers are changing the definition of the "human" (using my recent book *Machine Dreams*) and the definition of the economy.

#### 521. *Einstein's Philosophy of Science*

(3-0-3) Howard

A survey of the historical development of Albert Einstein's philosophy of science, paying special attention to the contemporary intellectual and philosophical context. Topics covered include the influence upon Einstein of such movements or schools as Machian positivism, Marburg neo-Kantianism, conventionalism, and Vienna Circle logical empiricism, as well as Einstein's influence on the further development of the philosophy of science in the 20th century, with special emphasis on issues such as the structure and interpretation of theories and the realism-instrumentalism debate. The nature and significance of interactions between science and philosophy are also considered. Note: No background in physics or mathematics is assumed.

#### 532. *Leibniz, Newton and Kant's First Critique*

(3-0-3) Franks

A close examination of central aspects of Kant's *Critique of Pure Reason*, considered as an attempt to resolve tensions between the model of intelligibility exemplified by Newton's physics and the model of intelligibility articulated in Leibniz's metaphysics.

We will investigate some conflicts between Leibniz and Newton with respect to space, time, causality, and freedom, and we will critically study both the methods adopted by Kant to resolve these conflicts (transcendental arguments) and the results supposedly achieved thereby (transcendental idealism). The *Critique* as seen from this perspective will be contrasted with the *Critique* as it is understood by some contemporary philosophers.

#### 543. *Ethics and Science*

(3-0-3) Shrader-Frechette

This course will focus on typical ethical problems likely to arise on conducting scientific research; the subtle ways in which scientific inferences, models, and methods may exhibit bias values; the conflicts of interest that often face researchers; the ethical arguments for alternative default rules in science; classical ethical techniques for resolving ethical dilemmas in science; necessary and sufficient conditions for scientific whistle blowing; appropriate behavior under scientific uncertainty; and analysis of ways that unethical science can compromise objectivity, consent, due process, the common good, rights to know, responsibility, and justice. Course texts include articles from scientific journals, reports of the National Academy of Sciences, and three books on ethics of scientific research (Erwin et al., Penslar, and Shrader-Frechette). Emphasis will be on actual scientific case studies and on short, analytic papers evaluating particular ethical problems in these case studies.

#### 550. *Plato's Timaeus as Cultural Icon*

(3-0-3) Reydam-Schils

This course will deal with the reception of Plato's *Timaeus*, both as a hermeneutical strategy for a richer understanding of the text itself, and as a study of the process of cultural assimilation. We will use the *Timaeus* also as a window to "survey" topics, such as the history of Neoplatonism and its impact on the Medieval tradition.

#### 560. *Introduction to History and Philosophy of Science*

(1-0-1) Staff

An introduction to the research methods and the varied areas of specialization in the history and philosophy of science. This course also functions as an introduction to the graduate HPS program. Required of all entering HPS students. (Every fall)

*561. Science and Social Values*

(3-0-3) Kourany

Should science be value free, or should it be shaped by the needs and ideals of the society that supports it? If the former, how can scientists shaped by society contribute to it, and what claim to the resources of the society can scientists legitimately make? If the latter, how can scientists still claim to be objective? These are some of the questions we shall pursue in this course. Their pursuit will take us through a varied terrain—e.g., C. P. Snow's "two cultures" divide and its manifestation in the current "science wars," the case of Lysenko and Soviet science, the current "war" on breast cancer, new understandings of scientific objectivity, and new social philosophies of science (especially those offered by Helen Longino and Philip Kitcher).

*565. The Scientific Revolution*

(3-0-3) Goulding, Crowe

This course studies selected developments in science during the period from 1500 to the death of Newton in 1727. The focus will be on such major figures as Copernicus, Kepler, Galileo, Huygens, and Newton. Philosophical, religious, and historiographical issues will receive some attention. Satisfies core history requirement.

*566. History of Modern Astronomy*

(3-0-3) Crowe

Traces the development of astronomy and cosmology from the late 17th century to the 1930s. Attention is given to the interactions of astronomy with other areas of science and with philosophical, religious, and social factors. Satisfies core history requirement.

*568. Topics in the History of Physical Science 1600 to 1900*

(3-0-3) Crowe

This course treats selected developments in the history of physical science, especially in the period from 1600 to 1900. Interactions with the main philosophical, social, and religious currents are included. Satisfies core history requirement.

*569. The Darwinian Revolution*

(3-0-3) Sloan

A combined historical and philosophical approach to the revolution created by the work of Charles Darwin. The course deals with the origins of Darwinism; the 19th-century debate over evolution; the subsequent development of mathematical and genetic approaches to natural selection theory; and the formulation of neosynthetic evolutionary theory. The course will close with consideration of more

recent developments connected to developmental genetics, punctuated equilibrium theory, and chaos-theoretical approaches to evolution. Students will be introduced to the historical and philosophical literature of current interest. Satisfies core history requirement.

*570. The Molecular Revolution in Biology*

(3-0-3) Sloan

This course offers a historical and philosophical analysis of the origins and development of the molecular revolution in biology that broke into full public view in the early 1950s with dramatic discoveries of the molecular structure of DNA and the biophysical mechanism of the action potential in the nervous system. The course will approach this with an analysis of the development of the chemistry and physics of living materials from Lavoisier and the German biophysical school (Helmholtz), through the remarkable advances in physiology of the French school (Bernard) and the development of genetics. The course will terminate in the examination of molecular approaches in contemporary work in human genetics (the Human Genome Project). Satisfies core history requirement.

*571. Environmental Justice*

(3-0-3) Shrader-Frechette

This course will survey environmental impact assessment (EIA), ecological risk assessment (ERA), and human-health risk assessment (HHRA); ethical and methodological issues related to these techniques; then apply these techniques to contemporary assessments for which state and federal governments are seeking comments by scientists and citizens. The course is hands-on, will have no tests, but will be project-based, with students working on actual assessments that they choose (about 2500 are done in U.S. each year). The goal will be to teach students EIA, ERA, and HHRA and how to evaluate draft analyses, particularly those used to cite facilities or make environment-related decisions in which poor people, minorities, and other stakeholders are themselves unable to provide comments. Course will cover flaws in scientific method and flaws in ethics that typically appear in these assessments.

*572. Science, Medicine and Social Reform, 1750 to 1950*

(3-0-3) Hamlin

The development of the idea that health care is a responsibility of government, involving the interrelations of developments in the medical sciences, the social structure of the medical profession, and changing ideas about

public responsibility for social welfare. Topics include Enlightenment concepts of medical policy; the public health movement; changing ideas of the hospital; developments in etiology, pathology, bacteriology, and therapeutics; and the politics and ideologies of social reform movements. Satisfies core history requirement.

*573. The Social Uses of Science, 1800 to the Present*

(3-0-3) Hamlin

Considers the impact of science, both intentional and unintentional, on society during the past two centuries. Topics include major technological applications of the biological and physical sciences, ideological uses of scientific theories and concepts, the elevation of science to the position of a central cultural norm, the growing emphasis on science in the academic curriculum, and the employment of scientific expertise in public decision making. Satisfies core history requirement.

*574. Problems and Themes in the History of Technology*

(3-0-3) Hamlin

Examines concerns of the modern historiography of technology. These include problems closely related to issues in the history and philosophy of science—the relation of science to technology, contexts of inventiveness, technological diffusion, relation of technology to ideology and rational reconstruction in the history of technology. Also considers problems closely related to issues of social, economic, and political history—incentives to technical change, effects of technologies, relation of technological controversy to political process, technological determinism as a historical explanation, and the place of technology in the new social history. Satisfies core history requirement.

*576. Nature, Economy, and Society*

(3-0-3) Mirowski

Explores the way the understanding of nature in both its generic and specific senses has informed the evolution of economic thought. We start with an examination of various economic images in economics: Mill, Marx, Veblen, and Hayek. This serves as a prelude to some specific historical controversies in the history of economics, such as the relative importance of histories of physics and biology in economics, the impact of mathematical formalization upon the content of economics, the struggle to define legitimate experimentation in economics, the response to sociobiology and psychology, and other related topics.

577. *History of Economic Thought*

(3-0-3) Mirowski, Sent

This is a course that intends to ask how it is that we have arrived at this curious configuration of doctrines called “economics” and more importantly, how differing modes of historical discourse tend to ratify us in our prejudices about our own involvement in this curious project. A basic knowledge of economics (including introductory economics and preferably intermediate economics) will be presumed.

578. *Philosophy and the Human Sciences*

(3-0-3) Staff

This course examines the complex and multifaceted process that resulted in the clear separation of what we would now call philosophy from the human sciences. That process included the transformation and emergence of a number of more specific fields, including psychology, anthropology, and sociology, from a more general realm of largely philosophical investigation. We will trace the history of the human sciences as they differentiated from older philosophical inquiry and defined themselves, mainly through some form of affiliation or opposition to philosophy, on the one hand, and the exact sciences, on the other. Particular emphasis will be placed on late-nineteenth-century debates about epistemological and methodological issues, and their interconnection to debates concerning the institutional and academic location of the human sciences.

579. *Colloquium in Anglo-American Intellectual History*

(3-0-3) Turner

A readings course in selected topics in Anglo-American intellectual history from the late 17th century through the late 19th century. “Anglo-American,” as used here, comprises those discourses common to Britain and Anglophone North America. This does not preclude occasional French or German voices. Examples might include sensationalist psychology, evangelical Calvinism, Newtonian physics, republicanism, Scottish common-sense philosophy, liberalism, and Darwinism.

581. *Philosophy of Science*

(3-0-3) Howard, McKim

A survey of major problems, movements, and thinkers in 20th-century philosophy of science. The course begins with a look at the historical background to logical empiricism, its rise to prominence, and its early critics, such as Popper. After a study of major problems in the neo-positivist tradition, such as confirmation, explanation, and reduc-

tionism, we will pause to note as well a few major problems in the foundations of the special sciences, including indeterminacy and complementarity in quantum mechanics, and the conventionality of the metric in relativity theory. Historicist critiques of neo-positivism, chiefly Kuhn’s, will be studied next, followed by a consideration of the realism-instrumentalism debate. The course concludes with a brief look at new perspectives, such as social constructivism and feminist philosophy of science. Satisfies core philosophy requirement. (Every fall)

582. *Explanation, Causation, and Scientific Laws*

(3-0-3) McKim

Can there be causal relatedness without laws? Are scientific explanations always causal? Are there really any laws of nature? How could we know? The triad of concepts mentioned in the course title are deeply rooted in scientific practice and have provided central themes for philosophical reflection about science and the world science seeks to understand. Yet each remains highly controversial. This course explores some of the best current thinking about how these notions and their interrelationships should be understood.

583. *Philosophy of Biology*

(3-0-3) Moss

An examination of major problems in the philosophy of biology and recent work on those problems. The course begins with a comparison between traditional “biological philosophy” and “philosophy of biology” proper, an expression that emerged in the 1970s in the context of Anglo-American philosophy of science. A significant array of issues and key figures in this modern subdiscipline will be presented critically, more particularly: (1) The problem of the autonomy (vs. provincialism) of biological sciences and the related debates over physical-chemical reductionism and teleology. (2) Problems raised by specific biological theories and concepts: systematics, cell theory, evolutionary theory, and genetics. These theories will be examined from three points of view: their claim to unify the biological sciences, their structure and explanatory power, and the specific problems of definition raised by certain theoretical concepts (concepts of the cell, of selection and fitness, of species, of categories and taxa, of the gene). (3) Two problems in the epistemology of medicine will be analyzed: definitions of disease and notion of a ‘cause’ of a disease. (4) Finally, two ethical problems involving major epistemological issues will be discussed: eugenics and race.

584. *Philosophy of Social Science*

(3-0-3) McKim

An inquiry into the central forms of explanation employed in the social sciences: rational choice, intentional, functional, structural, and interpretive. One emphasis will be on understanding the ways in which these approaches conform to or differ from explanatory strategies in the natural sciences. A second emphasis will be on the microfoundations of social theory: What assumptions about human nature and social life are presupposed in adopting a particular explanatory strategy?

585. *Feminist Philosophy of Science*

(3-0-3) Kourany

In recent years feminists have offered rather sharp critiques of modern Western science: for example, that it has been controlled by men right from the start, with women excluded from its most important activities; that it has sought from the start to dominate nature with a method characterized by such so-called masculine traits as disinterestedness and emotional detachment, and (at least in recent times) aggressiveness and competitiveness; and that it has tended to leave women largely invisible in its knowledge and research, or portrayed in negative terms, and has thereby justified such things as inferior educational and athletic opportunities for women, inferior medical treatment for women, and inferior positions for women in the workplace, the family, and every institution of human life. At the same time, feminists have drawn our attention to a number of recent cases of scientific research that they have considered exemplary—not subject to the above kinds of critique, and indeed, pointing us toward a much better (more useful, more objective, truer, etc.) science, and they have put forward various theories to explain and justify such an evaluation. In this course we shall explore this terrain of so-called “feminist philosophy of science”—these critiques and cases of exemplary scientific research and justificatory theories—paying particular attention to articulating and assessing the theories. We shall also explore the relation between this feminist philosophy of science and so-called “mainstream philosophy of science.” Such exploration will lead us to an interesting vantage point from which to reflect on what philosophy of science (neither “feminist” nor “mainstream”) can and should be like.

*586. Philosophical Problems in Physics*

(3-0-3) Staff

This is a course for graduate students in the history and/or philosophy of science who are not specializing in foundational problems in physics but who wish to examine in some reasonable detail a selection of fundamental philosophical issues associated with major technical advances in the history of physics, beginning from Galileo and Newton, and ending with quantum mechanics.

*587. History of the Philosophy of Science up to 1750*

(3-0-3) McMullin, Joy

The classical authors in theory of science: Plato, Aristotle, Bacon, Descartes, Locke, Newton, and Hume. The connections between epistemology and theory of science will be emphasized. Satisfies core philosophy of science requirement.

*588. History of the Philosophy of Science 1750 to 1900*

(3-0-3) McMullin, Howard, Jauernig

The second half of the history of "classical" philosophy of science. Themes: the epistemic status of scientific knowledge-claims; the presuppositions, techniques, and modes of inference appropriate to natural science; the ontological status of scientific constructs. We shall begin with Reid and Kant, go on to Comte, Whewell and Mill, and end with Mach and Poincaré. Satisfies core philosophy of science requirement.

*589. Science and Religion*

(3-0-3) Ashley

Science and religion are complex phenomena that can be analyzed in terms (at least) of their epistemological, existential, and social dimensions. Both science and religion generate justified beliefs. The criteria and spheres of justification for these beliefs overlap and interrelate in extremely complicated ways that have led both to conflict and to mutual enrichment. This is an upper-division undergraduate- or introductory graduate-level review of these complicated interrelations. There will be two major divisions to the course. In the first we will take up methodological issues, considering different approaches to correlating science and religion. In the second part of the course we will deal in depth with the correlations between scientific cosmologies and Christian doctrines of creation and God's providential governance of creation.

*590. Economics and Philosophy*

(3-0-3) Mirowski, Sent

Covers a range of discrete topics located at the intersection of philosophy and economics, including: how economists have reacted to the evolution of the philosophy of science in the 20th century; how conceptions of the natural and the social shape their beliefs; the role and content of mathematical discourse in economics; implications of different theories of probability for both theoretical and empirical (econometric) practice; the recent attempt to reclaim ground from moral and political philosophy; and the looming importance of cognitive science and artificial intelligence.

*591. Methodological Issues in Economics*

(3-0-3) Mirowski, Sent

Contemporary work in the philosophy of science on issues such as explanation, verification, and prediction is employed in the critical examination of economic theorizing in the neoclassical, Keynesian, and Marxist traditions.

*592. Topics in Economic Theory*

(3-0-3) Mirowski

This course will analyze the promises and problems of alternative economic theories of the behavior of scientists and comparisons of science to a market. It will provide a comprehensive survey of the existing literature and then review the capacity of economic language and theories to elucidate the structures of science. It will further open up an inquiry into the effect of economics upon the actual conduct and content of science. Particular topics that will be covered are: the intellectual history of theories of an economics of science, evolving formats of university/government and university/industry relations, labor economics views on science, the economics of the dissemination and validation of findings, the conception that science is a public good, the economics of fraud in science, the causes and consequences of the division of labor in science, and the economics of intellectual property rights.

*599. Thesis Direction*

(V-V-V) Staff

Research and writing on an approved subject under the direction of a faculty member.

*600. Nonresident Thesis Research*

(0-0-1) Staff

Required of nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.

*674. The Question of Laws in Scientific and Ethical Thought*

(3-0-3) Joy

The concept of laws of nature in modern science not only shapes our thinking about nature, but also structures important inquiries in ethics and metaphysics. But ever since Newton, the concept of laws of nature has been defined in radically different ways, and the very existence of such laws has been questioned. This seminar will begin by considering several influential accounts of laws of nature, including earlier treatments (those of Newton, Hume, Kant) and 20th-century treatments (those of Lewis, Armstrong, and critics of laws, Cartwright and Van Fraassen). It will then investigate what issues are at stake in a commitment to the coherence and existence of laws of nature. These issues concern the scientific study of nature, ethical inquiry regarding moral responsibility, and the metaphysical disagreements about the compatibility of human freedom and causal determinism.

*680. Scientific Realism and Anti-Realism*

(3-0-3) McMullin

The controversy regarding scientific realism has been one of the two or three focal issues in the philosophy of science over recent decades. After a brief look at the historical origins of the controversy in early astronomy and in Newtonian mechanics, we shall go on to examine the criticisms, defenses, and explications of realism in the writings of van Fraassen, Laudan, Putnam, Boyd, Hacking, and others.

*684. Philosophy of Cognitive Science*

(3-0-3) Ramsey

In this course, we will begin by examining the philosophical underpinnings of cognitive science. We will then look at some of the implications of cognitive research for a number of traditional philosophical issues and debates. Questions to be addressed include: Is the mind separate from the brain? Could we ever make a machine that feels pain? Are humans systematically irrational? Do we have innate knowledge?

*685. Continental Philosophy of Science*

(3-0-3) Gutting

A survey of recent French and German work in philosophy of science. Figures discussed might include Bachelard, Canguilhem, Foucault, and Habermas.

686. *Historical Foundations of Space-Time Theory*

(3-0-3) Brading, Jauernig, Howard

This course is an historically organized survey of major issues in the philosophical foundations of space-time theory. The seminar will start with a review of the development of space-time theory from Newton to Einstein. Then, after a nontechnical but rigorous introduction to current physical conceptions of space and time (both special and general relativity), we will turn our attention to various specific topics, such as: conventionalism and the structure of space-time; the "hole" argument in general relativity; causality and space-time; space-time substantivalism; space, time, and individuation; temporal becoming; black holes and space-time singularities.

687. *Historical Foundations of the Quantum Theory*

(3-0-3) Howard, Brading

This course is an historically organized survey of major issues in the philosophical foundations of quantum mechanics. Working with a mix of primary and secondary texts, we will first survey the development of the quantum theory through the emergence of wave and matrix mechanics in the 1920s, the aim being to understand the context in which Bohr's complementarity interpretation and debates about it first arose. A careful study of the Bohr-Einstein debate over the completeness of quantum mechanics will be followed by a review of the major controversies over interpretation in the second half of the 20th century, including the measurement problem, hidden variables theories, and Bell's theorem. The course will conclude with a look at new questions of interpretation unique to the context of quantum field theory. The course will not assume advanced training in physics.

688. *Theology and the Natural Sciences*

(3-0-3) McMullin

The rapid progress of the natural sciences over the last few centuries has raised numerous issues for Christian theology, just as Aristotelian natural philosophy did in the 13th century. Dealing with those issues had a transformative effect on theology at that earlier moment. Is something similar happening today? Ought it? To enter into issues of this sort involving two very different ways of knowing inevitably involves two other ways: philosophy and history. The contribution of these latter to the four-way dialectic will be emphasized. Such a dialectic makes heavy epistemic demands, as case histories will demonstrate.

697. *Directed Readings*

(V-0-V) Staff

Readings and discussion of chosen texts under the personal supervision of a member of the faculty.

699. *Research and Dissertation*

(V-V-V) Staff

Independent research and writing on an approved subject under the direction of a faculty member.

700. *Nonresident Dissertation Research*

(0-0-1) Staff

Required of nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.

*Faculty*

J. Matthew Ashley, *Associate Professor of Theology and Fellow in the Center for Social Concerns*. B.S., St. Louis Univ., 1982; M.T.S., Weston School of Theology, 1988; Ph.D., Univ. of Chicago, Divinity School, 1993. (1993)

Katherine A. Brading, *Assistant Professor of Philosophy*. B.Sc., King's College, Univ. of London, 1992; B.Phil., Oxford Univ., 1996; D.Phil., Oxford Univ., 2001 (2004)

Michael J. Crowe, *the Rev. John J. Cavanaugh, C.S.C., Professor Emeritus of the Humanities, Program of Liberal Studies*. B.S., Univ. of Notre Dame, 1958; B.A., *ibid.*, 1958; Ph.D., Univ. of Wisconsin, 1965. (1961)

Christopher B. Fox, *Professor of English and Director of the Keough Institute for Irish Studies*. B.A., Cleveland State Univ., 1971; M.A., State Univ. of New York at Binghamton, 1974; Ph.D., *ibid.*, 1978. (1986)

Paul W. Franks, *Assistant Professor of Philosophy and Fellow in the Nanovic Institute for European Studies*. B.A., Oxford Univ., 1986; M.A. Oxford Univ., 1990; Ph.D., Harvard Univ., 1993. (2000)

Robert D. Goulding, *Assistant Professor in the Program of Liberal Studies*. B.Sc., Univ. of Canterbury, 1989; B.A., Univ. of Canterbury, 1990; M.A., Warburg Inst., Univ. of London, 1992; Ph.D., *ibid.*, 1999. (2003)

Gary M. Gutting, *Professor of Philosophy and Fellow in the Nanovic Institute for European Studies*. A.B., St. Louis Univ., 1964; Ph.D., *ibid.*, 1968. (1969)

Christopher S. Hamlin, *Professor of History, Fellow in the John J. Reilly Center for Science, Technology, and Values, and Fellow in the Nanovic Institute for European Studies*. B.A.,

Antioch College, 1974; M.A., Univ. of Wisconsin, 1977; Ph.D., *ibid.*, 1982. (1985)

Don A. Howard, *Director, Professor of Philosophy, and Fellow in the Nanovic Institute for European Studies*. B.Sc., Michigan State Univ., 1971; A.M., Boston Univ., 1973; Ph.D., *ibid.*, 1979. (1997)

Anja Jauernig, *Assistant Professor of Philosophy*. B.A., Univ. of Bonn, 1994; B.S., *ibid.*, 1995; M.A., *ibid.*, 1997; M.A., Princeton Univ., 1999. (2002)

Lynn S. Joy, *Professor of Philosophy*. A.B., Radcliffe College, Harvard Univ., 1971; A.M., Harvard Univ., 1981; Ph.D., *ibid.*, 1982. (2000)

Janet Kourany, *Associate Professor of Philosophy*. B.S., Columbia Univ., 1965; Ph.D., *ibid.*, 1977. (1982)

A. Edward Manier, *Professor of Philosophy*. B.S., Univ. of Notre Dame, 1953; A.M., St. Louis Univ., 1956; Ph.D., *ibid.*, 1961. (1959)

Vaughn R. McKim, *Associate Professor of Philosophy*. B.A., Oberlin College, 1962; M.A., Yale Univ., 1964; Ph.D., *ibid.*, 1966. (1966)

Rev. Ernan McMullin, *the John Cardinal O'Hara Professor Emeritus of Philosophy*. B.Sc., National Univ. of Ireland, 1945; B.D., Maynooth College, 1948; Ph.D., Univ. of Louvain, 1954. (1954)

Philip E. Mirowski, *the Carl E. Koch Professor of Economics*. B.A., Michigan State Univ., 1973; M.A., Univ. of Michigan, 1976; Ph.D., *ibid.*, 1979. (1990)

Lenny Moss, *Assistant Professor of Philosophy and Fellow in the Nanovic Institute for European Studies*. B.A., San Francisco State Univ., 1981; Ph.D., Univ. of California, 1989; Ph.D., Northwestern Univ., 1998. (1999)

Philip L. Quinn, *the John A. O'Brien Professor of Philosophy*. B.A., Georgetown Univ., 1962; M.S., Univ. of Delaware, 1966; Ph.D., Univ. of Pittsburgh, 1969. (1985)

William M. Ramsey, *Associate Professor of Philosophy*. B.S., Univ. of Oregon, 1982; Ph.D., Univ. of California, San Diego, 1989. (1989)

Esther-Mirjam Sent, *Associate Professor of Economics*. Doctorandus, Univ. of Amsterdam, 1989; Ph.D., Stanford Univ., 1994. (1994)

Kristin Shrader-Frechette, *the F. J. and H. M. O'Neill Professor of Philosophy, Concurrent Professor of Biological Sciences, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.Sc., Xavier Univ., 1967; Ph.D., Univ. of Notre Dame, 1972. (1998)



Phillip R. Sloan, *Professor in the Program of Liberal Studies and Concurrent Professor of History*. B.S., Univ. of Utah, 1960; M.S., Scripps Inst. of Oceanography, 1964; M.A., Univ. of California, San Diego, 1967; Ph.D., *ibid.*, 1970. (1974)

Thomas A. Stapleford, *Assistant Professor in the Program of Liberal Studies*. B.A., B.M.E., Univ. of Delaware, 1997; M.Sc., Univ. of Edinburgh, 1998; Ph.D., Harvard Univ., 2003. (2003)

James C. Turner, *the Rev. John J. Cavanaugh, C.S.C., Professor of the Humanities and Fellow in the Nanovic Institute for European Studies*. B.A. Harvard Univ., 1968; M.A., *ibid.*, 1971; Ph.D., *ibid.*, 1975. (1995)

## Literature

### Program Director:

Margaret A. Doody

### Director of Graduate Studies:

Collin Meissner

Telephone: (574) 631-0481

Location: 336 O'Shaughnessy Hall

E-mail: litprog@nd.edu, meissner.1@nd.edu

Web: <http://www.nd.edu/~litprog>

The Ph.D. in literature at the University of Notre Dame is an innovative interdisciplinary program that focuses on the study of literature from a transnational and intercultural perspective. Combining in one doctoral program the forces of several departments and programs—[Classics (Arabic, Greek, Latin, Syriac), East Asian studies, French and Francophone studies, German, Iberian and Latin American studies (Portuguese, Spanish), Irish studies, Italian studies], philosophy, and theology—the Ph.D. in literature brings together outstanding faculty and resources to enable doctoral students to study literature both within traditional disciplines and across disciplinary and national boundaries.

Designed for the intellectually creative student, the Ph.D. in literature requires both depth and breadth of language study while offering students curricular flexibility in the design of a degree that is responsive to their own interests in literature. Uniquely tailored to take advantage of the University's many resources, the program offers an unprecedented level of intellectual and financial support.

### Intellectual Strength and Support

Notre Dame is well known as an intellectual center for the study of the ancient world, religion and literature, medieval life and culture, Irish literature and culture, the Renaissance, and modernism. Admitted students enjoy the company of their peers and close association with a diverse and lively group of faculty, not only within the departments listed above but also in numerous other departments and institutes at Notre Dame, such as the Department of English, the Devers Program in Dante Studies, the Erasmus Institute, the Kellogg Institute for International Studies, the Keough Institute for Irish Studies, the Kroc Institute for International Peace Studies, the Nanovic Institute for European Studies, and the Medieval Institute. These institutes, like the departments, bring distinguished scholars as visiting professors and speakers to campus and hold conferences of international repute. Students will be welcomed as valued and contributing members of this community of scholars.

Notre Dame's library system houses nearly three million volumes and subscribes to more than 23,000 serial publications. In addition to its general holdings, the system's main library, the Theodore M. Hesburgh Library, also has world-renowned special collections in Dante, the Byzantine world, the Italian Renaissance, the French Revolution and Enlightenment, the Spanish Inquisition, Southern Cone literature, Irish literature, and medieval literature and history. Students can also access the art exhibits and collections housed in Notre Dame's Snite Museum, one of the top university art museums in the country.

### Financial Assistance and Funding for Professional Activity

The full range of financial assistance, including fellowships (University Presidential Fellowships, first-year fellowships, ethnic minority fellowships, and others), teaching assistantships, and tuition scholarships, described in the front section of this *Bulletin* is available to students in the Ph.D. Program in Literature. All admitted doctoral students will be fully funded for at least five years with stipends and full-tuition scholarships. Stipends will come in the form of teaching fellowships, research fellowships, and graduate fellowships. While all admitted students will receive stipends and full tuition waivers, merit-based fellowships of \$18,000 will be awarded to selected applicants.

The Ph.D. in literature emphasizes the development of linguistic expertise as well as training in criticism, theory, and research. To this end, the program will either provide directly or facilitate the acquisition of grants, fellowships, or other forms of funding through various agencies to support advanced students in a research-oriented year abroad.

### Admissions

The program in literature admits only students intending to pursue the doctorate. Students who have already completed the M.A. degree in a relevant literary field or in a related nonliterary field (such as anthropology, history, theology, philosophy, etc.) are encouraged to apply. Work completed at another institution may, upon determination by the program's administrative board, be credited toward the Ph.D. degree. An advanced level of preparation in the languages relevant to a student's proposed course of study is requisite for all applicants to the program and indispensable for students in the program.

Incoming students begin studies in the fall semester. Students applying to enter in the fall should have complete dossiers (application, transcripts, writing samples (one in English and one demonstrating facility examining literature in a foreign language), letters of recommendation, and GRE (general test only) scores on file with Notre Dame's Office of Graduate Admissions no later than February 1. Applicants should describe their areas of interest as explicitly as possible on the "Statement of Intent" accompanying the application and ideally should list the prospective faculty with whom they wish to study. The writing samples should demonstrate the applicant's skills in writing, analysis, and literary research. Proficiency in language ought also to be demonstrated by examination or agreed-upon method at this time.

### Online Application

The URL for the Graduate School's online application is <http://www.nd.edu/~gradsch/apply/appintro.html>.

### General Requirements for the Doctoral Degree

The Ph.D. Program in Literature offers an innovative academic framework for the formation of future scholar-teachers in both the classical and modern languages and literatures. Guided by the director and by faculty advisers in their primary field, students are expected to fashion individualized courses of study bringing together an integrated blend of courses in their primary field, in related

field(s), and/or in literature more broadly construed. The doctoral program has been designed in recognition of and in anticipation of more dramatic changes in the way literature is being taught and studied. The program's design allows for the development of graduates with multiple interdisciplinary competencies: in a national literature, in a cross-cultural field or genre, in the multiple valencies of a literature as understood from a transnational and even global perspective, and in the instruction of one or more foreign languages.

Students in the program will be required to complete a minimum of 54 credit hours of study (18 courses) during three years of course work, including a minimum of six courses in their primary field of study, five in the primary field and/or related fields, and five specially designed seminars in literature. Students must complete during their first two years of study the program's specially designed course in literary theory, as well as a team-taught course in world literature that will focus attention on multiple regions, periods, and languages within and beyond the borders of Europe and the Americas. Before the end of their second year of course work, students will be expected to complete at least one course each in philosophy and theology so as to better understand the historical disciplines that have shaped the ways we talk and think about literature.

#### Course Requirements

Primary field*	6 courses	18 credit hours
Primary and/or related fields	5 courses	15 credit hours
Literature seminars	5 courses	15 credit hours
Philosophy	1 course	3 credit hours
Theology	1 course	3 credit hours

\* Primary field and related fields may be organized around periods (e.g., late antiquity, medieval, Renaissance, Enlightenment, fin de siècle, etc.); around genres (e.g., epic, tragedy, comedy, the ancient and/or modern novel, etc.); around literary movements (e.g., modernism, symbolism, the avant-garde, etc.); or around languages (e.g., ancient Greek, Latin, French, Spanish, German, Italian, etc.).

*Reading Courses.* Given the innovative nature of the program and the encouragement of a wide variety of pursuits, some courses taken by graduate students will be individual study conducted with an individual professor. The program's Graduate Studies Manual outlines the rules and procedures governing such courses.

#### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

Courses for fall 2003 include the following:

The following two courses, which are required, are produced by the Ph.D. Program in Literature and should normally be offered every year. They are open to graduate students not in the program, but permission to attend must be obtained.

#### 580B. *The World's Story: Love, Desire and Identity*

(3-0-3) Goldblatt, Doody

A team-taught course treating literature from different traditions, including European, Near Eastern, and Far Eastern. This is a required course for the Ph.D. in literature and should normally be taken in the first year of study.

#### 581. *Literary Theory*

(3-0-3) Program faculty

This is a required course of the Ph.D. in literature and should be taken in the first year of study.

Examples of courses meeting requirements of the literature program offered with different constituent departments.

Note: This is not an exhaustive list of courses. The following courses may not be offered every year.

#### Suggested Courses

##### Literature

556. *The Novel as an Agent of Change*  
(3-0-3) Doody

510. *Introduction to Literary Criticism*  
(3-0-3) Toumayan

520. *European Literature and the Vernacular Arts*  
(3-0-3) Boitano

515L. *Graduate Seminar: Age of Cicero*  
(3-0-3) Ladouceur

##### English

506. *Introduction to Graduate Studies*  
(3-0-3) Buttigieg

510A. *Roman Martyrs*  
(3-0-3) Lapidge

571 B. *From Brecht to Performance Art: Drama and Dramatic Theory, 1930-2000*  
(3-0-3) Bruns

572. *Liberalism and Modernism: Newman, Arnold, Acton and Joyce*  
(3-0-3) Deane

593B/493B. *Latino Poetry*  
(3-0-3) Menes

##### French

593. *French Caribbean Literature*  
(3-0-3) Ayo, Coly

##### German

557A. *Schiller (in German)*  
(3-0-3) Norton

592A. *Drama on Political Conflicts*  
(3-0-3) Hösle

##### Irish

542I. *Poetry & Politics, 1541-1688*  
(3-0-3) Ó Buachalla

##### Italian

541I. *European Romanticism*  
(3-0-3) Ferrucci

527I. *Petrarch: The Soul's Fragments*  
(3-0-3) Cachey

585. *Modern Italian Poetry/Translation Studies*  
(3-0-3) Welle

##### Philosophy

567. *Aesthetics*  
(3-0-3) Rush

523. *Early Medieval Philosophy*  
(3-0-3) Gersh

574. *Kant's Practical Philosophy*  
(3-0-3) Hösle

579. *Political Philosophy*  
(3-0-3) Sterba

581. *Philosophy of Science*  
(3-0-3) Howard

659. *Divine Providence*  
(3-0-3) Flint

661. *Philosophical Theology (Metaphysics of Creation)*  
(3-0-3) Burrell

**Spanish**

583. *Spanish-American Novel*  
(3-0-3) Ibsen

591. *Twentieth-century Caribbean Literature*  
(3-0-3) Anderson

**Theology**

511A. *Exegesis: Gospels*  
(3-0-3) Neyrey

521. *Early Christianity: An Introduction*  
(3-0-3) Cavadini

603. *Hebrew Bible Seminar: The Pentateuch*  
(3-0-3) Page

603J. *Judaica Seminar: Early Jewish Hermeneutics*  
(3-0-3) Najman

605A. *The Jewish-Christian Debate in the High Middle Ages*  
(3-0-3) Signer

661. *Philosophical Theology*  
(3-0-3) Burrell

**Languages**

The basic requirement for all doctorate candidates in the program is three languages, two of which must be in addition to the native tongue. Students in literature are minimally required to demonstrate near-native proficiency in the language of their primary field and a scholarly reading knowledge of an additional language, but the language component will vary according to the individualized program of study. Language requirements are designed to provide a rigorous base for in-depth study of two or more literary traditions and to ensure that students will successfully compete for placement in national literature departments as well as interdisciplinary programs.

**Examinations**

The permission-to-proceed examination in the program will be administered in January of the second year in residence.

The Ph.D. candidacy examination will normally take place at the end of August in the third year of residence. It will consist of a written and an oral component. One take-home exam, focused on a special reading list created by the student and his/her advisers, will function as a bridge to the dissertation proposal.

**Preparation for the Profession**

Notre Dame's innovative literature Ph.D. considers a national literature's disciplinary integrity as part of the underlying foundation that supports a truly interdisciplinary and translinguistic course of study. The built-in flexibility of the program promotes ways of relating literary material across disciplinary divisions in order to facilitate the development and training of future scholars who will be well prepared and positioned to respond to current and developing needs in the language and literature job market.

As a natural component of their professional development, students will apply their teaching assistantships in a variety of venues—language courses, mythology, ancient literature, English composition, and 300-level courses in English literature. The required practicum in the beginning of the fourth year will offer students an opportunity to team-teach a course with a regular faculty member in their field.

The program also offers a "Preparing for the Profession" doctoral colloquium that discusses a number of issues related to the study of literature from a professional perspective. This will include discussion of new developments in the field as well as the examination of topics of germane importance to the study of literature. In addition, the colloquium will address issues surrounding the development of a dissertation topic, research strategies, and the timely production and completion of a dissertation. Also, this seminar will introduce students to professional scholarly activities such as preparing papers for academic conferences, submitting essays for publication to academic journals, and developing strategies for entering the job market. The program's job placement apparatus works locally with students through everything from producing a letter of application to mock interviews, to the production of a "job talk." In addition, the program's faculty make use of their extended network of contacts throughout the profession to make hiring institutions aware of Notre Dame candidates on the job market.

**Participating Faculty**

The following is a partial list of Notre Dame faculty who came together to develop the Ph.D. Program in Literature. They form a core group of outstanding scholars who will be joined by numerous other faculty whose interests and expertise will enable students to craft doctoral degrees responsive to their own particular interests in world literatures. For a complete listing of participating faculty and their scholarly interests and current gradu-

ate students please visit our Web site at <http://www.nd.edu/~litprog>.

**Faculty**

Martin Bloomer, *Associate Professor of Classics*. B.A., Yale Univ., 1982; M.A., *ibid.*, 1983; M.Phil., *ibid.*, 1984; Ph.D., *ibid.*, 1987. (1998)

Keith R. Bradley, *Chair and the Eli J. Shaheen Professor of Classics and Concurrent Professor of History*. Litt.D., Sheffield, 1997.

Joseph A. Buttigieg, *the William R. Kenan Jr. Professor of English and Fellow in the Nanovic Institute for European Studies*. B.A., Univ. of Malta, 1968; B.Phil., Univ. of Oxford (Heythrop College), 1970; M.A., Univ. of Malta, 1974; Ph.D., State Univ. of New York, Binghamton, 1976. (1980)

Theodore J. Cachey Jr., *Director of Graduate Studies and Professor in Romance Languages and Literatures (Italian) and the Albert J. Ravarino Director of the Devers Program in Dante Studies*. B.A., Northwestern Univ., 1978; M.A., Univ. of California, Los Angeles, 1982; Ph.D., *ibid.*, 1986 (1990).

Seamus Deane, *the Donald and Marilyn Keough Professor of Irish Studies and Professor of English*. B.A., Queen's Univ., Belfast, 1961; M.A., *ibid.*, 1963; Ph.D., Cambridge Univ., 1966 (1993).

Margaret Doody, *Director of the Ph.D. Program in Literature and the John and Barbara Glynn Family Professor of Literature*. B.A., Dalhousie Univ., Halifax, 1960; B.A., Oxford Univ., 1962; M.A., *ibid.*, 1967; Ph.D., *ibid.*, 1968; Honorary L.L.D., Dalhousie Univ., 1985. (2000)

Julia V. Douthwaite, *Assistant Provost for International Studies, Professor of French Language and Literature, and Fellow in the Nanovic Institute for European Studies*. B.A., Univ. of Washington, 1980; M.A., *ibid.*, 1984; Ph.D., Princeton Univ., 1990. (1991)

Christopher R. Fox, *Director of the Keough Institute for Irish Studies and Professor of English*. B.A., Cleveland State Univ., 1971; M.A., State Univ. of New York, Binghamton, 1974; Ph.D., *ibid.*, 1978. (1986)

Luke Gibbons, *the Grace Director of Irish Studies, Professor of English, and Concurrent Professor of Film, Television, and Theatre*. B.A., Univ. College, Galway, 1972; H.Dip.Ed., National Univ. of Ireland, Maynooth, 1976; M.A., Univ. College, Galway, 1976; Ph.D., Trinity College, Dublin, 1989. (2001)

Howard Goldblatt, *Visiting Research Professor of Chinese*. B.A., Long Beach State College, 1961; M.A., San Francisco State Univ., 1971; Ph.D., Indiana Univ., 1974.

Vittorio Hösle, *the Paul G. Kimball Professor of Arts and Letters, Concurrent Professor of Philosophy, Concurrent Professor of Political Science, and Fellow in the Nanovic Institute for European Studies*. Dr. habil., Univ. of Tübingen, 1986; Ph.D., *ibid.*, 1982. (1999)

Lionel M. Jensen, *Chair and Associate Professor of East Asian Languages and Literatures, Concurrent Associate Professor of History, and Fellow in the Helen Kellogg Institute for International Studies*. B.A., Williams College, 1976; M.A., Washington Univ., 1980; Ph.D., Univ. of California, Berkeley, 1992. (2000)

Robert E. Norton, *Chair and Professor of German and Russian Languages and Literatures (German) and Fellow in the Nanovic Institute for European Studies*. B.A., Univ. of California, Santa Barbara, 1982; M.A., Princeton Univ., 1985; Ph.D., *ibid.*, 1988. (1998)

Breandán Ó Buachalla, *the Thomas and Kathleen O'Donnell Professor of Irish Language and Literature (Classics)*. B.A., National Univ. of Ireland, 1958; M.A., *ibid.*, 1959; Ph.D., *ibid.*, 1970. (2003)

Mark W. Roche, *the I. A. O'Shaughnessy Dean of Arts and Letters, Rev. Edmund P. Joyce, C.S.C., Professor of German Language and Literature, and Concurrent Professor of Philosophy*. B.A., Williams College, 1978; M.A., Univ. Tübingen, 1980; Ph.D., Princeton Univ., 1984. (1996)

Dayle Seidenspinner-Núñez, *Chair and Professor of Romance Languages and Literatures (Spanish)*. B.A., Univ. of California, Berkeley, 1968; M.A., *ibid.*; Ph.D., Stanford Univ., 1977. (1997)

Alain Toumayan, *Associate Professor in Romance Languages and Literatures (French) and Fellow in the Nanovic Institute for European Studies*. B.A., Univ. of Pennsylvania, 1976; M.A., Yale Univ., 1978; M.Phil., *ibid.*, 1980; Ph.D., *ibid.*, 1982. (1989)

## Medieval Studies

### Director:

Thomas F. X. Noble

Telephone: (574) 631-6603

Fax: (574) 631-8644

Location: 715 Hesburgh

E-mail: medinst@nd.edu

Web: <http://www.nd.edu/~medinst>

### The Medieval Institute

The Medieval Institute, established in 1946 and located on the seventh floor of the Hesburgh Library, is a center of research and advanced instruction in the civilization of the Middle Ages, with particular strengths in religious and intellectual history, Mediterranean civilization, old and middle English, medieval Latin, theology and philosophy, Dante studies, medieval musicology, and liturgy. The graduate studies curriculum combines programmatic inter-disciplinary course work, training in the technical skills of medieval studies, and linguistic preparation.

The institute's library contains nearly 90,000 volumes and various collections of pamphlets, reprints, and photographic materials. The reference collection contains major primary source collections, bibliographic and reference materials, catalogs, journals, and indexes.

The institute's library has long held extensive collections relevant to the Latin culture of the Middle Ages. Holdings in the history of medieval education are unrivalled in North America. Recently, the institute has enlarged its focus to include vernacular and Latin literatures, musicology, liturgy, medieval Judaism and Islam, and art history. Microfilms of more than 3,000 medieval manuscripts from European libraries and a collection of more than 200 facsimiles of medieval seals supplement this collection. Over the years the institute has accumulated a valuable collection of medieval manuscripts, incunabula, and other manuscripts, and rare books that are preserved in the Department of Special Collections. Also found there is the John Augustus Zahm, C.S.C., Dante Collection containing early and rare editions and an extensive and valuable set of literary studies of the *Divine Comedy* from the 19th and early 20th centuries. Recently, the institute acquired 90 medieval coins, likewise housed in Special Collections.

What sets Notre Dame's institute apart is its convenient gathering in one place of most of the printed materials essential to medieval studies. The Reading Room holds major dictionaries, bibliographical guides, reference works, and primary source collections. The Astrik L. Gabriel Universities Collection in a separate room offers remarkable resources, both published and unpublished, for the history of medieval universities. Another room, equipped with faculty and study carrels, holds a large collection of manuscript catalogs and materials pertinent to paleography, diplomatics, and early printed books.

Research in the institute is also supported by the University's Milton V. Anastos Collection in Byzantine studies, which has extraordinary holdings in the history of the Byzantine empire.

The Frank M. Folsom Ambrosiana Microfilm and Photographic Collection consists of microfilms of the 12,000 medieval and Renaissance manuscripts held in the Biblioteca Ambrosiana in Milan. The collection also contains about 50,000 photographs and negatives of miniatures and illuminated initials from the manuscripts, supplemented by some 15,000 color slides. The Mary Davis Drawings Collection contains photographs, negatives, and color slides of the 8,000 drawings in the Ambrosiana. The institute purchases all volumes related to the Ambrosiana materials and maintains a bibliography of all citations to Ambrosiana manuscripts.

The institute regularly sponsors major conferences and hosts a variety of guest lectures and seminars every year. In fall 2002, the institute will inaugurate the Conway Lectures, an annual series of three lectures delivered by a distinguished medievalist and published under institute auspices.

### The Program of Studies

The institute admits graduate students interested in pursuing the M.M.S. and Ph.D. in an interdisciplinary program. The student must pass a Latin competency test by the fourth semester of course work and formally demonstrate a reading knowledge of two modern European languages. One should be completed before the end of the first year and the other before the end of the second year.

## The Master of Medieval Studies Degree

### Course Requirements

To receive the M.M.S. degree, students must take:

1. *Introduction to Medieval Studies* (MI 501, MI 502, each one credit hour);
2. *Medieval Latin II* (MI 576 Medieval Latin Survey);
3. *Paleography* (MI 517);
4. one graduate-level course in medieval history, preferably one of the proseminars offered incoming graduate students in medieval history;
5. one graduate-level course in medieval literature, either the medieval vernaculars or medieval Latin, wherein the literature is read in the medieval language;
6. one graduate-level introductory course in medieval philosophy or theology;
7. one graduate-level course in medieval music or medieval art.

Students must choose four fields from among 32 offered by the institute, master the appropriate reading lists, and pass an oral examination with four professors. Students must have completed 34 credit hours and passed the examination in medieval Latin to receive the M.M.S. degree.

### The Doctoral Degree

All students, both those entering with a B.A. and those entering with an M.A., will take the aforementioned M.M.S. program. Students with the appropriate master's or equivalent degree may apply for credit transfer in accordance with Graduate School requirements, but also will be required to take one year of course work in the M.M.S. program. After successful completion of this additional year of course work in the M.M.S. program, students may seek admission to the doctoral program.

Students admitted to the Ph.D. program must take one additional year of course work and prepare two additional fields, one of their own choosing and one in the area of their dissertation research. The Ph.D. written examination consists of five written exams, given by professors in five chosen fields. The oral examination, which follows if at least four written exams are passed, will pursue questions in the chosen fields, and focus upon the field of the dissertation.

After successful completion of both written and oral examinations, the candidate, in consultation with the director and the student's adviser, prepares a dissertation proposal for

committee approval. The adviser and the three readers of the dissertation proposal must approve it.

### Joint Program in Medieval Philosophy

Students admitted to the institute with a special interest in philosophical authors or topics may be admitted to the joint program in medieval philosophy.

Administered jointly with the Department of Philosophy, the program modifies the standard doctoral program for medieval studies in the following ways:

1. Four courses are taken in the Department of Philosophy, not counting courses cross-listed in the institute. Typically, the philosophy courses include work in ancient and modern philosophy as well as thematic seminars in the area of a student's special interest. For students with little prior preparation in recent philosophy, the course "Analytic Philosophy" may be required as a fifth course.
2. A special manuscript studies course in the transmission and redaction of university texts is taken in the institute.
3. At least one section of the comprehensive examinations is taken in an area of philosophy outside the medieval period, with a member of the Department of Philosophy serving as examiner.
4. Where appropriate, a member of the philosophy department serves as one of the readers of the dissertation.

Applications for admission to the program are made by letter to the secretary of the Joint Program Committee.

### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

Relevant courses in other departments are cross-listed in the Medieval Institute and vice versa.

#### 501, 502. *Introduction to Medieval Studies*

(1-0-1) (1-0-1) Noble and faculty  
A one-credit-hour course designed to introduce students to the basic bibliographies, handbooks, and research tools in medieval

studies. Professors from various disciplines will participate.

#### 503A. *Medieval Spanish Literature: From Reconquest to Renaissance*

(3-0-3) Seidenspinner-Núñez

The defining feature of medieval Spain is the Reconquest, the fluctuating repossession of lands conquered by Muslim invaders in 711 that continued for more than 700 years. This course will survey the masterworks of the Spanish Middle Ages within the ideological, sociocultural, and political context of reconquest Spain and will include the *kharjas*, *Poema de mio Cid*, romancero, *Los milagros de nuestra Senora* by Gonzalo de Berceo, *Conde Lucanor* by Don Juan Manuel, *Libro de buen amor* by Juan Ruiz, *Arcipreste de Talavera* by Alfonso Martínez de Toledo, *Carcel de amor* by Diego de San Pedro, *Celestina* by Fernando de Rojas, and miscellaneous selections. Primary texts will be supplemented with critical, scholarly, cultural, and theoretical readings.

#### 511. *Proseminar in Medieval History I*

(3-0-3) Noble

A historiographical introduction to medieval history between the years 500 and 1100. The purpose of the course is to acquaint students with important debates on the whole range of historical topics in this era, major historical monographs, and the approaches of major contemporary historians.

#### 512. *Proseminar in Medieval History II*

(3-0-3) Biddick, Constable, Van Engen

An introduction to the main topics, interpretations, and themes of the study of the high and later Middle Ages, 1100 to 1400. We will read primary sources each week, but the emphasis will be on the interpretations made by historians and medievalists over the centuries (but especially during the late 20th century) of the culture, economy, society, religion, and politics of this period. Attention will be paid in each of the seminars to "new approaches" to the study of the culture of the Middle Ages—in other words, the theory and assumptions underlying interpretations, the selection of questions asked and to be asked of the sources, and the choice of sources on which to base those interpretations.

#### 514. *Diplomatics*

(3-0-3) D. J. Boulton

Gives students practical experience in locating, reading, and understanding documents from England, France, the Empire, Italy, and Spain. All such material will be placed in its cultural, scholarly, institutional, and human setting.

516. *Proseminar in Medieval Music*

(3-0-3) Bower

An introduction to the theoretical and practical facets of the discipline of music during the Middle Ages. Readings in Calcidius, Macrobius, Boethius, Isidore, *Musica enchiridias*, Guido d' Arezzo, and John of Garland; an examination of the basic genres of chant and their place in the mass and the office hours; as well as tropes, hymns, sequences, and organum. Students are expected to have a working knowledge of Latin.

517. *Paleography*

(3-0-3) M. Boulton

An introduction to Latin paleography from the beginnings of Latin writings to about 1500. Seminars will cover the developments of handwriting over the course of this period and practical exercises in reading various hands. Special emphasis will be given to the technique of describing medieval manuscripts, to the nature of paleographical research, and to the implications of paleography for other forms of research. Students are expected to have a working knowledge of Latin.

518. *Islam: Religion and Culture*

(3-0-3) Afsaruddin

A study of the rise of Islam in the Arabian peninsula in the seventh century and its subsequent consolidation as a major world religion and civilization. Lectures and readings will deal with the life of the Prophet Muhammad, the Qur'an and its interpretation, early Islamic history, community formation, law and ritual, theology, philosophy, mysticism, and literature.

519A. *Medieval Theory of the Will*

(3-0-3) Dumont

The concept of the will as a distinct faculty of rational desire is arguably one of the genuinely original and most influential developments of medieval philosophy. This course will trace the origin and evolution of the will from Anselm of Canterbury to Duns Scotus, focusing in particular on the emergence of voluntarism at the end of the 13th century, according to which the will became a completely self-determining, rational power. The consequences of this for other aspects of medieval ethical theory, such as virtues and natural law, will also be examined.

521. *Early Christianity: An Introduction*

(3-0-3) Cavadini, Daley

This course will consider the origins of Christian nonbiblical theological literature, from the time of the New Testament until

Origen, in the middle of the third century.

By reading a wide selection of complete texts in translation from the period, we will try to develop a sense of how Christian thinkers, in the first two centuries of the church's history, expressed their emerging sense of the community's distinctive faith and form of life, in tension and dialogue with Judaism, Gnostic religion, and Hellenistic culture, and how the outlines of the tradition of orthodox Christian theology first emerged in this process. Readings will include early Christian poetry and Biblical apocrypha, letters of pastoral admonition, martyr-acts, apologetic literature, and selections from the more theologically-ambitious works of Irenaeus, Clement of Alexandria, and Origen.

522. *Historical Theology: Medieval*

(3-0-3) Wawrykow

The High Middle Ages witnessed tremendous creativity in theology, and the writings of theologians as diverse as Thomas Aquinas and Mechthild of Magdeburg have proven to be of enduring significance. This course examines the high medieval achievement in theology, both scholastic and spiritual, through close study of selections from the most important theologians of the 13th and early 14th centuries. While considerable attention will be given to doctrinal development and intellectual disagreement, cultural as well as literary questions will also receive their due. To what extent did institutional and educational changes stimulate theological progress? Why did theologians employ such a broad range of genres? And are different genres better suited to certain theological tasks? How do earlier writings, both Christian (scriptural, patristic, and early medieval) and non-Christian (especially, but not exclusively, Aristotelian), figure in the high medieval theological enterprise?

523. *Early Medieval Philosophy*

(3-0-3) Gersh

A survey of medieval philosophical literature from ca. 400 to ca. 1200 based on original texts. We shall review the most well-known authors and works in the first instance: Augustine (*Soliloquies*, *De Libero Arbitrio*, *Confessions*), Boethius (*Opuscula Sacra*, *De Consolatione Philosophiae*, logical works), Eriugena (*Periphyseon*), Anselm of Canterbury (*Monologion*, *Proslogion*), the "School of Chartres" (*Commentaries on Boethius*). However, considerable emphasis will be placed on major traditions ignored by earlier histories of medieval philosophy: glossing of Plato Latinus, Aristotle Latinus, Macrobius, and Martianus Capella.

524. *Later Medieval Mystical Theology*

(3-0-3) Emery

In the Latin world, the term mystical theology was largely a by-product of the widespread reception of the writings of pseudo-Dionysius the Aeropagite in the later Middle Ages. Like other medieval arts and sciences, the subject of mystical theology was defined by a corpus of authoritative texts, topics, questions, etc. Moreover, as Dionysius himself taught, mystical theology was conceived to be reciprocally related to "intelligible" or scholastic theology. In this course, we shall read a series of texts that were included in the historically actual library of mystical theology.

525. *Lyric and Narrative in Medieval French Literature*

(3-0-3) M. Boulton

Examines the ideology of troubadour poetry and its influence on French literature of the 12th, 13th, and 14th centuries. We will trace this influence from the narrative response to lyric poetry in the romances of Lancelot and Guillaume de Dole, through the erotic pseudo-autobiographies (*Roman de la Rose*, *Remede de Fortune*), to the tendency of lyric cycles to recount stories (Christine de Pizan's *Cent Ballades*). In these works and others, the confrontation of lyric and narrative tendencies, the combinations of song and speech, and the intertextual implications of hybrid works will be of particular interest.

525A. *Topics in Early Christianity*

(3-0-3) Cavadini, Leyerle

526. *Editing Scholastic Texts*

(3-0-3) Emery

Takes students through the steps of editing a medieval scholastic text, from the beginning search for manuscripts through their comparison and construction of apparatus.

528. *Topics in Medieval Theology:*

*The Sacraments*

(3-0-3) Prügl

Pastoral necessity as well as heresies and uncertainties about the nature of the sacraments made it unavoidable for the medieval church to reflect upon its most distinctive liturgical rites. Within the context of the formation and growth of scholasticism, the sacraments provided an excellent training ground to test the strength of western theological thought. Due to the influence of Peter Lombard's collection of patristic "Sententiae," the sacraments finally became a major field within the institutionalized theology at the universities. This course will focus on those events and texts

of the earlier Middle Ages which challenged theologians like Paschasius Radbertus, Berengar of Tour, and Lanfranc of Bec to specify their views about the Eucharist. It will consider the formation of a systematic treatise on the sacraments in the French schools of the 12th century, and finally present the synthesis of high scholastic sacramental theology in Thomas Aquinas and Bonaventure.

### 530. *Introduction to Old English*

(3-0-3) O'Brien-O'Keeffe

This introduction to the study of old English will focus on the elements of the language preparatory to reading and analyzing a variety of prose and verse texts. Issues for discussion and study will include: current and past constructions of philology, the canon, the politics of editing, issues in translation, interpretative strategies, subject formation, issues in period construction, research tools, and possibilities for future work. No prior experience with old or middle English is necessary.

### 530C. *Latin Literature of Anglo-Saxon England*

(3-0-3) Lapidge

During the early Middle Ages, England was in the vanguard of European learning, and a number of Anglo-Latin authors—notably Aldhelm, Bede, and Alcuin—helped to determine the course of education and letters for 500 years and more. The course will provide a historical introduction to the large and unexplored corpus of pre-Conquest Anglo-Latin literature; the focal point of the course will be the close study (in the Latin original) of the principal Anglo-Latin authors and texts, as well as of the distinctive literary genres which were pioneered and developed by Anglo-Latin authors, such as the enigma or literary riddle.

### 531. *Beowulf*

(3-0-3) Lapidge, O'Brien O'Keeffe

*Beowulf* is the longest and earliest surviving heroic poem in any medieval Germanic language, and has been recognized for over two centuries as a literary masterpiece. Yet, on examination, the reasons why it is reckoned a masterpiece are not always clear: its narrative design is frequently oblique and obscure; its language is dense and often impenetrable; and it relates to a Germanic society which can barely be reconstructed, let alone understood, by modern scholarship. The aims of the course will be to understand the narrative design and poetic language of *Beowulf*, and then to attempt to understand these features of the poem in the context of early Germanic society. The language of *Beowulf* is difficult

and therefore a sound training in old English grammar and a good reading knowledge of old English literature, especially poetry, are essential prerequisites for the course.

### 531C. *Constructing Subjects in Anglo-Saxon England*

(3-0-3) O'Brien-O'Keeffe

This course addresses the question of the very existence of the subject in the early Middle Ages. To frame the question, participants in the course will read some contemporary theorists of subjectivity as well as some patristic writers on the self. The rest of the course will investigate constructions of subjectivity in mainly prose texts written in England before approximately 1100.

### 533A. *Allegory and Symbol*

(3-0-3) Mann

Allegory has often been regarded as a poor relation of symbol, a colorless and two-dimensional genre in which didactic intent stifles poetic creativity. In recent years, however, there have been numerous successful attempts to reclaim it as a major genre whose mode of operation highlights fundamental questions about the nature of language and its relation to reality. This course will work jointly with medieval texts and modern critical theories of allegory, using them for reciprocal illumination, to outline different ways of reading allegories and responding to their particular complexities. It will also ask how we are to define the difference between allegory and symbol, when we stop using these terms merely as labels for works we do or don't admire. Texts to be considered will include Prudentius's *Psychomachia*, Dante's *Divine Comedy*, *The Romance of the Rose*, *Piers Plowman*, Chaucer's early poems, Malory's *Quest of the Holy Grail*, and Henryson's beast fables.

### 533B. *Middle English Drama*

(3-0-3) Nolan

This course will cover the origin, development, and performance of middle English drama in the 14th and 15th centuries. We will begin with the emergence of the drama from the *quem quaeritis* trope in the Easter liturgy, and examine carefully the claim that the secular dramas of the later Middle Ages moved from the altar to the church steps to the streets. Each of the four major Corpus Christi cycles will be discussed, along with saints' plays and morality plays. We will also survey the major critical approaches to the drama, from formalist accounts of typology and genre to cultural materialist notions of ritual, allegory, and symbol, to historicist examinations of city and performance.

### 533C. *English Religious Writing*

(3-0-3) Nolan

This course will explore the tradition of religious writing in middle English, beginning with Richard Rolle and ending with the religious controversies of the 15th century. We will pose a series of related questions: why do writers begin to produce devotional material in English in the 14th century? What are the implications of writing about sacred matters and sacred texts in the vernacular? What are the major theological questions at issue in these texts? How can heresy be distinguished from orthodoxy? What is the emerging definition of the "orthodox" to be found in the repressive legislation of the early 15th century? We will be particularly concerned to read "religious" and "literary" texts in tandem, placing Chaucer's saints' lives next to Julian of Norwich's "shewings," for example. The course will also consider the critical tradition, exploring historical, theoretical, materialist, literary, feminist, and other ways of thinking about the sacred, the vernacular, and the heretical.

### 534. *Lyric Poetry of the Renaissance*

(3-0-3) DellaNeve

This course will focus on the poetry and poetic theory of the leading theorist of the Pléiade, Joachim Du Bellay. We will begin by reading Du Bellay's literary manifesto for the upstart Pléiade group, the *Deffense et illustration de la langue française*. We shall then consider Du Bellay's earliest poetry, the sequence of love poetry entitled *Olive*. At this juncture we shall examine how Du Bellay's literary theory relates to his earliest poetic production, as we consider the role of imitation of classical and Italian models in his *canzoniere*. The course will also examine Du Bellay's non-love poetry, namely the sequences entitled the *Antiquitez* and especially Du Bellay's masterpiece, the *Regrets*. Topics for discussion here include the concepts of parody and satire as well as Du Bellay's relationship with Italy (antique and modern) and with his chief poetic rival, Ronsard. Because imitation theory and practice is crucial in the works of Du Bellay, students will read a number of Italian texts, including the poems of Petrarch and the Petrarchists (available in Italian as well as English translation); some attention will also be given to English poets who were inspired by Du Bellay, most especially Spenser.

538. *Chaucer: Canterbury Tales*

(3-0-3) Frese

A study of the *Canterbury Tales* read in the original middle English. Chaucer's comic genius will shape the approach to the text, which has been carefully constituted by its author as a virtual anthology of medieval fictional forms—everything from bawdy stories to saints' lives engaged Chaucer's most mature imaginative energies in this, his last great work. The class will work its way toward an appreciation of the kaleidoscopic subtleties involved in his poetic shaping of this wide, deep, and humanly envisioned text-world.

539C. *First Aid in Middle English*

(1-0-1) Mann

Middle English without pain! This compact seminar will meet twice weekly for three weeks in the spring term. It will provide a grounding in middle English grammar and syntax by working through a specially-prepared booklet, and also practice in translating middle English texts. The course is strongly recommended for any graduate student planning to take a middle English course, whether or not middle English is their major field.

539E. *Problems in Textual Criticism*

(1-0-1) Lapidge

Textual criticism is the art and science of evaluating evidence of manuscript-readings in the process of establishing a text, and involves understanding of the vagaries of medieval manuscript transmission. This compact spring seminar will offer an opportunity to discuss the problems that are posed by the transmissional histories of texts composed (in Latin and old English) during the Anglo-Saxon period, but comparative material from earlier (classical and biblical) and later texts will also be brought into play. In particular, attention will be given to ways of adjudicating the apparatus criticus that accompanies "critical" editions, and to the different sorts of problems that are posed by texts transmitted in single manuscripts, in autograph or idiograph manuscripts, or in multiple copies, and the ways of determining the genealogical relationship (and representing it in a stemma codicum) between individual manuscripts in cases where a work is preserved in more than one manuscript.

540. *Classics of the Italian Renaissance*

(3-0-3) Cachey

Five literary classics and the critical discourse surrounding them, including Poliziano's *Stanze per la giostra*, Sannazaro's *Arcadia*, Machiavelli's *Il Principe*, Castiglione's *Cortegiano*, and Ariosto's *Orlando furioso*.

543. *Seminar: Medieval Spain*

(3-0-3) Constable

This course examines the history and historiography of medieval Spain from the eighth to the 15th century. Readings concentrate on the economic, social, and political development of the peninsula and the cross-cultural exchange between its peoples. Particular emphasis will be placed on the Muslim-Christian encounter and the ways in which this relationship has shaped the field of Spanish medieval history.

547. *Dante I*

(3-0-3) Cachey, Moevs

Many have considered Dante's *Comedy* to be the greatest poetic achievement in Western literature. It is also perhaps the most perfect synthesis of medieval culture and the most powerful expression of what even today remains the foundation of the Catholic understanding of human nature, the world, and God. This course is an in-depth study, over two semesters, of the entire *Comedy*, in its historical, philosophical, and literary context, with selected readings from the minor works (e.g., *Vita Nuova*, *Convivio*, *De vulgari eloquentia*).

548. *Dante II*

(3-0-3) Cachey, Moevs

Many have considered Dante's *Comedy* to be the greatest poetic achievement in Western literature. It is also perhaps the most perfect synthesis of medieval culture and the most powerful expression of what even today remains the foundation of the Catholic understanding of human nature, the world, and God. *Dante I* and *Dante II* are a close study, over two semesters, of the entire *Comedy*, in its cultural (historical, literary, artistic, and philosophical) context. *Dante II* focuses on the *Purgatorio* and the *Paradiso*, with some discussion also of the *Monarchia*.

552. *Early Renaissance Italy*

(3-0-3) Rosenberg

The development of Italian painting, sculpture, and architecture from 1280 to 1480. Works by such artists as Giotto, Masaccio, Brunelleschi, Donatello, Alberti, and Botticelli will be considered in the context of the period that gave birth to the modern language of art and witnessed the revival of the centrality of man as the greatest of God's creatures.

558. *Northern Renaissance Painting*

(3-0-3) Rosenberg

The development of painting in northern Europe (France, Germany, Flanders, and Holland) from approximately 1300 to 1500. Special attention will be given to the art of Jan van Eyck, Hieronymus Bosch, Albrecht Dürer, and Pieter Brueghel. In tracing the evolution of manuscript and oil painting and the graphic media, the student will become conscious of the special wedding of nature, art, and spirit that defines the achievement of the Northern Renaissance.

559. *Early Medieval Art: The Illuminated Book*

(3-0-3) Barber

This course will investigate the art produced in Western Europe between the seventh and 11th centuries. Often characterized as a Dark Age, this period in fact demonstrates a fertile, fluid, and inventive response to the legacy of Late Antique Christianity. The course will focus on the production and reception of illuminated manuscripts, using facsimiles of these works as a basis for teaching. Students will become familiar with art-historical methods for the examination of such works and will be invited to contemplate the interplay of word and image that these books propose. Categories of material discussed include: Insular art, the Carolingian scriptoria, Ottonian imperial image making, Anglo-Saxon art, Spanish Apocalypses, and Italian Exultets.

565. *St. Augustine's Confessions*

(3-0-3) Sheerin

This course provides an introduction to St. Augustine's *Confessions*, through reading of extensive selections from the Latin text, a careful reading of the entire work in English translation, and the application of a variety of critical approaches, old and new.

566. *Trecento: Giotto to the Duomo*

(3-0-3) Gill

Beginning with Giotto's Scrovegni Chapel in Padua, we will examine the arts in Italy in the 1300s, concluding with Brunelleschi's revolutionary design for the dome of the Florence Cathedral of 1436. We will consider the regional traditions of the city-states, including Siena, Venice, Florence and Pisa, as well as Rome, and as expressed in narrative fresco programs, altarpieces, sculpture, and architecture. Among our subjects are the royal tombs in Naples and Milan, the evolution of the equestrian monument, St. Mark's in Venice, the character of Gothic expression in Italy, and impact of the Black Death.



*568. Readings in Byzantine Greek*

(1-0-1) Jenkins

Ongoing weekly reading group of Byzantine Greek. Readings are focused on short but complete texts in hopes of producing and making accessible workable translations. Intermediate knowledge of classical or New Testament Greek is required.

*569. History of the Italian Language*

(3-0-3) Cachey

This course presents an introduction to essential texts and topics surrounding the Italian “questione della lingua” with a focus on the Medieval and Renaissance periods, from the origins and Dante’s *De vulgari eloquentia* (c. 1305) to Pietro Bembo’s *Prose della volgar lingua* (1525) and the linguistic debates of the High Renaissance. A post-Renaissance perspective on the language question will also be explored. Besides regular seminar presentations addressing course readings, students will be required to develop research projects examining the impact of the language question on the development of Italian literary history utilizing primary source materials from Renaissance holdings in the Department of Special Collections, Hesburgh Library.

*571. The Vulgate and Related Texts*

(3-0-3) Bower

Readings and critical discussion of the various layers of texts in the Vulgate Bible: 1) the old, essentially unrevised layer (Acts, Epistles, Apocalypse); 2) Jerome’s revised Psalter (Galicán); 3) Jerome’s revised Gospels; 4) Jerome’s translations from the Hebrew (Canonical Books of the Old Testament, included the Psalter *iuxta Hebraicum*). Some of Jerome’s introductory material will also be read, along with several passages from Augustine’s *de doctrina christiana*. An elementary knowledge of Latin is prerequisite; students will be expected to translate in class.

*573. Latin for Medieval Philosophy*

(3-0-3) Gersh

The aims of the course will be both linguistic and philosophical. Via the reading of 25-30 short extracts, we shall on the one hand study the evolution of Latin style and technical vocabulary through patristic, Carolingian, 12th-century scholastic and humanistic writings, and on the other consider the manner and extent to which philosophical thought itself has been influenced by the language in which it is presented and articulated. The course is aimed at philosophers wishing to prepare themselves for the study of primary sources

in Latin and philologists wishing to acquire some understanding of this specialized and important type of literature. Although grammar and syntax will be explained by the instructor whenever necessary, a knowledge of basic Latin will be assumed.

*574. Introduction to Plotinus*

(3-0-3) Gersh

The course will be divided into two parts:

(1) A general survey of Plotinus’ philosophy based on writings of his early and middle periods; (2) A close study of Plotinus’ longest treatise (divided into four parts by Porphyry): *Enneads III.8, V.8, V.5, II.9*. In both parts of the course, our aim will be not only to understand Plotinian thought as a system of emanative monism but also to evaluate the expository and argumentative techniques by which this thought is organized into verbal discourse.

*575A. Medieval Latin I: Introduction to Christian Latin*

(3-0-3) Sheerin

This course has two goals: to improve the student’s all-around facility in dealing with Latin texts and to introduce the student to the varieties of Christian Latin texts and basic resources that facilitate their study. Study of syntax and vocabulary will be facilitated by regular exercises in Latin composition. Exposure to texts will be provided through common readings, which will advance in the course of the semester from the less to the more demanding: Latin translations of Scripture, exegesis, homiletic, texts dealing with religious life, formal theological texts, and Christian Latin poetry.

*576. Medieval Latin II: Medieval Latin Survey*

(3-0-3) Sheerin

This will be a survey of the varieties of medieval Latin literary texts. Keith Sidwell’s *Reading Medieval Latin* will serve as the base text, with occasional supplements especially for the period after the 12th century. Goals for the course are enhancement of reading skills and experience of an overview of medieval Latin literature, with acquisition of bibliographical knowledge that will allow the student to continue working on her/his own in this area.

*579. Latin Wit and Wisdom: The Collection and Use of the Sententiae*

(3-0-3) Bloomer

This seminar will examine the long tradition of collection of sententiae, the Latin aphorisms that were an integral part of ancient and medieval schooling, moral formation, and learning. We shall begin with a brief overview

of the gnome and proverb as species of sapiential literature, but as a working practice we shall focus in the main on the history of some of the great collections (*Publilius Syrus, aka Seneca Philosphus*; the *Distichs of Cato*). Reading a text for its sententiae is both a scribal act and a hermeneutic process—in brief, a good way to examine a very different sort of reading and writing from the modern. Far from being museum items, collections of verbal lore are meant to be used, embellished, and imitated. Another major focus thus will be on new collections (Alcuin, Othlo, Egberts, perhaps a final week on the apex of the tradition, Erasmus’ *Adagia*).

*580. Medieval Art Seminar: Vision and Ecstasy in Medieval Art*

(3-0-3) Barber

This seminar will address a wide range of medieval texts and objects that will enable us to analyze the nature of medieval vision as it pertains to the visual arts. The type of texts included will be theological, liturgical, literary, epistolary, rhetorical, and philosophical. Objects will include architecture, illuminated manuscripts, frescoes, mosaics, and icons. The seminar will encompass both Byzantium and the Latin West. The primary purpose of the seminar is to examine the complexity of visual experience as a form of knowledge. The secondary purpose is consider the extent to which this experience is ecstatic, disrupting our modernist notion of the observant subject as the foundation of knowledge.

*581. Medieval German Literature*

(3-0-3) Wimmer

A survey of German literature from its beginnings during Germanic times until the 17th century. Ideas, issues, and topics are discussed in such a way that their continuity can be seen throughout the centuries. Readings include modern German selections from major medieval authors and works such as Hildebrandslied, Rolandslied, Nibelungenlied, Iwein, Parzival, Tristan, courtly lyric poetry, the German mystics, secular and religious medieval drama, *Der Ackermann aus Böhmen*, and the beast epic *Reineke Fuchs*.

*582. The Medieval Book*

(3-0-3) Bower

A historical survey of the medieval book as a cultural, archeological, artistic, and commercial object from about A.D. 300 to 1500. General outline: (1) the early Middle Ages: from scroll to codex, the Bible in the early Middle Ages, insular gospel books, continental book production; (2) the Carolingian Renaissance and its heritage: spiritual and

pedagogical foundations of book culture, deluxe products, critical texts, authors and their manuscripts, the glossed book, and the monastic scriptoria of the 10th to the 12th centuries; (3) the later Middle Ages: the university book trade, popular spirituality and the book trade (i.e., *Book of Hours*).

583. *Art History Seminar: The Courts of Renaissance Italy*

(3-0-3) Rosenberg

Historically the history of Italian Renaissance art has been dominated by three cities: Florence, Venice, and Rome, but a splendid world of courtly culture which blended traditional feudal/chivalric values with a growing humanistic interest in classical antiquity, flourished right alongside these three centers. Although Jakob Burckhardt acknowledged this fact in his 19th-century classic essay *The Civilization of the Renaissance in Italy*, it is only recently that scholarly attention has returned to the extraordinarily important alternative visual and cultural tradition of the Italian Renaissance courts. Building on this rising tide of interest, this seminar will focus on art and patronage in five princely cities (Milan, Naples, Ferrara, Mantua, and Urbino) from the 14th through the 16th centuries. Its goal will be to define the nature of courtly culture in Renaissance Italy. Issues which will be addressed in the semester include: the court artist, the image of the ruler and the ideology of power, palace and fortress, the prince's private space, aristocratic leisure and villeggiatura, Renaissance urbanism, and the role of women as courtly patrons.

585. *Der Artusroman/Arthurian Epic*

(3-0-3) Christensen

This course will explore the enduring legend of King Arthur and his court as interpreted by German authors of the high Middle Ages (late 12th and 13th centuries). We will spend the majority of the semester on the three best-known and most complete Arthurian epics in the German tradition: *Erec* and *Iwein* by Hartmann von Aue, and Wolfram von Eschenbach's *Parzival*, as well as later German adaptations they influenced. These tales are among the most imaginative and fascinating in the German canon. Our exploration of these texts will focus on their relationship to their French and English predecessors, on the many twists and turns in story line and character development that each individual author creates, and on the information they suggest about life in the medieval world. We will also take a look at some film adaptations of the Arthurian legend.

586. *Apuleius*

(3-0-3) Bradley

An investigation of the historical Apuleius. The seminar will examine the Roman-African context into which Apuleius was born, recreate the educational travels to Carthage, Athens, and Rome that occupied his early life, and focus especially on his trial for magic in Sabratha in 158/9, before following him back to Carthage where he spent the rest of his life. Notice will be taken of all of Apuleius' writings, but special attention will be paid to the *Apology*, and to the documentary nature and sociocultural importance of the *Metamorphoses*.

590. *Byzantine Art*

(3-0-3) Barber

Byzantine art has often been opposed to the traditions of Western naturalism, and as such has been an undervalued or little known adjunct to the story of medieval art. In order to develop a more sophisticated understanding of this material we will examine the art produced in Byzantium in the period from the ninth to the 12th century, a period that marks the high point of Byzantine artistic production and influence. Stress will be placed upon the function of this art within the broader setting of this society. Art theory, the notions of empire and holiness, the burdens of the past and the realities of contemporary praxis will be brought to bear upon our various analyses of material from all media. How we, as art historians can write the history of this rich culture will be a central issue of this course.

597. *Directed Readings*

(V-V-V) Staff

Specialized reading related to the student's area of study.

598. *Special Studies*

(V-V-V) Staff

Topics vary by semester.

602. *Canon Law in the High Middle Ages*

(3-0-3) Van Engen

This course will introduce students to the study of canon law in the high Middle Ages. It will teach them the structure and usage of Gratian's *Decretum*, the university textbook, and of the papal *Decretales* (1234), the only truly authorized lawbook of the medieval church. In addition, students will learn to use and to read the extensive glossating and commentary literature that grew up around these authoritative texts. To focus the students' historical approach, the fall 2003 semester will focus on teachings about custom, arguably the most omnipresent and socially significant

form of law in the Middle Ages: its status in law, its authority over against positive legislation or court decisions, and quite particularly the venues and practices in the church where custom was presumed to prevail.

603. *Seminar: Story and History in 13th-Century Europe*

(3-0-3) Van Engen

This course explores the place of "stories" in the making of medieval culture, and the degree to which we can draw "history" from them. It will touch upon some of the same conceptual problems raised recently in discussions of the distinction between fiction and history. The course will focus on examples from three key areas of storytelling: the exempla, which became so crucial to sermons and moral instruction; chronicles (such as Salimbene's), which became ever more storylike in their construction; and hagiography.

605. *Colloquium: Commercial Revolution in the Middle Ages*

(3-0-3) Constable

The theory of a commercial revolution in Europe and the rise of so-called "European hegemony" provides a focus for looking at a broad spectrum of issues and documents relevant to the rise of agrarian, commercial, and urban institutions in medieval Europe. This course will concentrate on the problems of the shifting balance of power in the Mediterranean world in the Middle Ages. Although it is easy to see a shift from Muslim to Christian hegemony in this period, it is much harder to find an explanation for this change. Theories range from crude cultural superiority to subtler explanations involving differential technology, mercantile, and agrarian development; political and military structure; monetarization and metallic balance; or demographic shifts in reaction to the Black Death. This colloquium will consider these changes, and their possible explanations, in light of both primary texts and secondary interpretations.

606. *Colloquium: Medieval Cities*

(3-0-3) Constable

This colloquium examines the development and structure of urban centers in Europe and the Mediterranean world from late antiquity to the later Middle Ages. Through a discussion of primary texts, secondary historical studies, and works on modern urban theory, we will track the history of urban life in the Middle Ages, with particular attention given to the topography, society, culture, and economy of cities in southern Europe.

*609. Merovingian Franks, 450 to 750*

(3-0-3) Noble

This course will survey and analyze key literature and sources on the establishment, development, and eventual collapse of the Merovingian Frankish kingdom. Central issues will include: the nature, origins, and audiences of the major sources; Frankish ethnicity; Frankish kingship; central and local institutions in the Frankish kingdoms; the economy of Merovingian Francia; the Merovingian church; academic and intellectual institutions; problems of language and communications; and Merovingian relations with their neighbors. Student responsibilities will include: substantial weekly reading assignments (most but not all sources will be read in translation; scholarly works in French and German will be assigned); periodic oral and written reports; and two or three synthetic essays.

*612A. Augustine and Philosophy*

(3-0-3) Gersh

An introduction to Augustine's work concentrating on his reaction to earlier philosophical materials (a reaction naturally conditioned by his Christian outlook). During the course, we shall examine his relation to scepticism (e.g., in *Contra Academicos*), to Stoic linguistic theory (in *De Dialectica*), to Pythagoreanism (in *De Quantitate Animae*), and especially to Neoplatonism (e.g., in *De Ordine, Soliloquies, De Immortalitate Animi, De Vera Religione, Confessions*). Augustine's relation to the philosophical generalities of the handbook tradition will also be an issue. Part of the course will be devoted to the philosophical readings in *De Civitate Dei*. Part of the course will be devoted to the transmission of "philosophical" Augustinism to the Middle Ages.

*621. Early Christianity Seminar: The Theology of the Cappadocian Fathers*

(3-0-3) Daley

This seminar will study a broad and representative sampling of works by the three great Cappadocian Fathers in an attempt to see their own characteristic synthesis of Trinitarian theology, theological anthropology, eschatological hope, and ascetical spirituality. Special attention will be given to their influence on each other's thought, and to their place in the longer tradition of Greek patristic theology. Greek language ability will not be required, but those with intermediate or better knowledge of Greek will be able—as part of the course requirement—to participate in a section in which we will read and interpret original texts.

*633. Medieval Exegesis Seminar*

(3-0-3) Signer

Our focus will be on the relationship between biblical interpretation and the polemical literature written by Jewish and Christian authors from 1050 to 1200. Students will read the recent accounts of this literature by Gavin Langmuir, Anna Sapir Abulafia, Gilbert Dahan, and Jeremy Cohen. Excerpts from medieval Christian authors such as Abelard, Gilbert Crispin, Guibert of Nogent, Bernard of Clairvaux, Peter the Venerable, Petrus Alfonsi, and Alan of Lille. Passages from Jewish authors such as Rashi, Rabbi Joseph Kara, Rabbi Samuel ben Meier, and Rabbi Joseph of Orleans will also be studied. Students will be expected to make an oral presentation and write a paper that provides an explication of the arguments in a polemical work.

*634. Medieval Theology Seminar: Christology of Aquinas*

(3-0-3) Wawrykow

Thomas Aquinas offered sustained reflections on Jesus Christ in a wide variety of his works and, throughout his career, Thomas's Christology played a central role in his entire theology, providing a distinctive cast to his understanding of God and the human person. This course examines the Thomistic accomplishment in Christology, paying particularly close attention to the different ways in which Thomas organized his various discussions of Christ and to the principal developments in his depiction of Christ.

*635. The Jewish-Christian Debate in the High Middle Ages*

(3-0-3) Signer

The growth of urban centers in Europe and Iberia during the Middle Ages rekindled the literary debates between Jews and Christians that began in the Early Church. Both Jews and Christians constructed images of the Other that were grounded in earlier arguments from Scripture and augmented them with the new tools of reason and linguistic knowledge. Our seminar will read both Jewish and Christian documents analyzing them in light of the work of modern historians such as Gilbert Dahan, Jeremy Cohen, David Berger, and Gavin Langmuir. In addition to reading disputation literature, we shall analyze papal policy, noble patronage, and canon law.

*647. Cultures in Contact*

(3-0-3) Constable

This colloquium will consider the cross-cultural history of the western Mediterranean, including North Africa, southern Italy, and France, Sicily, and the Iberian Peninsula from

the eighth to the 15th century. Special attention will be devoted to political, social, economic, and cultural contacts between Jews, Christians, and Muslims in this region. The course will focus primarily, but not exclusively, on secondary monographs and articles. Students may write either a research paper or a historiographical essay.

*661. Philosophical Theology: The Metaphysics of Creation*

(3-0-3) Burrell

The religious traditions which averred the free creation of the universe—Judaism, Christianity, and Islam—subjected Hellenic views on actuality and possibility to a radical challenge, yet it took time for thinkers in these traditions to work out the philosophic implications of that doctrine. We shall trace that growing debate, as it began with al-Farabi and Ibn Sina, and was filtered through Moses Maimonides to Aquinas. Attention will be paid to the ways in which these diverse religious faiths influenced philosophic reflection on these matters, and how the consequent views of actuality and possibility can affect current metaphysical discussion of issues like divine eternity and simpleness, as well as the relations between created and creating freedom.

*673. Medieval Liturgy*

(3-0-3) Driscoll

The purpose of this seminar is to examine the various sacramental rites in the Middle Ages, especially the Eucharistic liturgy, and to attempt to reconstruct them within the context of liturgical enactment, architectural space, artistic and musical decoration, etc. The seminar must necessarily deal with liturgical texts, but this is only a first step for understanding the broader dimensions of the liturgy. Architectural, artistic, and musical components will be taken into consideration. Numerous commentaries on the liturgy are also an important source for garnering the medieval understanding of the liturgy, especially in its allegorical interpretation. A tangential but key element for the understanding is the devotional and spiritual practices that grew up alongside the official liturgy. Therefore, some attention will be given to these dimensions, including liturgical drama.

*688. Medieval Legal History*

(3-0-3) Rodes

Studies the formative period of the Anglo-American legal system using 14th-century Year Books and other materials from the same period. Students are graded on individual presentations and papers. Topics are flexible,

as long as they involve the use of primary source material involving England from about 1250 to 1350.

696. *Field Examination Preparation*

(3-0-3) Director

Offers students a possibility, normally in their second or third year, to work closely with a professor in preparing for one of their field examinations.

696A. *Dissertation Proposal Preparation*

(V-V-V) Director

Offers students the opportunity to work with their adviser in preparing their dissertation proposal.

697. *Directed Readings*

(V-V-V) Director

Offers students a possibility, normally in their second or third year, to work closely with a professor in preparing a topic mutually agreed upon. Student and professor must sign a form that records the readings.

699. *Research and Dissertation*

(V-V-V) Staff

Independent research and writing on an approved subject under the direction of a faculty member.

700. *Nonresident Dissertation Research*

(0-0-1) Staff

Required of nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.

*Faculty*

Abbot Astrik L. Gabriel, *Director of the Frank M. Folsom Ambrosiana Microfilm and Photographic Collection and Professor Emeritus*.

Ph.D., Univ. of Budapest, 1936; Privatdozent, *ibid.*, 1941; Ecole des Chartes; Hautes Etudes, Paris, 1932–36; Corresponding Fellow, Inst. de France, 1962; Corresponding Fellow, Bavarian Academy of Sciences, 1971; Honorary Member, Hungarian Academy of Sciences, 1983. (1948)

Stephen Ellis Gersh, *Professor*. B.A., Cambridge Univ., 1969; M.A., *ibid.*, 1973. (1977)

Louis E. Jordan, *Librarian*. B.A., Univ. of Massachusetts, 1973; M.A., Univ. of Chicago, 1974; Ph.D., Univ. of Notre Dame, 1980; M.L.S., Indiana Univ., 1981. (1981)

Ralph M. McInerny, *the Michael P. Grace Professor of Medieval Studies*. B.A., St. Paul Seminary, 1951; M.A., Univ. of Minnesota, 1952; Ph.L., Univ. Laval, 1953; Ph.D., *ibid.*, 1954. (1955)

Thomas F. X. Noble, *the Robert M. Conway Director of the Medieval Institute and Professor of History*. B.A., Ohio Univ., 1969; M.A., Michigan State Univ., 1971; Ph.D., *ibid.*, 1974. (2001)

Marina B. Smyth, *Librarian*. B.S., National Univ. of Ireland, 1963; M.M.S., Univ. of Notre Dame, 1977; Ph.D., *ibid.* and Univ. College Dublin, 1984; M.L.S., Indiana Univ., 1992. (1990, 1993)

*Associated Faculty*

Asma Afsaruddin, *Associate Professor of Classics and Fellow in the Joan B. Kroc Institute for International Peace Studies*. A.B., Oberlin College, 1982; M.A., Johns Hopkins Univ. 1985; Ph.D., *ibid.*, 1993. (1996)

Joseph P. Amar, *Associate Professor of Classics and Concurrent Associate Professor of Theology*. B.A., Catholic Univ. of America, 1970; S.T.B., *ibid.*, 1973; S.T.L., *ibid.*, 1974; M.A., *ibid.*, 1983; Ph.D. *ibid.*, 1988. (1988)

Charles E. Barber, *the Michael P. Grace Professor of Arts and Letters and Associate Professor of Art, Art History, and Design*. B.A., Courtauld Inst. of Art, 1986; Ph.D., *ibid.*, 1989. (1996)

Kathleen A. Biddick, *Professor of History and Fellow in the Nanovic Institute for European Studies*. A.B., Barnard College, 1971; M.A., Univ. of Toronto, 1973; Ph.D., *ibid.*, 1982. (1983)

Alexander Blachly, *Professor of Music*. B.A., Haverford College, 1967; M.A., Columbia Univ., 1972; Ph.D., *ibid.*, 1995. (1993)

W. Martin Bloomer, *Associate Professor of Classics*. B.A., Yale Univ., 1982; M.A. *ibid.*, 1983; M.Phil., *ibid.*, 1984; Ph.D., *ibid.*, 1987 (1998)

D'arcy Jonathan Dacre Boulton, *Professional Specialist in the Medieval Institute and Concurrent Associate Professor of History*. B.A., Univ. of Toronto, 1969; M.A., Univ. of Pennsylvania, 1970; Ph.D., *ibid.*, 1978; D.Phil., Oxford Univ., 1976. (1990)

Maureen B. McCann Boulton, *Professor of French Language and Literature*. B.A., College of New Rochelle, 1970; M.A., Univ. of Pennsylvania, 1972; Ph.D., *ibid.*, 1976; M.Litt., Oxford Univ., 1980. (1985)

Calvin M. Bower, *Professor of Music*. B.Mus., Univ. of Southwestern Louisiana, 1960; M.M., George Peabody College, Vanderbilt Univ., 1963; Ph.D., *ibid.*, 1967. (1981)

Keith R. Bradley, *Chair and the Eli J. Shaheen Professor of Classics and Concurrent Professor of History*. B.A., Sheffield Univ., 1967; M.A., *ibid.*, 1968; B.Litt., Oxford Univ., 1970; Litt.D., Sheffield Univ., 1997. (2001)

Rev. David B. Burrell, C.S.C., *the Rev. Theodore M. Hesburgh, C.S.C., Professor of Arts and Letters, Professor of Theology and Philosophy, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. A.B., Univ. of Notre Dame, 1954; S.T.L., Gregorian Univ., 1960; Ph.D., Yale Univ., 1965. (1964)

Theodore J. Cacey Jr., *Director of Graduate Studies in Romance Languages and Literatures, Professor of Italian Language and Literature, and the Albert J. Ravarino Director of the Devers Program in Dante Studies*. B.A., Northwestern Univ., 1974; M.A., Univ. of California, Los Angeles, 1982; Ph.D., *ibid.*, 1986. (1990)

John C. Cavadini, *Chair and Associate Professor of Theology, and Executive Director of the Institute for Church Life*. B.A., Wesleyan Univ., 1975; M.A., Marquette Univ., 1979; M.A., Yale Univ., 1980; M.Phil., *ibid.*, 1983; Ph.D., *ibid.*, 1988. (1990)

Kirsten M. Christensen, *Assistant Professor of German Language and Literature*. B.A., Arizona State Univ., 1984; M.A., Brigham Young Univ., 1991; Ph.D., Univ of Texas, Austin, 1998. (1999)

Paul M. Cobb, *Assistant Professor of History*. B.A., Univ. of Massachusetts, 1989; M.A., Univ. of Chicago, 1991; Ph.D., *ibid.*, 1997. (1999)

Robert R. Coleman, *Associate Professor of Art, Art History, and Design, and Research Specialist in the Medieval Institute*. B.A., State Univ. College of New York, New Paltz, 1970; M.A., Univ. of Chicago, 1973; Ph.D., *ibid.*, 1988. (1982, 1990)

Olivia R. Constable, *Director of Graduate Studies and Associate Professor of History*. B.A., Yale Univ., 1983; Ph.D., Princeton Univ., 1989. (1995)

Rev. Brian Daley, S.J., *Director of Graduate Studies in Early Christian Studies and the Catherine F. Huisking Professor of Theology*. B.A., Fordham Univ., 1961; B.A., Oxford Univ., 1964; M.A., *ibid.*, 1967; Ph.D., Loyola Seminary, 1966; Lic. Theo., Hochschule Sankt Georgen, 1972; D. Phil., Oxford Univ., 1979. (1996)

- JoAnn DellaNeve, *Associate Professor of French and Comparative Literature*. A.B., Bryn Mawr College, 1976; M.A., Univ. of Pennsylvania, 1978; M.A., Princeton Univ., 1980; Ph.D., *ibid.*, 1982. (1982)
- Rev. Michael S. Driscoll, *Associate Professor of Theology*. B.A., Carroll College, 1969; S.T.B., Gregorian Univ., 1977; S.T.L., San Anselmo, 1980; S.T.D., Inst. Catholique de Paris, 1986; Ph.D., Sorbonne, Paris, 1986. (1994)
- Stephen D. Dumont, *Associate Professor of Philosophy*. B.A., Wabash College, 1969; M.A., Univ. of Toronto, 1976; M.S.L., Pontifical Inst. of Medieval Studies, 1979; Ph.D., Univ. of Toronto, 1982. (2001)
- Kent Emery Jr., *Professor in the Program of Liberal Studies and Fellow in the Medieval Institute*. B.A., Univ. of Virginia, 1966; M.A., Univ. of Toronto, 1968; Ph.D., *ibid.*, 1976. (1985)
- Alfred J. Freddoso, *Professor of Philosophy*. B.A., St. John Vianney Seminary, 1968; Ph.D., Univ. of Notre Dame, 1976. (1976, 1979)
- Dolores Warwick Frese, *Professor of English*. B.A., College of Notre Dame of Maryland, 1958; M.A., Univ. of Iowa, 1961; Ph.D., *ibid.*, 1972. (1973)
- Meredith J. Gill, *Assistant Professor of Art, Art History, and Design*. B.A., Univ. of Melbourne, 1981; M.A., Princeton Univ., 1986; Ph.D., *ibid.*, 1992. (1998)
- Li Guo, *Assistant Professor of Classics*. B.A., Shanghai International Studies Univ., 1979; M.A., Alexandria Univ., 1984; Ph.D., Yale Univ., 1994 (1999)
- Paula M. Higgins, *Professor of Music*. B.A., Mt. Holyoke College, 1976; M.F.A., Princeton, 1978; Ph.D., *ibid.*, 1987. (1990)
- Rev. John I. Jenkins, C.S.C., *Vice President and Associate Provost of the University and Associate Professor of Philosophy*. B.A., Univ. of Notre Dame, 1976; M.A., *ibid.*, 1978; M.Div., Jesuit School of Theology at Berkeley, 1988; S.T.L., *ibid.*, 1988; D.Phil., Oxford Univ., 1989. (1988)
- Encarnación Juárez, *Assistant Professor of Spanish Language and Literature*. Lic., Univ. of Barcelona, 1977; M.A., Univ. of California, Berkeley, 1981; Ph.D., *ibid.*, 1987. (1995)
- Mary M. Keys, *Assistant Professor of Political Science*. B.A., Boston College, 1988; M.A., Univ. of Toronto, 1989; Ph.D., *ibid.*, 1998. (1994; 1996)
- Michael Lapidge, *the Notre Dame Professor of English*. B.A., Univ. of Calgary, 1962; M.A., Univ. of Alberta, 1965; Ph.D., Univ. of Toronto, 1971. (1999)
- Blake Leyerle, *Associate Professor of Theology and Concurrent Associate Professor of Classics*. B.A., Yale Univ., 1982; M.A., Duke Univ., 1988; Ph.D., *ibid.*, 1991. (1990)
- Jill Mann, *the Notre Dame Professor of English*. B.A., Oxford Univ., 1964; Ph.D., Cambridge Univ., 1971. (1999)
- Julia Marvin, *Assistant Professor in the Program of Liberal Studies*. B.A., Princeton Univ., 1988; M.A., *ibid.*, 1992; Ph.D., *ibid.*, 1997. (1997)
- Christian R. Moevs, *Associate Professor of Italian Language and Literature*. B.A., Harvard Univ., 1980; M.A., Columbia Univ., 1989; Ph.D., *ibid.*, 1994. (1994)
- Maura Bridget Nolan, *Assistant Professor of English*. A.B., Dartmouth College, 1988; A.M., Duke Univ., 1992; Ph.D., *ibid.*, 1998. (1996)
- Katherine O'Brien O'Keeffe, *the Notre Dame Professor of English*. A.B., Fordham College, 1970; Ph.D., Univ. of Pennsylvania, 1975. (1992)
- Aideen O'Leary, *Assistant Professor of History*. B.A., Trinity College, Dublin, 1989; M.Litt., *ibid.*, 1992; Ph.D., Cambridge Univ., 1997. (2000)
- Mark C. Pilkinton, *Professor of Film, Television, and Theatre*. B.S., Memphis State Univ., 1969; M.A., Univ. of Virginia, 1971; Ph.D., Univ. of Bristol, England, 1975. (1984)
- Thomas Prügl, *Assistant Professor of Theology*. B.A., Univ. of Munich, 1984; Lic. Theo., *ibid.*, 1988; Th.D., *ibid.*, 1994. (2001)
- Gretchen J. Reydams-Schils, *Associate Professor in the Program of Liberal Studies and Fellow in the Nanovic Institute for European Studies*. B.A., Catholic Univ. of Leuven, 1987; M.A., Univ. of Cincinnati, 1989; Ph.D., Univ. of California, Berkeley, 1994. (1994)
- Robert E. Rodes, *the Paul J. Schierl/Fort Howard Corporation Professor of Legal Ethics and Professor of Law*. A.B., Brown Univ. 1947; LL.B., Harvard Univ., 1952 (1956)
- Charles M. Rosenberg, *Professor of Art, Art History, and Design*. B.A., Swarthmore College, 1967; M.A., Univ. of Michigan, 1969; Ph.D., *ibid.*, 1974. (1980)
- Dayle Seidenspinner-Núñez, *Chair of Romance Languages and Literatures and Professor of Spanish Language and Literature*. B.A., Univ. of California, Berkeley, 1968; M.A., *ibid.*, 1971; Ph.D., Stanford Univ., 1977. (1977)
- Daniel J. Sheerin, *Professor of Classics and Concurrent Professor of Theology*. B.A., St. Louis Univ., 1965; Ph.D., Univ. of North Carolina at Chapel Hill, 1969. (1985)
- Susan Guise Sheridan, *the F. J. and H. M. O'Neill II Associate Professor of Anthropology*. B.A., Univ. of Maryland, 1984; M.A., *ibid.*, 1986; Ph.D., Univ. of Colorado, 1992. (1992)
- Rabbi Michael A. Signer, *the Abrams Professor of Jewish Thought and Culture (Theology) and Fellow in the Nanovic Institute for European Studies*. B.A., Univ. of California, Los Angeles, 1966; M.A., Hebrew Union College-JIR, 1970; Ph.D., Univ. of Toronto, 1978. (1992)
- John Van Engen, *the Andrew V. Tackes Professor of History*. A.B., Calvin College, 1969; Ph.D., Univ. of California, Los Angeles, 1976. (1977)
- Joseph Wawrykow, *Director of Graduate Studies and Associate Professor of Theology*. B.A., Univ. of Manitoba, 1978; M.A., *ibid.*, 1980; M.A., Yale Univ., 1981; M.Phil., *ibid.*, 1984; Ph.D., *ibid.*, 1987. (1986)
- Albert K. Wimmer, *Director of Graduate Studies and Associate Professor of German Language and Literature, Fellow in the Medieval Institute, and Fellow in the Nanovic Institute for European Studies*. M.A., Univ. of Notre Dame, 1964; M.A., *ibid.*, 1967; Ph.D., Indiana Univ., 1975. (1964)

## Music

### Chair:

Paul Johnson

### Director of Graduate Studies:

Ethan Haimo

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### The Program of Studies

The Department of Music offers programs leading to two degrees: master of music (in performance and literature or performance) and master of arts (in musicology or theory).

All applicants must fulfill the general requirements for admission into the Graduate School. Applicants for the performance degree programs should come to campus for an audition if possible. If a personal audition is not possible, applicants may submit a video or cassette tape recording with their application. Applicants for the M.A. programs must submit an undergraduate paper or other example of their writing.

All master's degree programs require 36 credit hours and normally require two years for completion. Details of each degree program vary substantially, depending on the student's specialty or instrument; therefore, students should obtain a copy of the department's official *Bulletin of Information*, which contains specific information on each of the programs. A sketch of each program follows:

The master of music degree in performance and literature provides an intensive program of graduate studies for the student with a proven ability in performance and an interest in the literature of his or her instrument. All students in this degree program must present two full recitals: a qualifying recital during the first year of study and a degree recital in the second year. (Students in the piano-accompanying concentration perform in two chamber music recitals and serve as accompanists for six recitals.)

The courses of study vary from instrument to instrument, given their different needs and possibilities. In general, all students in the M.M. in performance and literature take 12 credit hours in a principal instrument and an additional nine credit hours in a core of courses in music history and theory (three credit hours in each). The remaining 15 credit

hours are taken in literature, chamber music, opera workshop, and orchestral excerpts, as appropriate. All students in this degree program must pass a competency examination in basic music theory and history before they graduate. This examination covers the standard theoretical and historical issues included in a typical undergraduate music program.

The master of music in performance is a degree designed to give intensive training to a student who has finished a master's degree elsewhere and who wants further training in his or her instrument (but does not wish to pursue a doctorate). This program is designed for highly advanced students who are preparing to enter the professional ranks of performing musicians and is designed to place maximum emphasis on the study of the student's principal instrument. Two full-length recitals are required (eight recitals as accompanists for pianists wishing to specialize in accompanying). Extensive repertoire will be covered during this two-year program, giving the students direct practical experience with a wide range of the most challenging works written for the instrument: solo, orchestral, and chamber.

The master of arts degrees in musicology and theory provide the student with intensive professional training in the scholarship of music. These programs are designed to enable the students, upon graduation, to enter a top-level doctoral program at another university. Students in the M.A. programs must pass a reading examination in French, Latin, or German, must submit a master's thesis to the graduate committee, and must pass a final written comprehensive examination. Students whose interests are in medieval music will benefit from the exceptional resources of the Medieval Institute.

### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

Course numbering does not indicate level of student achievement. Repetition of the course numbering on a transcript indicates further studies.

### Applied Music

All courses are usually offered each semester.

#### 501. String Performance Techniques

(1-0-1) Buranskas, Plummer  
Performance class/master class format designed to give string students opportunities in which to perform.

#### 152A Orchestra

(V-0-1) Stowe  
An ensemble devoted to preparation and performance of orchestral music of the 18th to 20th centuries.

#### 502. Vocal Performance Techniques

(1-0-1) Resick  
Development of interpretation skills pertaining to songs and operatic literature.

#### 503. Diction I—German

(1-0-1) Resick  
Elements and expressive techniques of German diction, utilizing the International Phonetic Alphabet.

#### 504. Diction II—English, Italian

(1-0-1) Resick  
Elements and expressive techniques of English and Italian diction, utilizing the International Phonetic Alphabet.

#### 505. Diction III—French

(1-0-1) Resick  
Elements and expressive techniques of French diction, utilizing the International Phonetic Alphabet.

#### 506. Piano Performance Class

(1-0-1) Blacklow  
Master class format designed to give piano students opportunities in which to perform.

#### 508. Orchestral Excerpts

(1-0-1) Buranskas, Plummer  
Excerpts from the standard orchestral literature encompassing styles from the 18th century through the 20th century. Instructed by individual members of the faculty.

#### 509. Chamber Music

(V-0-V) Buranskas, Plummer, Resick, Blacklow  
Intensive study and performance of chamber music for advanced performers.

#### 510. Piano

(V-0-V) Blacklow  
Individual instruction.

**511. Organ**

(V-0-V) Cramer  
Individual instruction.

**512. Harpsichord**

(V-0-V) Catello  
Individual instruction.

**514. Voice**

(V-0-V) Resick, Riley-Schofield  
Individual instruction.

**515A. Violin**

(V-0-V) Plummer  
Individual instruction.

**515B. Viola**

(V-0-V) Staff  
Individual instruction.

**516. Cello**

(V-0-V) Buranskas  
Individual instruction.

**517. Brass**

(V-0-V) Dye  
Individual instruction. Arrangements possible with members of Chicago Symphony with chair's permission.

**518. Woodwinds**

(V-0-V) Dye  
Individual instruction. Arrangements possible with members of Chicago Symphony with chair's permission.

**519. Percussion**

(V-0-V) Staff  
Individual instruction.

**525, 526. Advanced Conducting I and II**

(2-0-2) Staff  
Study and practice of advanced skills in conducting. Score analysis for conductors; rehearsal techniques; principles of stylistic integrity in performance.

**528. Opera Workshop**

(V-0-V) Resick  
*Prerequisite:* vocal training.  
Musical and stage preparation of an opera production culminating in public performance. Admission by audition only.

**529. Vocal Coaching**

(1-0-1) Resick  
Development of interpretation skills pertaining to songs and operatic literature.

**Core of Courses in Music History and Theory**

This core of courses provides a basic curriculum required of all students in the performance and literature and musicology/theory programs. Each student must take 12 credit hours from the core, six in theory and six in history.

**531. Analytic Topics**

(3-0-3) Johnson, Smith  
Detailed analysis of selected works.

**532. Twentieth-Century Analysis**

(3-0-3) Haimo, Johnson  
Techniques of composition employed by composers of the 20th century.

**533. Schenkerian Analysis**

(3-0-3) Smith  
Intensive analysis of musical composition utilizing the Schenkerian method.

**534. Tonal Forms**

(3-0-3) Haimo  
Topics relating to the problems of form in tonal music.

**535. Opera**

(3-0-3) Youens  
Topics relating to the history of opera.

**536. Chamber Music Genre**

(3-0-3) Youens  
Topics relating to the history of chamber music.

**537. Church Music**

(3-0-3) Blachly, Bower, Frandsen, Higgins  
Topics relating to the history of church music.

**538. Symphonic Music**

(3-0-3) Bower  
Topics relating to the history of symphonic music.

**539. Theory Review for Performers**

(2-0-2) (2-0-2) Dwyer  
For M.M. students who need theory review.

**The Studies Series**

The following series of courses treats problems in historical periods and general areas of musical research. They will be listed in schedules for each semester with further descriptions indicating the focus for that semester. The range of approach to these courses is broad; they may be general surveys of a period or an area or they may center around a specific topic within a period or area or even a specific composer. Recent offerings have

included courses on Handel and the German *Lied*. Also satisfies Core History requirements.

**542, 543. Studies in Medieval Music**

(3-0-3) (3-0-3) Bower, Higgins  
An examination of the music from the fifth through 15th centuries.

**544, 545. Studies in Renaissance Music**

(3-0-3) (3-0-3) Blachly, Higgins  
An examination of the music from 1430 to 1600.

**546. Handel's Operas and Oratorios**

(3-0-3) Frandsen  
An examination of Handel's operas (including *Rinaldo*, *Julius Caesar*, and *Xerxes*) and oratorios (including *Esther*, *Israel in Egypt*, and *Jephtha*), with a particular focus on Handel's approach to drama and musical characterization in each genre, and his appropriation and redefinition of operatic conventions in the context of the English theatrical oratorio.

**548, 549. Studies in Classical Music**

(3-0-3) (3-0-3) Higgins, Youens  
An examination of the music from 1750 to 1820.

**550. Studies in Lied**

(3-0-3) Youens  
The study of selected German art-songs for solo voice and piano by the masters of the genre.

**Other Courses in Music****540. Bibliography of Music**

(3-0-3) Jones  
This course has five main objectives:

1. To learn about music in libraries, its control and organization, and to develop a sense of comfort with library collections of music.
2. To study standard reference works in music—both print and electronic sources—and understand their value, deficiencies, and potential uses.
3. To develop an ability to evaluate new reference sources and to choose works that will be of the greatest value to any particular project.
4. To develop a sense of the state of musical documentation in general.
5. To demonstrate this knowledge and these abilities by performing the preliminary work for a major research project.

563, 564. *Composition*  
(V-0-V) (V-0-V) Haimo, Johnson  
Private instruction in composition.

565. *Band Arranging*  
(3-0-3) Dye  
Covers the basic orchestrational, technical, and formal problems associated with arranging pre-existing material for band. This course will be project-oriented, and instruction will focus on the student's own arrangements.

575. *String Literature*  
(3-0-3) Buranskas, Plummer  
Concentrated study of the principal literature written for the string instruments.

579. *Wind Literature*  
(3-0-3) Staff  
An exploration of the history of the literature for winds from the works of Giovanni and Andrea Gabrieli to the present century.

581, 582. *Piano Literature*  
(2-0-2) (2-0-2) Blacklow  
Concentrated study of the principal literature written for the keyboard.

583, 584. *Organ Literature*  
(3-0-3) (3-0-3) Cramer  
Concentrated study of the principal literature written for the organ.

587. *Advanced Violin Literature*  
(3-0-3) Plummer  
Extensive study of violin repertoire with an emphasis on sonatas, concertos, and solo works from the Baroque period to the 20th century.

588. *Advanced Cello Literature*  
(3-0-3) Buranskas  
Extensive study of cello repertoire with an emphasis on sonatas, concertos, and solo works from the Baroque period to the 20th century.

590. *Qualifying Recital*  
(0-0-0) Staff  
For first-year students.

#### Other Graduate Courses

591. *Graduate Recital*  
(0-0-0) Staff  
Formal registration for final project in performance.

596. *Qualifying Recital*  
(0-0-0) Staff  
Formal registration for qualifying recital for students in performance and literature.

598. *Special Studies*  
(V-V-V) Staff  
Individual study under personal direction of a faculty member.

599. *Thesis Direction*  
(V-V-V) Staff  
Planning and developing the master's thesis for M.A. students.

600. *Nonresident Thesis Research*  
(0-0-1) Staff  
Required of nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.

#### Faculty

Alexander Blachly, *Professor*. B.A., Haverford College, 1967; M.A., Columbia Univ., 1972; Ph.D., *ibid.*, 1995. (1993)

John Blacklow, *Assistant Professor*. B.A., Harvard Univ., 1987; M.M., Juilliard School, 1989; D.M.A., Univ. Southern California, 1996.

Calvin M. Bower, *Professor*. B.Mus., Univ. of Southwestern Louisiana, 1960; M.M., George Peabody College, Vanderbilt Univ., 1963; Ph.D., *ibid.*, 1967. (1981)

Karen L. Buranskas, *Associate Professor*. B.Mus., Indiana Univ., 1973; M.M., Yale Univ., 1977. (1979)

Darlene Catello, *Adjunct Instructor*. B.A., Denison Univ., 1959; M.Mus., Univ. of Notre Dame, 1976; M.Mus., Univ. of Michigan, 1987. (1988)

William Cerny, *Professor Emeritus*. B.A., Yale Univ., 1951; B.Mus., *ibid.*, 1952; M.Mus., *ibid.*, 1954. (1972)

Craig J. Cramer, *Professor*. B.Mus., Westminster Choir College, 1976; M.Mus., Eastman School of Music, 1977; Performer's Certificate, *ibid.*, 1978; D.M.A., *ibid.*, 1983. (1981)

Lawrence Dwyer, *Associate Professional Specialist*. B.A., Univ. of Notre Dame; M.S., Univ. of Illinois (Urbana), 1967. (2002)

Ken Dye, *Director of Bands and Professor*. B.M., Univ. of Southern California, 1974; M.A., California State Univ., Long Beach, 1980; M.B.A., Univ. of Houston, 1985; Ed.D., *ibid.*, 1983. (1998)

Mary E. Frandsen, *Assistant Professor*. B.M., State Univ. of New York at Potsdam, 1980; M.A., Eastman School of Music, 1985; Ph.D., *ibid.*, 1997. (1997)

Walter R. Ginter, *Adjunct Associate Professor*. B.Mus., Westminster Choir College, 1956; M.Mus., *ibid.*, 1957. (1975)

Ethan T. Haimo, *Director of Graduate Studies and Professor*. B.A., Univ. of Chicago, 1972; M.F.A., Princeton Univ., 1974; Ph.D., *ibid.*, 1978. (1976)

Paula M. Higgins, *Professor*. B.A., Mount Holyoke College, 1976; M.F.A., Princeton Univ., 1978; Ph.D., *ibid.*, 1987. (1990)

Paul G. Johnson, *Chair and Associate Professor*. B.Mus., Northwestern Univ., 1976; M.F.A., Princeton Univ., 1980; Ph.D., *ibid.*, 1981. (1981)

Eugene J. Leahy, *Professor Emeritus*. B.Mus., Univ. of Notre Dame, 1947; A.B., *ibid.*, 1951; M.Mus., De Paul Univ., 1949; M.A., *ibid.*, 1952; D.F.A., Chicago Musical College, 1952. (1952)

Rev. Patrick H. Maloney, C.S.C., *Associate Professor Emeritus*. A.B., Univ. of Notre Dame, 1950; M.Mus., Catholic Univ. of America, 1956. (1956)

James S. Phillips, *Assistant Professor Emeritus*. B.A., Univ. of Notre Dame, 1956; M.A., *ibid.*, 1961. (1965)

Carolyn R. Plummer, *Associate Professor*. B.Mus., Indiana Univ., 1970; M.Mus., New England Conservatory, 1973. (1989)

Georgine Resick, *Associate Professor*. B.M., American Univ., 1973; Artist Diploma, Peabody Conservatory, 1975. (1990)

Peter H. Smith, *Associate Professor*. B.M., Juilliard School, 1986; M.M., *ibid.*, 1986; M.A., Yale Univ., 1987; M.Phil., *ibid.*, 1989; Ph.D., *ibid.*, 1992. (1991)

Daniel C. Stowe, *Associate Professional Specialist*. A.B., Univ. of California, Davis, 1984; M.M., Univ. of Southern California, 1986; M.A., Cornell Univ., 1989. (1993)

Susan L. Youens, *Professor*. B.Mus., Southwestern Univ., 1969; M.A., Harvard Univ., 1971; Ph.D., *ibid.*, 1975. (1984)



## Philosophy

### Chair:

Paul Weithman

### Director of Graduate Studies:

Leopold Stubenberg

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### The Program of Studies

The graduate program in philosophy at Notre Dame provides intensive professional training in philosophy. It is a doctoral program, although students may choose to terminate at the master's level. In recent years, an average of six Ph.D.s in philosophy has been awarded each year and fellowship aid has been forthcoming from a variety of sources. At present there are 65 doctoral students in residence and 42 graduate faculty.

The department is one in which all major philosophical viewpoints and approaches are respected and given serious attention. The typical Notre Dame philosopher (whether student or faculty) is someone who combines a particular specialized competence with a willingness and ability to interact with and learn from other approaches to philosophy. The department is one in which the interaction of diverse areas and styles of philosophy is an important influence on each member's work. This model of interactive pluralism has enabled the department to become a major presence in the mainstream of the American philosophical profession while preserving and enhancing its distinctive character as part of a Catholic university. Faculty and students with interests in almost any major area of philosophy find the resources for serious and thorough exploration of their interests and for profitable encounters with alternative approaches. Those concerned with issues and projects arising from their interest in or commitment to Christian (and especially Catholic) traditions have an unequalled opportunity to pursue these concerns while maintaining fruitful connections with the entire range of contemporary philosophical activity.

In the structure of the program there is a strong emphasis on the history of philosophy. The major historical periods (ancient, medieval, and modern) are treated in depth both with regard to the general contours of these historical periods and in terms of the particular themes and tenets of the major

philosophers within each. In practice, the former is handled as a function of the latter: inasmuch as our students are expected to have had surveys of these periods as undergraduates, the graduate seminars on specific figures or themes are designed to develop and deepen an appreciation for historical context and for the philosophical issues that emerge. The role of the history courses is twofold. One aim of the courses offered in the history of philosophy is to enhance the students' knowledge and appreciation of the basic works that have shaped our philosophical traditions so that their subsequent research and teaching will have a historical foundation as rich as possible. Of equal importance, however, is the development of these classical historical areas as foci of genuine research fields in their own right. Given its tradition and scope, the department is able to have a considerable number of people doing serious scholarly work in each of these historical periods. In addition, it can draw on the resources of the Medieval Institute, the classics department, and the history department to supplement its efforts.

Though the primary goal of the graduate program has always been to produce broadly educated philosophers, the size of the department has also facilitated the development of a number of areas of special strength in research and teaching. At the present time, the department offers students with particular interests in any of the following fields unusual opportunities to work with a strong group of scholars in their area of specialization: philosophy of religion, medieval philosophy, philosophy of science, ethics, continental philosophy, metaphysics, and philosophy of math and logic. The fields of philosophy of mind, epistemology, and contemporary analytic philosophy are also strongly represented. Special concentrations in medieval philosophy and in continental philosophy are available through the department. A joint Ph.D. in logic between the mathematics and philosophy departments is also possible. Graduate-level work in the history of science is available through the University's graduate program in the history and philosophy of science. Students specializing in philosophy of science have the opportunity to incorporate a master's degree from this program into their program of doctoral studies in philosophy. Students may also apply for admission to the special HPS philosophy track Ph.D.

In addition to a wide range of graduate courses (about 30 are offered each year), the department provides many other aids to the students' philosophical development. The

annual Ernan McMullin Perspectives in Philosophy series brings three or four prominent philosophers to campus. Each gives a public lecture and a conference is held on his or her work. In addition, there are many visiting lecturers in philosophy from other universities. Within the department, there is also a continuing series of weekly colloquia, where each Friday afternoon a faculty member or graduate student presents a paper in an informal setting with discussion following.

Finally, our students, with departmental support and outside funding, regularly visit distinguished philosophy departments both in the United States and abroad to undertake further study. Notre Dame graduate students have recently visited at Arizona, Brown, Michigan, North Carolina, Ohio State, Cambridge, Oxford, Louvain, Göttingen, Tübingen, Münster, and Halle.

There are six specialized institutes, the work of which is associated with that of the department. Kenneth M. Sayre directs the interdisciplinary Philosophic Institute, which has been supported by the National Science Foundation. The Medieval Institute has rich resources of medieval manuscripts, including a microfilm collection of the holdings of the famous Ambrosiana Library in Milan. Students may take specialized courses in paleography and medieval history offered by the institute. Ralph McNerny directs the Jacques Maritain Center, from which comes much of the work in English on Maritain. The Center for Philosophy of Religion, under the direction of Thomas Flint, hosts visiting fellows, sponsors conferences and symposia, and publishes a monograph series. The Reilly Center for Science, Technology, and Values, under the direction of Gerald McKenny, sponsors research, visiting lectures, and periodic conferences on value-related issues in science and technology. Finally, the Notre Dame Center for Ethics and Culture, headed by David Solomon, fosters research and teaching inspired by the ethical and political ideals embodied in Catholic social teaching.

A number of journals of international reputation are associated with the department: *The Notre Dame Journal of Formal Logic* (edited by Michael Detlefsen); *Deutscher Idealismus—Ein Internationales Jahrbuch/German Idealism—An International Yearbook* (edited by Karl Ameriks); *Grazer Philosophische Studien* (edited by Leopold Stubenberg and Marian David of Notre Dame, and Johannes Brandl of Paris-London-Universität Salzburg); and *Notre Dame Philosophical Reviews* (edited by Gary Gutting).

### *Requirements for the Ph.D. in Philosophy*

Entering students are expected to have the equivalent of an undergraduate major in philosophy. If their major has been in another field they may still be admitted, but in such cases deficiencies may have to be made up on a noncredit basis at Notre Dame. Each applicant for graduate admission to the department is required to furnish, in addition to the materials requested by the Graduate School, a sample of the applicant's written work in philosophy (approximately 10 to 15 pages in length).

For the doctorate a student must complete a 47 semester-credit-hour residency requirement. Students who enter the doctoral program with an M.A. are normally excused from six to 12 credit hours of graduate course work. Any philosophy graduate student is permitted to take up to six credit hours of approved undergraduate course work in philosophy and up to six credit hours of course work in related fields to satisfy the 47 credit hours. Those who choose to concentrate in such specialized fields as logic and philosophy of science may be required to take courses in other departments in support of their specialization. Students are expected to maintain a minimum B average in all of their course work.

The faculty as a whole formally evaluates the progress of first- and second-year graduate students at the end of their first and second summers in the program. The first-year evaluation focuses on the students' performance in courses and on the comprehensive exam in the history of philosophy, which is taken at the end of the first summer. The second-year evaluation focuses on the students' performance in courses, as teaching assistants, and on the second-year research paper, which is completed by the end of the second summer. Students in the third year and beyond are evaluated at the beginning of each spring term.

Students who have successfully completed the research paper then begin to prepare for an oral candidacy exam in an advanced field of philosophy. After passing the oral exam, students submit a dissertation proposal. Both the oral exam and the dissertation proposal must be completed by the end of the fourth year. If the faculty judge at any stage that a student's progress is unsatisfactory, the student may be required to terminate his or her graduate studies with an M.A. A student may receive a nonresearch M.A. degree in philosophy after finishing 30 credit hours of graduate

course work and passing a special M.A. oral candidacy examination. The research M.A. is a 30-hour degree program requiring the preparation of a master's thesis. A student may complete six of the 30 credit hours in research courses. (Continuing students may receive a nonresearch M.A. upon successful completion of the written Ph.D. candidacy examinations and 30 credit hours of graduate course work.)

### *Course Requirements*

All doctoral students are expected to meet the following general course distribution requirements during their first two years of course work. (Each semester course is worth three credit hours.)

1. History of Philosophy
  - (a) Ancient Philosophy
  - (b) Medieval Philosophy
  - (c) Modern Philosophy
2. Metaphysics
3. Epistemology
4. Ethics
5. Philosophy of Science
6. Symbolic Logic

Course requirements in history of philosophy may be satisfied by taking any of a number of graduate courses offered in a historical area, though no course may be used to satisfy more than one general area requirement. Passing the Intermediate Symbolic Logic course (PHIL 513) satisfies the department's graduate requirement in formal logic. Taking the core course in metaphysics, epistemology, ethics, and philosophy of science fulfills the requirements in those areas. Beginning students are encouraged to complete the requirements as early as feasible, consistent with their academic backgrounds and in consultation with the director of graduate studies. In addition to the courses listed above, graduate students are required to take a proseminar in philosophy (PHIL 501) during their first semester, the colloquium seminar (PHIL 601 and 602) during their first year, a practicum for teaching assistants (PHIL 595) before TA-ing for the first time, and a practical seminar on teaching (PHIL 701) during their fourth year.

### *Candidacy Examination*

The candidacy examination for the Ph.D. consists of two parts: (1) a written examination in the history of philosophy, and (2) an oral examination in the student's chosen area of concentration.

The written examination is taken near the end of the summer following the first year of course work. Each student takes a six-hour examination in the history of philosophy (three hours covering ancient and medieval and three hours covering modern).

The second part of the candidacy examination consists of a one-and-one-half-hour oral examination by a board of five faculty examiners taken during a student's third year of residence. This examination must be taken no later than one year following the completion of the research paper requirement. The purpose of the oral examination is to confirm a candidate's readiness to begin significant research in his or her chosen area of concentration. Areas of concentration available in the department for the oral examination and for subsequent dissertation research include:

- ancient philosophy
- medieval philosophy
- modern philosophy
- ethics
- political philosophy
- philosophy of science
- philosophy of religion
- contemporary European philosophy
- metaphysics
- epistemology
- philosophy of mind
- philosophy of language
- formal logic
- philosophy of mathematics

### *Language Requirement*

Acquiring the doctoral degree involves passing GREs in two foreign languages. At least one of these examinations must be completed before the oral candidacy examination is taken. Though German, French, Greek, and Latin are the standard choices, with the concurrence of the director of graduate studies, some other language may be substituted where the candidate's dissertation is likely to require the use of the alternate language.

### *Dissertation*

After completing the candidacy requirements and under the guidance of their chosen faculty advisers, doctoral candidates begin preparation of a written thesis proposal and representative bibliography for presentation to the thesis evaluation committee. This committee is an ad hoc board of five graduate faculty members appointed by the director of graduate studies to review the candidate's proposal. A doctoral candidate is expected to incorporate into the proposal those committee members' recommendations that, in their view, render it a viable and acceptable thesis

project. This proposal is to be submitted and approved as soon as possible following completion of written and oral candidacy exams.

Having completed the doctoral candidacy requirements in the third year of residence and formulated an acceptable doctoral thesis proposal, the candidate is expected to complete and present a doctoral dissertation during the fourth or fifth year of residence.

Further information about financial aid opportunities, the department's many programs and activities and its faculty is contained in the brochure *Graduate Studies in Philosophy at Notre Dame*, available by writing directly to the department.

### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

These courses are representative of offerings in the program over a two-year period.

### Area One: Ancient Philosophy

505. *Debate Between Plato and Aristotle*  
(3-0-3) Gersh

A study of the history of the debate between the two main ancient traditions of philosophy with special reference to the theory that Platonism and Aristotelianism can, in some profound manner, be reconciled.

507. *Moral Perfection and the Exemplary Sage*  
(3-0-3) O'Connor

A consideration of themes from ancient pagan, Christian, and Jewish reflection on virtue and the sage. In addition to the ancient texts themselves, we will be considering contemporary work by philosophers such as Annas, Cavell, Foucault and Hedot.

508. *Socrates and Athens*

(3-0-3) O'Connor, Vacca

A study of the moral upheaval in Athens during the Peloponnesian War, using Thucydides, Aristophanes, Euripides, and Sophocles as primary sources. Then an examination of Socrates as responding to that crisis, using *Alcibiades I*, *Gorgias*, and other dialogues.

515. *Plato*

(3-0-3) Sayre

A textual study of selected middle and late dialogues, with concentration on the *Theaetetus*, *the Sophist*, *the Parmenides*, and *Philebus*.

516. *Aristotle*

(3-0-3) Loux

An investigation of the central concepts of Aristotle's philosophy with emphasis on his metaphysics. Aristotelian doctrines will be examined against the background of Platonic and pre-Socratic thought.

517. *Aristotle's Philosophical Anthropology*

(3-0-3) Loux

An examination of Aristotle's views on problems in what we call the philosophy of mind and the theory of action. Texts to be read include Books I and II of the *Physics*, the *De Anima*, and large chunks of the *Nicomachean Ethics*, along with snippets from the *Parva Naturalia*.

### Area Two: Medieval Philosophy (See also Medieval Institute offerings)

519. *The Medieval Theory of the Will*

(3-0-3) Dumont

This course will trace the origin and evolution of the concept of the will from Anselm of Canterbury to Duns Scotus, focusing in particular on the emergence of voluntarism at the end of the 13th century, according to which the will became a completely self-determining, rational power.

522. *Introduction to Plotinus*

(3-0-3) Gersh

A general survey of Plotinus' philosophy based on writings of his early and middle periods, and a close study of Plotinus' longest treatise (divided into four parts by Porphyry): *Enneads III. 8, V. 8, V. 5, II.9*.

523. *Early Medieval Philosophy*

(3-0-3) Gersh

An introduction to medieval philosophy in the prescholastic period based on the reading of primary sources.

527. *Boethius: An Introduction*

(3-0-3) Gersh

A study of Boethius, one of the foundational figures of medieval culture, in an interdisciplinary and open-ended manner, simultaneously studying philosophical-theological and literary subject matter and applying philosophical-theological and literary methods.

614. *Augustine and Anselm*

(3-0-3) Gersh

An introduction to the thought (philosophical and theological) of Augustine and Anselm of Canterbury. Certain thematically connected ideas will be placed in relief in order to reveal the profound coherence and continuity of the Augustinian and Anselmian speculative systems. These ideas will include Being, Truth, Mind, and Will together with associated ontological, epistemological, and ethical questions.

### Area Three: Modern Philosophy

522. *Hume: Ethics and Philosophy of Mind*

(3-0-3) Joy

An exploration of how modern philosophers in the British empiricist tradition developed new theories of moral psychology and human action, with special attention to Hume's project of giving an empirical explanation of how the human mind works.

532. *Leibniz, Newton, and Kant's First Critique*

(3-0-3) Franks

A close examination of central aspects of Kant's *Critique of Pure Reason*, considered as an attempt to resolve tensions between the model of intelligibility exemplified by Newton's physics and the model of intelligibility articulated in Leibniz's *Metaphysics*.

533. *Hume*

(3-0-3) Delaney, Joy

A careful reading of the *Treatise of Human Nature*.

534. *Kant's Third Critique*

(3-0-3) Rush, Moss

An in-depth discussion of Kant's *Critique of Judgment*, focusing on Kant's aesthetic theory, his views on teleology, and scientific methodology. The reception of Kant's views in post-Kantian philosophy and history of science is also discussed.

536. *Kant's First Critique*

(3-0-3) Ameriks

An introduction to Kant's philosophy with primary emphasis on the *Critique of Pure Reason*.

### Area Four: Nineteenth- and Twentieth-Century Philosophy

526. *Twentieth-Century Thomism*

(3-0-3) McInerney

At century's end, received opinion was that Thomism as Existential is opposed to "Aristotelian Essentialism." The major moments of these developments will be discussed as

well as difficulties that *soi-disant* Existential Thomism must face. The relevance of recent work in Aristotle for rethinking Thomas's philosophy will be considered.

538. *Hegel*

(3-0-3) Ameriks

A close study of the *Phenomenology of Spirit*, with special emphasis on Hegel's epistemology and social theory.

545. *German Idealist Themes*

(3-0-3) Franks

A seminar on themes from German Idealism, focusing both on classical texts by Fichte, Schelling and Hegel, and on contemporary texts by Brandom, McDowell, etc.

547. *Heidegger*

(3-0-3) Watson

A close reading of Heidegger's seminal work *Being and Time*.

647E. *Heidegger and Praxis*

(3-0-3) Dallmayr

A seminar exploring Heidegger's philosophy with an accent on his contributions to "practical philosophy" (including ethics and politics).

548. *Contemporary Continental Philosophy*

(3-0-3) Gutting, Watson, Rush

An examination of structuralist and post-structuralist developments in contemporary French philosophy.

556. *Searle*

(3-0-3) Warfield

An examination of the work of John Searle. Topics to be addressed include the philosophy of action, philosophy of mind, "social reality," the nature of reference, speech acts, and others.

564. *Pragmatism*

(3-0-3) Delaney

After some introductory reading from contemporary pragmatism (Rorty, West, Putnam, Brandom, etc.) the course turns to representative basic texts of classical pragmatism (Peirce, James, and Dewey) to determine the roots of pragmatism so as to understand this perspective and assess the claims of contemporary positions to this designation.

645. *Foucault*

(3-0-3) Gutting

A survey and assessment of Foucault's philosophical project, through a reading and discussion of some of his major works: *The History of Madness*, *The Order of Things*, *Discipline and Punish*, and *The History of Sexuality* (volumes 1 and 2).

**Area Five: Philosophy of Religion**

528. *Creation and Freedom*

(3-0-3) Burrell

Modern western notions of freedom equate freedom with choice and exalt "doing what I wanna do"—something already exposed by Socrates as effective bondage to our endless needs. When freedom turns out to be bondage, and demands exploitation of other humans and of the earth to satisfy its demands, something seems wrong! We shall examine classical and modern sources to highlight the contrast, locating the signal difference in the presence (or absence) of a creator.

570. *Philosophy and Christian Theism*

(3-0-3) Plantinga

How, if at all, does Christian belief bear on the traditional concerns of philosophers? Is there such a thing as Christian philosophy? After considering the bearing of some common views of faith and reason on these questions, we turn to more specific questions in epistemology, ethics, and philosophical anthropology.

652. *Topics in Philosophy of Religion*

(3-0-3) Quinn

A seminar focusing on various topics in philosophy of religion. Recent topics have included ethics, religious epistemology, and religion and politics.

654. *The Problem of Evil*

(3-0-3) van Inwagen

This seminar is both an examination of the argument from evil and an introduction to current philosophical thinking about the argument. Also discussed is the larger topic of "the problem of evil," how that problem should be formulated and what the relation is between this problem and the question: How should theists respond to the argument from evil?

659. *Divine Providence*

(3-0-3) Flint

The view of providence offered the proponents of middle knowledge, and the objections raised against this Molinist view by both Thomists and contemporary analytic philosophers.

**Area Six: Metaphysics, Philosophy of Mind**

550. *Metaphysics*

(3-0-3) Loux, Plantinga, Rea, van Inwagen

A survey of some of the main topics of metaphysics. Topics to be covered include the metaphysics of modality, mind-body problem, antirealism, and the nature of natural laws. This is the core course for metaphysics. (Each academic year)

655. *Agency, Action and Action Explanation*

(3-0-3) Kim

A discussion of questions such as: What is it to be an agent? What is an action? Are actions explained or understood causally or nomologically, or in some other distinctive ways? What roles do "reasons" play in explaining actions?

664. *Topics in Philosophy of Mind*

(3-0-3) Ramsey, Stubenberg

Study of selected issues of contemporary interest in the field.

668. *Freedom and Responsibility*

(3-0-3) Warfield

An examination of recent work on freedom, determinism, and moral responsibility, beginning with Peter van Inwagen's *An Essay on Free Will*.

682. *Time and Persistence*

(3-0-3) Rea

An exploration of central issues in the philosophy of time, with special emphasis on the presentism/four-dimensionalism debate and the tensor/detensor debate.

**Area Seven: Ethics, Political Philosophy, and Aesthetics**

567. *Aesthetics*

(3-0-3) Rush

A consideration of some of the fundamental questions in aesthetics and philosophy of art, e.g., the nature of aesthetic representation, expression in art, the concept of beauty, what distinguishes art from 'mere things', the structure and function of imagination.

568. *Contemporary Ethics*

(3-0-3) Solomon

An examination of key issues in contemporary ethics. Readings will vary from year to year but will be drawn from the most influential contemporary work in moral philosophy.

**569. *Twentieth-Century Ethics***

(3-0-3) Solomon, Sterba, Shrader-Frechette  
A survey of a number of central positions and issues in contemporary ethical theory. The course will begin with an examination of the main metaethical positions developed from 1903 to 1970—intuitionism, emotivism, prescriptivism, and the various forms of ethical naturalism. This will provide a background for a discussion of issues arising from the more recent revival of classical normative theory. This is the core course for ethics. (Each academic year)

**571. *Justice***

(3-0-3) Wolterstorff

An attempt to bring together the philosophical and theological literature on justice. A focus of the course will be on the concepts of human justice and God.

**577. *Political Liberalism and Religion***

(3-0-3) Quinn, Weithman

A consideration, from the point of view of philosophy and legal theory, of whether religious arguments ought to be excluded from political debate on certain issues.

**579. *Political Philosophy***

(3-0-3) Sterba

A course focusing on John Rawl's most recent formulation of his theory of justice, *Justice as Fairness: A Restatement* and *The Law of Peoples* and the moral and political alternatives to Rawl's theory.

**580. *Ethics and Risk***

(3-0-3) Shrader-Frechette

An investigation of classical ethical papers, all in contemporary, analytic, normative ethics, that attempt to develop the ethical theory necessary to deal with legitimate imposition of risk of harm.

**Area Eight: *Epistemology*****562. *Epistemology***

(3-0-3) David, De Paul, Stubenberg, Warfield

The aim of this course is to survey and evaluate the major approaches to understanding epistemic value, viz., internalist theories such as coherentism and foundationalism, and externalist theories such as reliabilism. This is the core course for epistemology. (Each academic year)

**Area Nine: *Philosophy of Science (See also listings for History and Philosophy of Science)*****560. *Science and Social Values***

(3-0-3) Kourany

A consideration of such questions as: Should science be value free, or should it be shaped

by the needs and ideals of the society that supports it? If the former, how can scientists shaped by society contribute to it, and what claim to the resources of the society can scientists legitimately make? If the latter, how can scientists still claim to be objective?

**581. *Philosophy of Science***

(3-0-3) Gutting, Howard, McKim

An analysis of the distinctive character of science as a complex mode of inquiry. Competing views on the nature of scientific explanation and the ontological import of scientific theory will be discussed in the context of classical and contemporary literature. (Each academic year)

**583. *Philosophy of Biology***

(3-0-3) Moss

Central issues in the philosophy of science from the perspective of the life sciences with particular emphasis upon topics in evolution theory and sociobiology and upon the topic of intertheoretical integration in the life sciences (from organic chemistry to cognitive neuroscience). Topics to be covered include: teleology, reductionism and supervenience, the biological basis of cognition, explanation, scientific realism, theory change, and the critical appraisal of alternate research strategies.

**587. *History of the Philosophy of Science***

(3-0-3) McMullin

Focus on Aristotle, Bacon, Descartes, Galileo, Newton, Vico, Whewell, and Poincaré. The connections between theory of science and epistemology will be emphasized, as will the influence of metaphysics upon the origins of science.

**588. *History of the Philosophy of Science 1750 to 1900***

(3-0-3) Howard, McMullin

The second half of the history of "classical" philosophy of science. Themes: the epistemic status of scientific knowledge-claims; the presuppositions, techniques, and modes of inference appropriate to natural science; the ontological status of scientific constructs. We shall begin with Reid and Kant, go on to Comte, Whewell and Mill, and end with Mach and Poincaré.

**589. *Religion and Science: Conflict or Concord***

(3-0-3) Plantinga

A look at one of the most interesting and important topics of the last 500 years, the relation of the newly emerging modern science to religious belief—in particular Christianity.

**680. *Scientific Realism***

(3-0-3) McMullin

A study of the criticisms, defenses, and explanations of scientific realism in the writings of van Fraassen, Putnam, Fine, Hacking, Laudan, Psillos, Kukla, and Ganson.

**686. *Philosophy of Space and Time: Kant, Einstein***

(3-0-3) Howard

An introduction to contemporary metaphysics and its relation to the philosophy of science. Three topics to be covered in depth are: special relativity, the debate over relative and absolute space, and Kant's views on space.

**687. *Interpretative Problems in Quantum Mechanics***

(3-0-3) Staff

Intended for graduate students in physics and in the history and/or philosophy of science who wish to examine in some reasonable detail the roots, both historical and philosophical, of quantum mechanics and the profound conceptual problems to which that theory has given rise.

**688. *Theology and the Natural Sciences***

(3-0-3) McMullin

A study of issues raised for Christian theology by the rapid progress of the natural sciences over the last few centuries.

**Area Ten: *Logic and Philosophy of Language*****513. *Intermediate Logic***

(3-0-3) Bays, Detlefsen, Blanchette

An introduction to the basic principles of formal logic. The course includes a study of inference, formal systems for propositional and predicate logic, and some of the properties of these systems. The course will concentrate on proving some of the major results of modern logic, e.g., the completeness of first-order logic, the undecidability of first-order logic, the Lowenheim-Skolem theorems, and Gödel's incompleteness theorems. (Spring)

**590. *Topics in Philosophical Logic: Modal Metatheory***

(3-0-3) Bays

A study of topics in the metatheory of modal logic starting with some basic correspondence theory, and then discussion of completeness and the finite modal property.

**591. *Gödel's Theorems***

(3-0-3) Detlefsen

A thorough examination of the technical background and proofs of Gödel's theorems and related results. Application of this material to issues in philosophy of mind, philosophy

of mathematics, and epistemology will also be considered.

**593. *Philosophy of Mathematics***  
(3-0-3) Staff

A seminar focusing on central topics in the philosophy of mathematics.

**695. *Special Topics: Philosophy of Mathematics Workshop***

(3-0-3) Detlefsen, Bays

An ongoing research seminar in philosophical logic and the philosophy of mathematics.

**Other Graduate Courses**

**501. *Proseminar***

(1-0-1) Stubenberg

Required of all first-year students. An introduction to the methods of graduate research in philosophy. (Fall)

**595. *Teaching Methods: TA Practicum***

(1-0-1) Neiman

A one-credit course required of all philosophy graduate students during the year they first begin to assist in teaching.

**599. *Thesis Direction***

(V-V-V) Staff

For students doing thesis work for a research master's degree.

**600. *Nonresident Thesis Research***

(0-0-1) Staff

For master's degree students working in absentia.

**601, 602. *Colloquium Seminar***

(1-0-1) Staff

A one-hour seminar each semester tied to the talks given in the department's ongoing colloquium series. Required of all first-year students.

**697. *Directed Readings***

(V-0-V) Staff

Readings and discussion of chosen philosophical texts under the personal supervision of a member of the graduate faculty.

**699. *Research and Dissertation***

(V-V-V) Staff

Required of students in residence engaged in full-time dissertation research.

**700. *Nonresident Dissertation Research***

(0-0-1) Staff

For doctoral candidates not in residence while working on the dissertation. Required to maintain degree candidacy.

**701. *Teaching Practicum***

(1-0-1) Neiman

A course required of all graduate students before teaching a course on their own responsibility. The goal will be for each prospective teacher to produce viable syllabi and rationales for the courses they will be teaching.

**Upper-level Undergraduate Courses**

In addition to the courses listed above, certain courses offered in the department's undergraduate major program are open to graduate students for credit or audit. Such courses may be recommended to students whose undergraduate backgrounds are lacking in certain respects. The courses available are:

301. *Ancient and Medieval Philosophy*

302. *Modern Philosophy*

303. *Nineteenth- and Twentieth-Century Philosophy*

313. *Formal Logic*

422. *Epistemology*

423. *Ethical Theory*

443. *Analytic Philosophy*

445. *Introduction to Phenomenology*

**Faculty**

Karl Ameriks, *the McMahon-Hank Professor and Fellow in the Nanovic Institute for European Studies*. B.A., Yale Univ., 1969; Ph.D., Emerita. B.A., Laval Univ., 1950; M.A., *ibid.*, 1951; L.Ph., *ibid.*, 1952; Ph.D., *ibid.*, 1954. (1971)

Timothy Bays, *Assistant Professor (on leave 2003–2004)*. B.A., Northwestern Univ., 1988; Ph.D., Univ. of California, Los Angeles, 1995; Ph.D., *ibid.*, 1999. (1999)

Patricia A. Blanchette, *Associate Professor*. B.A., Univ. of California, San Diego, 1983; Ph.D., Stanford Univ., 1990. (1993)

Joseph Bobik, *Professor*. B.A., St. Bernard's College and Seminary, 1947; M.A., Univ. of Notre Dame, 1951; Ph.D., *ibid.*, 1953. (1955)

Sheilah Brennan, *Associate Professor Emerita*. B.A., Laval Univ., 1950; M.A., *ibid.*, 1951; L.Ph., *ibid.*, 1954. (1971)

Rev. David B. Burrell, C.S.C., *the Rev. Theodore M. Hesburgh, C.S.C., Professor of Arts and Letters, Professor of Theology and Philosophy, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. A.B., Univ. of Notre Dame, 1954; S.T.L., Gregorian Univ., 1960; Ph.D., Yale Univ., 1965. (1964)

Fred R. Dallmayr, *the Packey J. Dee Professor of Political Science, Professor of Philosophy, and Fellow in the Kellogg Institute for International Studies, the Kroc Institute for International*

*Peace Studies, and the Nanovic Institute for European Studies*. LL.B., Univ. of Munich, 1955; M.A. Southern Illinois Univ., 1956; Ph.D., Duke Univ. 1960. (1978)

Marian A. David, *Professor*. Magister Philosophiae, Karl-Franzens Univ., 1985; M.A., Univ. of Arizona, 1989; Ph.D., *ibid.*, 1990. (1989)

Cornelius F. Delaney, *Professor*. B.A., St. John's Seminary, 1961; M.A., Boston College, 1962; Ph.D., St. Louis Univ., 1967. (1967)

Michael R. De Paul, *Professor*. B.A., Univ. of Notre Dame, 1976; M.A., Ohio State Univ., 1979; Ph.D., Brown Univ., 1983. (1982, 1990)

Michael Detlefsen, *Professor*. A.B., Wheaton College, 1971; Ph.D., Johns Hopkins Univ., 1975. (1983)

Stephen D. Dumont, *Associate Professor*. B.A., Wabash College, 1974; M.A., Univ. of Toronto, 1976; M.S.L., Pontifical Inst. of Mediaeval Studies, Univ. of Toronto, 1979; Ph.D., Univ. of Toronto, 1982. (2001)

Thomas P. Flint, *Director of the Center for Philosophy of Religion and Professor*. B.A., St. Ambrose College, 1975; Ph.D., Univ. of Notre Dame, 1980. (1982)

Paul Franks, *Assistant Professor*. B.A., Oxford Univ., 1986; M.A., *ibid.*, 1990; Ph.D., Harvard Univ., 1993. (2000)

Alfred J. Freddoso, *Professor*. B.A., St. John Vianney Seminary, 1968; Ph.D., Univ. of Notre Dame, 1976. (1976, 1979)

Gary M. Gutting, *Professor and Fellow in the Nanovic Institute for European Studies*. A.B., St. Louis Univ., 1964; Ph.D., *ibid.*, 1968. (1969)

Don A. Howard, *Director of Graduate Studies in History and Philosophy of Science and Professor of Philosophy*. B.Sc., Michigan State Univ., 1971; A.M., Boston Univ., 1973; Ph.D., *ibid.*, 1979. (1997)

Anja Jauernig, *Instructor*. B.A., Rheinische Friedrich-Wilhelms-Univ., 1994; B.S., *ibid.*, 1995; M.A., *ibid.*, 1997; M.A., Princeton Univ., 1999

Rev. John I. Jenkins, C.S.C., *Vice President and Associate Provost of the University and Associate Professor*. B.A., Univ. of Notre Dame, 1976; M.A., *ibid.*, 1978; M.Div., Jesuit School of Theology at Berkeley, 1988; S.T.L., *ibid.*, 1988; D.Phil., Oxford Univ., 1989. (1988)

Lynn Joy, *Professor*. A.B., Radcliffe College, 1971; A.M., Harvard Univ., 1981; Ph.D., *ibid.*, 1982. (1988, 2000)

Thomas Kelly, *Assistant Professor*. B.A., Univ. of Notre Dame, 1994; Ph.D., Harvard Univ., 2000. (2003)

Janet Kourany, *Associate Professor*. B.S., Columbia Univ., 1965; Ph.D., *ibid.*, 1977. (2000)

Michael J. Loux, *the George N. Shuster Professor of Philosophy (on leave spring 2004)*. B.A., College of St. Thomas, 1964; M.A., Univ. of Chicago, 1965; Ph.D., *ibid.*, 1968. (1968)

Alasdair MacIntyre, *Senior Research Professor*. B.A., Queen Mary College, 1949; M.A., Manchester Univ., 1951. (1988, 2000)

A. Edward Manier, *Professor*. B.S., Univ. of Notre Dame, 1953; A.M., St. Louis Univ., 1956; Ph.D., *ibid.*, 1961. (1959)

Ralph M. McNerny, *the Michael P. Grace Professor of Medieval Studies*. B.A., St. Paul Seminary, 1951; M.A., Univ. of Minnesota, 1952; Ph.L., Univ. Laval, 1953; Ph.D., *ibid.*, 1954. (1955)

Vaughn R. McKim, *Associate Professor*. B.A., Oberlin College, 1962; M.A., Yale Univ., 1964; Ph.D., *ibid.*, 1966. (1966)

Rev. Ernan McMullin, *the John Cardinal O'Hara Professor Emeritus of Philosophy*. B.Sc., National Univ. of Ireland, 1945; B.D., Maynooth College, 1948; Ph.D., Univ. of Louvain, 1954. (1954)

Lenny Moss, *Assistant Professor (on leave fall 2003)*. B.A., San Francisco State Univ., 1981; Ph.D., Univ. of California, Berkeley, 1989; Ph.D., Northwestern Univ., 1998. (1999)

David K. O'Connor, *Associate Professor of Philosophy and Concurrent Associate Professor of Classics*. B.A., Univ. of Notre Dame, 1980; Ph.D., Stanford Univ., 1985. (1985)

Alvin Plantinga, *the John A. O'Brien Professor of Philosophy*. B.A., Calvin College, 1954; M.A., Univ. of Michigan, 1955; Ph.D., Yale Univ., 1958. (1974, 1981)

Philip L. Quinn, *the John A. O'Brien Professor of Philosophy*. B.A., Georgetown Univ., 1962; M.S., Univ. of Delaware, 1966; Ph.D., Univ. of Pittsburgh, 1969. (1985)

William M. Ramsey, *Associate Professor*. B.S., Univ. of Oregon, 1982; Ph.D., Univ. of California, San Diego, 1989. (1989)

Michael C. Rea, *Associate Professor (on leave spring 2004)*. B.A., Univ. of California at Los Angeles, 1991; M.A., Univ. of Notre Dame, 1994; Ph.D., *ibid.*, 1996. (2001)

Rev. Herman Reith, C.S.C., *Associate Professor Emeritus*. Ph.B., Gregorian Univ., 1938;

St.B., *ibid.*, 1940; M.A., Univ. of Notre Dame, 1944; Ph.D., Laval Univ., 1945. (1987, 1989)

John H. Robinson, *Director of the Thomas J. White Center for Law and Government, Associate Fellow in the Law School and Concurrent Assistant Professor of Law and Philosophy*. B.A., Boston College, 1967; M.A., Univ. of Notre Dame, 1972; Ph.D., *ibid.*, 1975; J.D., Univ. of California, Berkeley, 1979. (1981)

Fred Rush, *Assistant Professor*. B.A., Washington and Lee Univ., 1978; Ph.D., Columbia Univ., 1996. (2001)

Kenneth M. Sayre, *Professor*. A.B., Grinnell College, 1952; M.A., Harvard Univ., 1954; Ph.D., *ibid.*, 1958. (1958)

Kristin Shrader-Frechette, *the F. J. and H. M. O'Neill Professor of Philosophy, Concurrent Professor of Biological Sciences, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Edgecliff College, Xavier Univ., 1967; Ph.D., Univ. of Notre Dame, 1971. (1998)

William D. Solomon, *Associate Professor and the W. P. and H. B. White Director of the Center for Ethics and Culture*. B.A., Baylor Univ., 1964; Ph.D., Univ. of Texas at Austin, 1972. (1968, 1977)

James P. Sterba, *Professor and Fellow in the Joan B. Kroc Institute for International Peace Studies (on leave spring 2004)*. B.A., La Salle College, 1966; M.A., Univ. of Pittsburgh, 1972; Ph.D., *ibid.*, 1973. (1973)

Leopold Stubenberg, *Associate Professor*. B.A., Karl-Franzens Univ., 1984; M.A., Univ. of Arizona, 1988; Ph.D., *ibid.*, 1992. (1990)

Peter van Inwagen, *the John Cardinal O'Hara Professor of Philosophy*. B.S., Rensselaer Polytechnic Inst., 1965; Ph.D., Univ. of Rochester, 1969. (1995)

Ted A. Warfield, *Associate Professor*. B.A., Univ. of Arkansas, 1991; Ph.D., Rutgers Univ., 1995. (1995)

Stephen H. Watson, *Professor (on leave fall 2003)*. B.A., Carroll College, 1972; M.A., Duquesne Univ., 1975; Ph.D., *ibid.*, 1979. (1983)

Rev. Charles Weiher, C.S.C., *Assistant Professor Emeritus*. B.S., Univ. of Notre Dame, 1942; M.A., *ibid.*, 1956; Ph.D., *ibid.*, 1960. (1956)

Paul J. Weithman, *Chair and Professor*. B.A., Univ. of Notre Dame, 1981; M.A., Harvard Univ., 1986; Ph.D., *ibid.*, 1988. (1991)

## Romance Languages and Literatures

### Chair:

Dayle Seidenspinner-Núñez

### Director of Graduate Studies:

Theodore Cachey

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### The Program of Studies

The Department of Romance Languages and Literatures offers an M.A. degree in French and Francophone Studies, Italian Studies, and Iberian and Latin American Studies.

The primary aim of the master's program is to provide students with a comprehensive background in the literary and cultural achievements of French-, Italian-, and Spanish-speaking countries, both separately and in relation to each other. Additionally, the master's program may, with the permission of the department, include advanced courses in related areas of other disciplines, such as art, English, government, history, international studies, music, philosophy, psychology, and theology. Indeed, in the Italian Studies program, such allied courses are considered an integral component of the student's preparation. This interdisciplinary and comparative approach to the Romance literatures is a hallmark of the master's program. The various courses of study provided will, in most instances, lead to a career in teaching and scholarship, but they may also serve as fundamental training for those candidates who plan to enter professions where a knowledge of Romance languages plays an auxiliary role.

Students interested in pursuing the Ph.D. in literature degree with French and Francophone, Iberian and Latin American, or Italian studies as a primary field should consult the Ph.D. Program in Literature listing in this *Bulletin* for further information.

### Admissions

Graduate study in French and Francophone Studies, Italian Studies, or Iberian and Latin American Studies assumes a prior undergraduate major or its equivalent in the respective field. All applicants are required to take the Graduate Record Exam; in addition, if English is neither the applicant's native language or language of instruction, the applicants must also submit TOEFL scores. In addition to the materials required by the

Graduate School, the applicant should submit a writing sample and an audiocassette tape to demonstrate the applicant's ability in the target language; if the applicant is a non-native speaker of English, an audiocassette tape in English should be forwarded as well.

#### *General Requirements*

The master's programs encourage the student to work closely with his/her adviser to design a course of study to suit individual needs, interests, and future goals. All candidates for an advanced degree are expected to take a minimum of 30 credit hours of courses in their field of specialization, including *LLRO 510 Introduction to Literary Criticism* and a graduate course in comparative Romance literature.

During the second semester of the first year of graduate study, the student must pass an oral qualifying examination. The master's candidate will choose from a selection of texts and must demonstrate competency in analyzing a literary text in the target language before the graduate faculty. At this time, faculty members will discuss and evaluate the student's performance in the master's program.

Before taking the comprehensive written examination at the end of the second year, the student must demonstrate competency in a second foreign language by passing the GRE.

Students preparing for a career in teaching have the opportunity to teach several language courses before completion of the master's degree. A preliminary workshop, *LLRO 501 Methods of Foreign Language Teaching* and *LLRO 501L Practicum in Teaching* are required of all graduate teaching assistants.

#### *Program in French and Francophone Studies*

*Course requirements.* All candidates for a master's degree in French and Francophone Studies are required to take a minimum of 30 credit hours or 10 courses. *LLRO 510 Introduction to Literary Criticism*, required of all students, is taken during the first semester of residence. In addition, the minimum of 10 courses includes at least six courses in French and Francophone literature and one course in comparative Romance literature. Two courses may be in a second national literature or in an allied field; students taking both courses in the same national literature or in comparative literature will be designated as having fulfilled a minor in that field. Occasionally, at the invitation of the program faculty, these two courses may instead be fulfilled by writing a master's thesis under the direction of a faculty

member in the department. Two of the 10 courses may be at the 400 level.

*Comprehensive Master's Examination.* For the final written examination, the student chooses five of seven fields (medieval, Renaissance, 17th century, 18th century, 19th century, 20th century, Francophone) in which to be examined. Each area will be tested for a total of one hour.

*Combined B.A./M.A. Program in French and Francophone Studies.* The Department of Romance Languages and Literatures offers its majors in French the opportunity to participate in its graduate program through a combination B.A./M.A. degree in French. This program requires students to take 30 credit hours at the 200-level or above during the normal four-year undergraduate period, followed by a total of 30 credit hours of graduate courses taken during the fourth and fifth years in residence. Six credit hours will be counted toward both the undergraduate and the graduate degrees. During their senior year, participants in this program complete two graduate courses, take the qualifying exam given to all first-year graduate students, and apply to the Graduate School for admission during the spring semester. B.A./M.A. students are eligible for a teaching fellowship during their fifth year that includes a tuition waiver and a generous teaching stipend. Well-qualified students who are interested in this program should contact the Director of Graduate Studies or the Graduate Coordinator in French at the beginning of their junior year.

#### *Program in Italian Studies*

*Course requirements.* All candidates for a master's degree in Italian Studies are required to take a minimum of 30 credit hours or 10 courses. *LLRO 510 Introduction to Literary Criticism*, required of all students, is taken during the first semester of residence. The minimum of 10 courses includes four to six courses in Italian literature (two of these courses may be taken at the 400-level) and one course in Comparative Romance Literature. The remaining credit hours may be fulfilled through Italian studies courses in Italian literature, history, art history, philosophy, music, architecture, and comparative literature.

*Comprehensive Master's Examination.* The written master's examination is four hours in length and covers the following areas: Medieval, Renaissance, 17th and 18th centuries, 19th century, and 20th century. The exam

tests the candidate's knowledge of two areas of concentration and competency in the remaining fields.

*Combined B.A./M.A. Program in Italian Studies.* The Department of Romance Languages and Literatures offers its majors in Italian Studies the opportunity to participate in its graduate program through a combination B.A./M.A. degree in Italian Studies. This program requires students to take 30 credit hours at the 200-level or above during the normal four-year undergraduate period, followed by a total of 30 credit hours of graduate courses taken during the fourth and fifth years in residence. Six credit hours will be counted toward both the undergraduate and the graduate degrees. During their senior year, participants in this program complete two graduate courses, take the qualifying exam given to all first-year graduate students, and apply to the Graduate School for admission during the spring semester. B.A./M.A. students are eligible for a teaching fellowship during their fifth year that includes a tuition waiver and a generous teaching stipend. Well-qualified students who are interested in this program should contact the Director of Graduate Studies or the Graduate Coordinator in Italian Studies at the beginning of their junior year.

#### *Program in Iberian and Latin American Studies*

*Course requirements.* All candidates for a master's degree in Iberian and Latin American Studies are required to take a minimum of 30 credit hours or 10 courses. *LLRO 510 Introduction to Literary Criticism*, required of all students, is taken during the first semester in residence. The minimum of 10 courses includes at least six courses in Iberian and Latin American literature and one course in Comparative Romance Literature; when appropriate, a course in art, history, philosophy, or another allied field may substitute for the Comparative Romance Literature course with permission. Two of the 10 courses may be at the 400 level.

*Comprehensive Master's Examination.* The final written examination is eight hours in length and administered in four two-hour sessions over two days. The examination comprises the following eight fields: Medieval, Golden Age, 18th- and 19th-century peninsular, 20th-century peninsular; colonial Latin American, 19th-century Latin American, Latin American literature 1880-1946, and 1947 to the present.



*Combined B.A./M.A. Program in Iberian and Latin American Studies.* The Department of Romance Languages and Literatures offers its majors in Spanish the opportunity to participate in its graduate program through a combination B.A./M.A. degree in Spanish. This program requires students to take 30 credit hours at the 200-level or above during the normal four-year undergraduate period, followed by a total of 30 credit hours of graduate courses taken during the fourth and fifth years in residence. Six credit hours can be counted toward both undergraduate and graduate degrees. During their senior year, participants in this program complete two graduate courses, take the qualifying exam given to all first-year graduate students, and apply to the Graduate School for admission during the spring semester. B.A./M.A. students are eligible for a teaching fellowship during their fifth year that includes a tuition waiver and a generous teaching stipend. Well-qualified students who are interested in this program should contact the Director of Graduate Studies and/or the graduate liaison in Spanish at the beginning of their junior year.

#### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

The Department of Romance Languages and Literatures offers courses in a three-year cycle. While an individual course may not be offered each year, courses that cover the area of specialization are offered within the two years that it takes to complete the degree requirements.

#### Romance Literatures

##### 501. *Foreign Language Acquisition and Instruction*

(1.5-0-1.5) Farley

An introduction to theories of foreign language acquisition and methods of foreign language instruction related to them, including the direct, cognitive, communicative, and input (natural) approaches. Required of teaching assistants in the department.

##### 501L. *Practicum in Teaching*

(1.5-0-1.5) Farley, Dubreil, Ryan-Scheutz  
Lab session for 501 for the practice of strategies taught in 501 and their implementation

in courses taught by teaching assistants. Open only to teaching assistants in the department.

##### 510. *Introduction to Literary Criticism*

(3-0-3) Douthwaite, Heller, Toumayan

Various trends of modern literary criticism as they relate to the study of romance literatures. Required for all M.A. students in romance languages and literatures.

##### 517. *The Languages of Italy, I and II*

(3-0-3) Cachey, Welle

The diversity of literary languages of Italy studied separately and in relation to one another, including indigenous and imported vernaculars (including Provençal), Latin literatures (including the Macaronicae), Italian literature, and the literary canon in dialect. Part I focuses on the medieval and Renaissance periods while part II treats modern and contemporary Italian literature and the literary canon in dialect (including Goldoni, Belli, Porta, Pasolini, Zanzotto).

##### 518. *Transatlantic Encounters*

(3-0-3) Cachey

Examines the literature related to the discovery, exploration, and conquest of the "New World" (1492-1600).

##### 519. *Literature and History of Travel*

(3-0-3) Cachey

An exploration of the interactions of travel and literature in the formation of Western European identities, from Gilgamesh to global tourism and travel writings from the medieval period as well as from national literatures during the Renaissance, baroque, Enlightenment, and post-Enlightenment periods.

##### 520. *Paleography*

(3-0-3) Boulton

An introduction to Latin paleography from the beginnings of Latin writing to about A.D. 1500. Classes will consist of lectures on the developments of hand-writing over the course of this period and special emphasis will be given to practical exercises in reading various hands and to the technique of describing medieval manuscripts.

##### 521. *The Medieval Romance*

(3-0-3) Boulton

By examining representative English, French, German, and Italian romances of the 12th and 13th centuries and a selection of critical works, the course will attempt to define the characteristics and the narrative techniques of the medieval romance.

##### 531. *Lyric Poetry of the Renaissance*

(3-0-3) DellaNeva

A study of Petrarch's *Rime sparse*, Maurice Scève's *Délie*, and Shakespeare's *Sonnets*.

##### 551. *Dialogues Across the Channel: French, English, and Irish Women Writers, 16th through 19th Century*

(3-0-3) Douthwaite

Using the tools of literary history, feminist theory, and women's social history, students will analyze the works of French, English, and Irish women writing in the period 1654 to 1846 and chart the exchange of literary themes and ideas between national traditions. Authors include Lafayette, Burney, Morgan, Shelly, and Sand.

##### 569. *Silent Cinema*

(3-0-3) Welle

A historical analysis of the emergence and development of silent cinema in Europe and the United States before 1930. Emphasis on film genres, modes of production, film styles, film culture, and cinema in relation to society.

##### 570. *Film and Literary Interactions*

(3-0-3) Welle

The historical interactions of film and literature in a broadly comparative and theoretical framework.

##### 585. *Modern Italian Poetry and Translation Studies*

(3-0-3) Welle

The historical development of modern Italian poetry and an introduction to translation studies.

##### 586. *Immigrant Voices in Contemporary Brazilian Literature*

(3-0-3) Ferreira

The literary representation of European (Italian, German, and Spanish) and non-European (Japanese and Lebanese) immigrants in contemporary Brazilian prose fiction. Topics to be addressed include: the role of minorities in Brazil; ethnic and cultural diversity; national and communal identity; traveling and exile; home, belonging, and dislocation; and the relationship between memory and writing.

#### French Studies

##### 505. *History and Fiction, Scudéry to Tocqueville*

(3-0-3) Douthwaite

This course studies two textual traditions, fiction and historiography, as interrelated genres in the period 1654 to 1856. Theoretical readings in intellectual, social, and

cultural history will orient literary discussions. Authors studied include Bossuet, Mme. de la Guette, Prévost, Perrault, and Michelet.

522. *Readings in Old French*

(3-0-3) Boulton

An introduction to the language and literature of medieval France. We will read a variety of texts in verse and prose composed in the 12th, 13th, and 14th centuries.

523. *Lyric and Narrative in Medieval French Literature*

(3-0-3) Boulton

A study of narrative transformations of the themes of the courtly lyric in the 13th and 14th centuries.

528. *Medieval Romance: Chrétien de Troyes*

(3-0-3) Boulton

An examination of Chrétien's evolution as a writer, his treatment of the Arthurian legend, and the conventions he established for the genre.

530. *Love Poetry of the Renaissance*

(3-0-3) DellaNeva

An in-depth reading of the love lyrics of Ronsard or Maurice Scève, particularly as they relate to the Italian Petrarchist tradition.

531. *Lyric Poetry of the Renaissance*

(3-0-3) DellaNeva

An in-depth study of the *oeuvre* of one or two poets (e.g., Du Bellay), including non-amatory poetry.

532. *The Renaissance Woman*

(3-0-3) DellaNeva

A survey of images of women in Renaissance texts authored by men followed by an in-depth examination of the works of female authors of the French Renaissance.

541. *Racine et la Critique Moderne*

(3-0-3) MacKenzie

Racine's tragedies as seen through the optic of the critical methods espoused, for example, by Barthes (structuralism), Goldmann (Marxism), and Mauron (psychoanalysis).

542. *Autour/Auteurs de Port-Royal*

(3-0-3) MacKenzie

In this seminar we will examine the works of writers who either literally or by association espoused a Jansenist viewpoint. Authors include Pascal, La Bruyere, Lafayette, and Racine.

543. *Pascal*

(3-0-3) MacKenzie

An in-depth investigation of the scientific, polemical, and apologetic works of Blaise Pascal.

552. *Metamorphoses in Prose: 17th to 19th Centuries*

(3-0-3) Douthwaite

The diverse origins and developments in French narrative fiction from the 17th to the early 19th century. Pertinent aspects of French social, cultural, and political history will be examined along with literary texts, by authors such as d'Urfé, Lafayette, Graffigny, Diderot, and Hugo.

562. *Literature of the Fin-de-Siècle and the Belle Époque*

(3-0-3) Perry

Prose and poetry by Huysmans, Rachilde, Noailles, Mallarmé, Barrès, Gide, Proust, Valéry, and Colette, within the context of aesthetics at the turn of the 20th century. Excerpts from the writings of Schopenhauer, Nietzsche, and Bergson. Discussions of music (Wagner, Debussy) and dance (Duncan, Diaghilev).

564. *Flaubert*

(3-0-3) Toumayan

A study of all of Flaubert's published prose works. We will also consider selections from his *Carnets*, his *Voyage en Egypte*, and his correspondence. Special attention will be given to problems of literary history, narrative genre, and style.

565. *Baudelaire and the Symbolists*

(3-0-3) Toumayan

A study of the poetry of French symbolists with special attention to the works of Baudelaire, Mallarmé, Rimbaud, and Verlaine.

571. *Modern French Poetry from Symbolism through Surrealism*

(3-0-3) Perry

The modern development of the notion of the poet as visionary writer, as reflected in verse and prose poetry from Baudelaire to the surrealists and beyond.

572. *Cross Currents in Twentieth-Century French and Francophone Fiction*

(3-0-3) Perry

A critical survey of the past century as embodied in representative fictional works. Authors from among the following: Gide, Proust, Colette, Bernanos, Breton, Camus, Sartre, Sarraute, Robbe-Grillet, Duras,

Wittig, Brossard, Le Clézio, Tournier, Ben Jelloun.

578. *Proust: A World Lost and Regained*

(3-0-3) Perry

A close study of one of the most influential writers of the past century, whose novel alternates poetic prose with the criticism of art, history, society, politics, and psychology. The semester is dedicated to reading several volumes from *A la recherche du temps perdu*.

593. *Shifting Tableaux of "Caribbeanness": Postcolonial Discourses in French Caribbean Literature.*

(3-0-3) Coly

This seminar will explore the particular contributions of the French Caribbean to 20th-century postcolonial theory and criticism. Topics include the early modern imagining of "the uncivilized island savage," postcolonial rearticulations of "Caribbeanness," and how race, gender, class, and sexuality complicate the term "postcolonialism" in the context of the Caribbean.

597. *Directed Readings*

(V-V-V) Staff

599. *Thesis Direction*

(V-V-V) Staff

For students doing thesis work for a research master's degree.

600. *Nonresident Thesis Research*

(0-0-1) Staff

For master's degree students working in absentia.

697. *Directed Readings*

(V-V-V) Staff

*Italian Studies*

501. *Italian Language Acquisition*

(3-0-3) Ryan

An overview of current thinking about second-language acquisition theories and methods, with particular emphasis on their application in the Italian language classroom.

502. *Cultural Studies of Modern Italy*

(3-0-3) Welle

This course provides an interdisciplinary focus on Italian culture, politics, and society from unification in 1870 until the 1960s. Examining the critical paradigms, theoretical issues, and methodologies of cultural studies, emphasis is also given to the Italian tradition of literary/cultural analysis through the work of De Sanctis, Croce, Gramsci, De Martino, and Eco.

503. *The Italian "Questione della Lingua" and the Renaissance History of the Book*  
(3-0-3) Cachey

An advanced introduction to the history of the Italian language from *Le origini* to the High Renaissance with special emphasis on Dante, Petrarch, and Boccaccio during the medieval period and Bembo, Castiglione, and Machiavelli for the Renaissance.

509. *The Italian Lyric*  
(3-0-3) Moevs (in Italian)

A close textual analysis of selected lyric masterpieces from the breadth of the Italian tradition, from Cavalcanti to Montale. The course is designed to deepen the students' appreciation of poetry and poetic craft, to develop their confidence in approaching and mastering poetic texts, and to acquaint them with the greatest poetic voices of Italian literature.

520. *Topics in Medieval and Renaissance Literature*

(3-0-3) Cachey, Moevs

A study of the genres, movements, and major writers of the medieval and Renaissance periods. The course varies from year to year, but past topics have included Boccaccio, lyric poetry, Dante's *Paradiso*, Petrarch, Machiavelli, and Ariosto.

525. *Dante*  
(3-0-3) Cachey, Moevs

A focus on three overarching themes: (1) Dante's poetics, (2) Dante's "minor" works, and (3) Dante's reception, especially contemporary critical reception in North America.

531. *Petrarch and Boccaccio*

(3-0-3) Cachey, Moevs

An extensive and intensive reading of the *Canzoniere* and the *Decameron*, together with lesser works of the masters.

535. *La letteratura di viaggio: storia e critica*  
(3-0-3) Cachey

The problematic place of travel within the context of Italian literary history and the relationship of travel to the category of the literary itself is studied in primary source texts of the medieval, Renaissance, and modern periods.

536. *Classics of the Italian Renaissance*

(3-0-3) Staff

Five literary classics and the critical discourse surrounding them, including Poliziano's "Stanze per la giostra," Sannazaro's *Arcadia*, Machiavelli's *Il Principe*, Castiglione's *Cortegiano*, and Ariosto's *Orlando Furioso*.

550. *Alfieri, Foscolo, and Leopardi*  
(3-0-3) Moevs

A study of selected works from the three greatest poets of the neoclassical and early romantic period, with particular attention paid to the tension and fusion in their thought between enlightenment and romantic conceptions of self, humanity, and nature.

560. *Manzoni*  
(3-0-3) Moevs

A close reading of the *Promessi Sposi* in its historical and cultural context, with special attention focused on its artistic and social aims as a novel at once historical, political, and self-consciously Catholic.

570. *Twentieth-Century Italian Women Writers*  
(3-0-3) Ryan

This course examines the development of female discourse in novels of this century, starting with a text by Nobel Prize winner Grazia Deledda and ending with best-selling contemporary author Susanna Tamaro. We will trace and identify the subtleties and variations among women's voices that are slowly establishing more prominent positions within the Italian literary canon.

Class discussions, presentation, and writing assignments will examine themes such as childhood, adolescence, and motherhood; feminist movements in Italy and gender roles within certain historical contexts; and the varied nature of relationships between women and men, or women and other women.

580. *What Is Popular Literature?*

(3-0-3) Welle

A historical examination of modern and post-modern literary forms in Italy from the beginning of the 19th to the end of the 20th century. Emphasis on the historical novel, melodrama, and the *feuilleton*; crime, detective, and mystery novels; romances, the film-novel, the *foto-romanzo*, the *fumetto*, and the *e-zine*.

582. *History of Italian Cinema I: 1895 to 1943*  
(3-0-3) Welle

Traces the development of silent film, the transition to sound, and film under fascism, with particular emphasis on film's relationship to theater, literature, spectacle, and social and cultural history.

583. *Modern Italian Novel*

(3-0-3) Welle

Major works of Italian fiction from the 1840s until the 1960s are analyzed in relation to European literary currents and Italian

society and culture. Writers include Manzoni, De Amicis, Verga, Collodi, Tarchetti, D'Annunzio, Pirandello, Svevo, Aleramo, Invernizio, Lampedusa, Moravia, and Gadda.

585. *Modern Italian Poetry and Translation Studies*

(3-0-3) Staff

The historical development of modern Italian poetry and an introduction to translation studies.

587. *History of Italian Cinema II: 1945 to the Present*

(3-0-3) Welle

A close analysis of genres, spectatorship, directors, movements, and theoretical issues from neorealism to Italian television in the third millennium.

597. *Directed Readings*

(V-V-V) Staff

The following courses in Italian studies are cross-listed from participating departments:

505. *Family and Sentiment in Medieval Society*

524. *Ancient Italian Art and Architecture*

533. *Italian High Renaissance and Mannerist Art*

542. *Fifteenth-Century Italian Art*

544. *High Renaissance and Mannerist Art*

545. *Italian Baroque*

549. *Eighteenth-Century European Art*

571. *Twentieth-Century Italian Architecture and Design*

583. *Urban Space of Italy*

584. *Politics and Culture*

586. *Culture in Italian Cities*

599. *Thesis Direction*

(V-V-V) Staff

For students doing thesis work for a research master's degree.

600. *Nonresident Thesis Research*

(0-0-1) Staff

For master's degree students working in absentia.

### *Spanish*

503. *Topics in Medieval Spanish Literature*

(3-0-3) Seidenspinner-Núñez

The literature of medieval Spain in light of recent developments in critical theory.

511. *Spanish Golden Age Theater*

(3-0-3) Juárez

Readings of representative plays by Cervantes, Lope de Vega, Tirso de Molina, Ruiz de

Alarcón, and Caledón de la Barca in their historical and cultural context. The works will be studied in the light of the theatrical theory of the period as well as the contemporary criticism.

513. *Autobiographical Narratives of the Golden Age*

(3-0-3) Juárez

A study of fictional and historical autobiography in the Golden Age with attention to the development of the genre and the social and political problems represented in such texts as *Lazarillo de Tormes*, *Guzmán de Alfarache*, *El Buscón Estebanillo González* as well as the spiritual autobiography of Santa Teresa de Jesús, the life of the soldier Alonso de Contreras, and the adventures of Catalina de Erauso, *La monja Alférez*.

515. *Cervantes and His Time*

(3-0-3) Juárez

A close reading of Cervantes' *Don Quijote* in relation to the prose tradition of the Renaissance: novella, the pastoral romance, the romance of chivalry, the humanist dialogue, and the picaresque novel. We will also pay attention to the historical, social, and cultural context of the work.

531. *Nineteenth-Century Spanish Novel*

(3-0-3) Jerez-Farrán

Two forms of literary representation in the novel from the 1840s to the 1880s: the romantic-melodramatic and the realist-naturalist form.

540. *Avant-Garde Literature in Spain*

(3-0-3) Jerez-Farrán

The aesthetics and poetics of movements such as cubism, expressionism, dadaism, surrealism, and futurism studied in relation to the most representative literary works of the first three decades of the 20th century in Spain.

543. *Twentieth-Century Spanish Novel*

(3-0-3) Jerez-Farrán

A study of the development of the novel as an artistic genre in 20th-century Spain, from the Spanish-American War of 1898 to modern Spain examined within the context of the social, political, aesthetic, and intellectual crisis of the times in which they were written.

545. *Federico García Lorca: Prose, Theatre, Poetry, and Drawings*

(3-0-3) Jerez-Farrán

An in-depth study of Spain's preeminent poet and playwright, García López, that includes the rural tragedies, the avant-garde experimentations of his New York literary output,

together with his drawings and their interrelation with his literary works.

546. *Generation of 1927: Theatre and Poetry*

(3-0-3) Jerez-Farrán

The course includes a study of the theatre (mainly that of Lorca) and the poetry of the most representative poets of the so-called generation of 1927, with special emphasis on the metaphorical experiments of these poets, their stylistic development, thematic preoccupations, and personal aesthetic credos. These aspects will be studied against the cultural, historical, and social background of their time and country.

570. *Modernization and "Modernismo" in Spanish America: A Critical View*

(3-0-3) Olivera-Williams

An in-depth study of processes of modernization in Latin America and the literary production, written between 1880 and 1910, as responses as well as aesthetic and ideological propositions to the socio-political transformations of the region. Special attention will be paid to the lyric production, but other aesthetic systems, such as narrative fiction (short stories and novels), and essay will be studied.

571. *Creating a Nation/Creating a Woman*

(3-0-3) Olivera-Williams

An in-depth study of the most representative works by male and female authors of the 19th-century Spanish-American literature. The main focus of the seminar analyzes how these works establish intertextual dialogues to create images of nation, citizenship, and woman.

574. *Topics in Southern Cone Literature*

(3-0-3) Olivera-Williams

A study of representative movements and authors of 20th-century Southern Cone (Argentina, Chile, and Uruguay) literature through an examination of their aesthetic tendencies and sociohistorical contexts.

583. *Modern Spanish-American Novel*

(3-0-3) Ibsen, Anderson

Studies, through representative works, the modern aesthetic, cultural, and historical tendencies that characterize the 20th-century Spanish-American novel.

585. *One Century of Spanish-American Theater: Theory and Praxis*

(3-0-3) Olivera-Williams

An in-depth study, with the support of theories about drama, of the most representative Spanish-American plays of the 20th century.

Ideally, this seminar will produce certain hypotheses about the present state of dramatic practice in the continent.

587. *Topics in Mexican Literature*

(3-0-3) Ibsen

A study of representative movements and authors of 20th-century Mexican literature through an examination of their aesthetic tendencies and sociohistorical contexts.

588. *Spanish-American Short Story*

(3-0-3) Ibsen, Anderson

An overview of the principal tendencies of short narrative in 20th-century Spanish America, as well as major trends in narratological theory. Among the authors discussed are Horacio Quiroga, Jorge Luis Borges, Julio Cortázar, Rosario Ferré, Antonio Skármeta, and Luisa Valenzuela.

590. *Twentieth-Century Literature of the Hispanic Caribbean*

(3-0-3) Anderson, Heller

This course offers a comprehensive overview of contemporary Cuba, Puerto Rico, and the Dominican Republic. Special attention is given to questions of national identity and to the themes of moral, social, and political decay. Critical and theoretical works accompany the reading of primary texts on a number of related topics. Authors studied in this course include Gabriel García Márquez, Luis Rafael Sánchez, Guillermo Cabrera Infante, Reinaldo Arenas, Rosario Ferré, Juan Bosch, and others.

591. *Literature and Popular Culture in the Hispanic Caribbean*

(3-0-3) Anderson

This course focuses on the important influence of popular culture—music, film, television—in the fiction, theatre, and poetry of the Hispanic Caribbean. Special attention is given to the rich musical history and heritage of Cuba, Puerto Rico, and the Dominican Republic, and we study the important social and political components of musical genres, including *bomba*, *plena*, *son*, *salsa*, and *merengue*. Authors studied include Nicolás Guillén, Louis Palés Mato, Pedro Mir, Guillermo Cabrera Infante, Ana Lydia Vega, Magalí García Ramis, and others.

593. *Studies in Colonial Literature*

(3-0-3) Anadón

The development of narrative forms in Latin America. Examples of different prose works are studied: chronicles, humanistic histories, and letters. Special attention is given to the emergence of the novel.

596. *The Historical Novel in Latin America*  
(3-0-3) Anadón

The concepts of “history” and “fiction” are examined in relation to Latin-American historical novels. The *Tragicomedia de don Enrique de Castro*, considered to be the earliest example of this genre, is studied first, but the main emphasis is placed on more recent texts.

594. *Modern Spanish-American Poetry*

(3-0-3) Heller, Olivera-Williams

An overview of the major trends in Spanish-American poetry from the “vanguardia” to the present, with an emphasis on poetics and the social inscription of the works. Authors studied include Vicente Huidobro, César Vallejo, Pablo Neruda, Jorge Luis Borges, Gabriela Mistral, José Lezama Lima, Octavio Paz, Ernesto Cardenal, Alejandra Pizarnik, and others.

595. *Images of Nature in Spanish-American Literature*

(3-0-3) Heller

This course traces the images and metaphors with which Spanish-American writers and interested foreign travelers have described Latin-American nature. Earthly paradise, green inferno, a wasteland to be populated, or more nurturing aspect of the *madre patria*, these images and others have reflected ideological biases and shaped national cultures and identities. Authors considered include: Columbus, Carvajal, Humboldt, Darwin, Sarmiento, Gallegos, Rivera, and Vargas Llosa.

596. *Translating Hispanic Literature: Theory and Practice*

(3-0-3) Heller

Workshop serving as an introduction to literary translation, emphasizing practical discussions of each other’s work on prose and poetry translation exercises, as well as individual projects designed according to the student’s own interests. Complementary discussion of selected readings in translation history and theory (Steiner, Robinson, Venuti, and others).

597. *Topics in Latin-American Film*

(3-0-3) Anderson, Ferreira, Ibsen, Heller, Olivera-Williams

This course considers a variety of issues—national identity, colonialism, the status of women, violence and state repression, memory, etc.—through the medium of film, while also providing an overview of the major trends in contemporary Latin-American film.

*Faculty*

Samuel Amago, *Assistant Professor of Spanish*. B.A., Univ. of California, San Diego, 1996; Ph.D., M.A., Univ. Virginia, 1999; Univ. Virginia, 2003. (2003)

José Anadón, *Professor of Spanish Language and Literature*. B.A., Albion College, 1968; M.A., Univ. of Michigan, 1970; Ph.D., *ibid.*, 1974. (1975)

Thomas Anderson, *Assistant Professor of Spanish Language and Literature and Fellow in the Helen Kellogg Institute for International Studies*. B.A., Bowdoin College, 1992; M.A., Univ. of Pennsylvania, 1994; Ph.D., *ibid.*, 1998. (1998)

Paul F. Bosco, *Associate Professor Emeritus of Italian Language and Literature*. A.B., Wayne Univ., 1934; M.A., Harvard Univ., 1935; Ph.D., *ibid.*, 1942. (1947)

Maureen B. McCann Boulton, *Professor of French Language and Literature*. B.A., College of New Rochelle, 1970; M.A., Univ. of Pennsylvania, 1972; Ph.D., *ibid.*, 1976; M. Litt., Oxford Univ., 1980. (1985)

Theodore J. Cachey Jr., *Director of Graduate Studies, Professor of Italian Language and Literature, and the Albert J. Ravarino Director of the Devers Program in Dante Studies*. B.A., Northwestern Univ., 1974; M.A., Univ. of California, Los Angeles, 1982; Ph.D., *ibid.*, 1986. (1990)

Ayo Abiéto Coly, *Assistant Professor of French Language and Literature and Fellow in the Nanovic Institute for European Studies*. B.A., Université Cheikh Anta Diop (Sénégal), 1994; M.A., *ibid.*, 1996. (2001)

JoAnn DellaNeve, *Associate Professor of French and Comparative Literature*. A.B., Bryn Mawr College, 1976; M.A., Univ. of Pennsylvania, 1978; M.A., Princeton Univ., 1980; Ph.D., *ibid.*, 1982. (1982)

Bernard E. Doering, *Professor Emeritus of French Language and Literature*. B.S., Univ. of Dayton, 1944; M.A., Washington Univ., 1955; Ph.D., Univ. of Colorado, 1967. (1965)

Julia V. Douthwaite, *Assistant Provost for International Studies, Professor of French Language and Literature, and Fellow in the Nanovic Institute for European Studies*. B.A., Univ. of Washington, 1981; M.A., *ibid.*, 1984; Ph.D., Princeton Univ., 1990. (1991)

Andrew Farley, *Director of the Spanish Language Program and Assistant Professor of Spanish Language and Literature*. B.A., Furman Univ., 1994; M.A., Univ. of Georgia, 1996; Ph.D., Univ. of Illinois at Urbana-Champaign, 2000. (2001)

Isabel Ferreira, *Instructor of Portuguese and Brazilian Studies*. B.A., Rhode Island College, 1994; M.A., Brown Univ., 1997. (2001)

Janet Fisher-McPeak, *Associate Professional Specialist and Concurrent Lecturer*. B.A., Colorado Women’s College, 1975; M.A., Middlebury College, 1976; M.A., *ibid.*, 1979; A.B.D., *ibid.*, 1988; Ph.D., *ibid.*, 1997. (1989)

Ben A. Heller, *Associate Professor of Spanish Language and Literature*. B.A., Univ. of Pennsylvania, 1981; M.A., Washington Univ.; Ph.D., *ibid.*, 1990. (2000)

Kristine L. Ibsen, *Professor of Spanish Language and Literature and Fellow in the Kellogg Institute for European Studies*. B.A., California State Univ., Fullerton, 1983; M.A., Univ. of California, Los Angeles, 1984; Ph.D., *ibid.*, 1991. (1992)

Carlos Jerez-Farrán, *Associate Professor of Spanish Language and Literature and Fellow in the Nanovic Institute for European Studies*. B.A., Univ. of Sheffield, 1980; M.A., Univ. of Massachusetts at Amherst, 1983; Ph.D., *ibid.*, 1987. (1986)

Encarnación Juárez, *Assistant Professor of Spanish Language and Literature*. Licenciatura, Univ. Barcelona, 1977; M.A., Univ. of California, Berkeley, 1981; Ph.D., *ibid.*, 1987. (1995)

Louis A. MacKenzie Jr., *Associate Professor of French Language and Literature*. B.A., Univ. of Notre Dame, 1969; M.A., Middlebury College, 1972; Ph.D., Cornell Univ., 1976. (1983)

Christian R. Moevs, *Associate Professor of Italian Language and Literature*. B.A., Harvard Univ., 1980; M.A., Columbia Univ., 1989; Ph.D., *ibid.*, 1994. (1994)

Maria Rosa Olivera-Williams, *Associate Professor of Spanish Language and Literature*. B.A.S., Univ. of Toledo, 1976; M.A., Ohio State Univ., 1978; Ph.D., *ibid.*, 1983. (1982)

Catherine Perry, *Associate Professor of French Language and Literature and Fellow in the Nanovic Institute for European Studies*. B.A., Indiana Univ., 1987; M.A., *ibid.*, 1989; M.A., Princeton Univ., 1991; Ph.D., *ibid.*, 1995. (1993)

Colleen Ryan-Scheutz, *Assistant Professor of Italian*. B.A., Univ. of Notre Dame, 1990; M.A., Middlebury College, 1993; Ph.D., Indiana Univ., 1997. (1999)

Dubreil Sébastien, *Assistant Professor of French Language and Literature*. M.A., Univ. of Nantes, 1994; Ph.D., Emory, 2001. (2002)

Dayle Seidenspinner-Núñez, *Chair of Romance Languages and Literatures and Professor of Spanish Language and Literature*. B.A., Univ. of California, Berkeley; 1968; M.A., *ibid.*, 1971; Ph.D., Stanford Univ., 1977. (1997)

Alain P. Toumayan, *Associate Professor of French Language and Literature and Fellow in the Nanovic Institute for European Studies*. B.A., Univ. of Pennsylvania, 1976; M.A., Yale Univ., 1978; M.Phil., *ibid.*, 1980; Ph.D., *ibid.*, 1982. (1989)

Hugo J. Verani, *Research Professor of Spanish Language and Literature*. B.A., Phillips Univ., 1966; M.A., Univ. of Wisconsin, 1967; Ph.D., *ibid.*, 1973. (2002)

John P. Welle, *Professor of Italian Language and Literature, Concurrent Professor of Film, Television, and Theatre, and Fellow in the Nanovic Institute for European Studies*. B.A., St. John's Univ., 1974; M.A.T., St. Thomas College, 1975; M.A., Indiana Univ., 1980; Ph.D., *ibid.*, 1983. (1983)

## Theology

### Chair:

John C. Cavadini

### Director of Graduate Studies:

Joseph Wawrykow

### Director of M.A./M.T.S. Programs:

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### Director of M.Div. Program:

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### The Summer Master of Arts Program

The summer master of arts in theology is designed to provide graduate-level training in theology through one of several areas of study within the department. It offers a well-defined and yet flexible educational program that allows for a diversity of goals of individual students. It is also sensitive to the professional and pastoral context of the educational interests of the candidates.

The program serves the following constituencies:

- those seeking to teach theology at the high school level;
- those seeking to serve the church or diocese in an enhanced capacity;
- those seeking theological training to augment their work in other professional contexts (i.e., hospitals, social work, etc.).

Students seeking to go on for doctoral work in theology, or seeking more training to teach in high school, should apply to the M.T.S. program.

Applicants must have GRE scores of 1500 or better, 1000 and 4/6 in the new test, and at least six courses for credit in theology or religious studies on their official transcripts.

### Program Description

The summer M.A. in theology is a 30 credit-hour degree, consisting of classes in consecutive summer sessions. Summer M.A. students may take courses during the academic year for credit towards their degree. However, no academic year tuition scholarships will be provided for such course work.

There are six areas of concentration for the summer M.A. in theology: biblical studies,

history of Christianity, liturgical studies, moral theology, spirituality, and systematic theology.

Apart from liturgical studies, an area of concentration is normally constituted by:

- five courses in the area of concentration;
- one course each in four other areas;
- one free elective.

### Liturgical Studies

*Basic requirements (21 credits):* Liturgical history, liturgical theology, ritual studies, Eucharist, Christian initiation, liturgical prayer, and liturgical year.

*Electives (nine credits):* There are no required courses for any of the areas of concentration except for liturgical studies. However, those planning to teach in high school should take THEO 557: Educating in Faith: Catechesis in Catholic Schools, during their summer course work.

Those needing a more general and flexible program of studies may pursue a general M.A. program, in which the course of study is planned in consultation with the director. The sole requirement is the inclusion of at least one course in each area of study. This may be of particular interest to those teaching theology in high school who wish to use the summer M.A. to enhance their effectiveness in teaching in a number of different areas.

### Comprehensive Exams

In the last semester of course work, students should prepare five questions that they would like to explore in the comprehensive exams. These questions will guide both the student and the adviser in the construction of exam bibliographies. The student should then meet with the area adviser to refine these questions and construct her/his bibliography, drawing from the five annotated bibliographies provided by each area. A bibliography should be made up of 20 books, with 12 books from the bibliography in the area of concentration and two books from each of the other four areas. The bibliography should also contain five recent journal articles, so that students become acquainted with the journals in their fields of study. The bibliographies must be approved both by the area adviser and the summer M.A. director no later than one month before the student hopes to take exams. M.A. exams are given in the first week of November, April, and July. Students must be enrolled and registered for a thesis research class during the semester they plan to take their exams.

The exam board, to be chosen by the summer M.A. director in consultation with the area adviser, will be made up of two faculty from the area of concentration, and one faculty from another area. Students pursuing the general M.A. degree may have an exam board chosen from three different areas. The student may confidentially choose the inclusion of one member of the board (subject to availability), and the exclusion of one faculty member. Each member of the exam board will submit three questions, framed in light of the five questions proposed by the student, to the area adviser, who will then formulate five questions, and submit them to the summer M.A. director for final approval.

The comprehensive exams themselves are made up of written and oral exams. The student will be asked to answer three of the five questions during the four-hour written exams, given on the Monday of exam week. These written answers will then be distributed to the board, and will form the basis of the 40-minute oral exam on Wednesday or Thursday of the same week. During the oral exams, questions not answered by the student on the written exam may be addressed, as may books on the bibliography and courses taken by the student. Evaluation of the student's performance will be made on the basis of both the written and oral exams.

#### *Applications*

Applications to the summer M.A. program are due May 1 and must include an application form, a statement of intent, transcripts of degrees and course work, three letters of recommendation, and GRE scores. All application materials should be directed to the Graduate School.

#### *The Master of Theological Studies Program*

The master of theological studies (M.T.S.) is specifically designed to train graduate students for future doctoral work in the various disciplines within the study of theology. The M.T.S. is a 48-credit-hour degree designed to give students exposure to the full range of theological studies while also allowing them to develop competence in an area of concentration. Along with two years of full-time course work, the M.T.S. also includes participation in the master's colloquium, competency in one modern language, and a comprehensive oral exam to be given at the end of the second year of course work. Biblical studies and history of Christianity also have ancient language requirements.

In order to introduce every M.T.S. student to the full range of theological education, every student in the program must take at least six credit hours in biblical studies, six in the history of Christianity, three in liturgical studies, three in moral theology, and three in systematic theology. There are five areas of concentration. Students must take at least 15 credit hours in the area of their concentration.

#### *Areas of Concentration*

*Biblical Studies:* The concentration in biblical studies involves 15 credit hours in biblical studies, six in history of Christianity, three in liturgical studies, three in moral theology, and three in systematic theology. In place of electives, biblical studies students will take nine credit hours in one ancient language (Greek, Hebrew, or Latin) and nine credit hours in another ancient language.

*History of Christianity:* The concentration in history of Christianity involves 15 credit hours in history of Christianity (with the possibility of three to be taken outside the department), six in biblical studies, six in systematic theology, three in liturgical studies, and three in moral theology. Six credit hours will normally be devoted to the study of ancient languages. Nine credit hours will be electives, distributed according to the interests of the students, and may include courses outside the Department of Theology (e.g., philosophy, Medieval Institute, history, art history, etc.), with the prior approval of history of Christianity faculty and the M.A./M.T.S. director.

*Liturgical Studies:* The concentration in liturgical studies will involve 15 credit hours in liturgical studies, six in biblical studies, six in history of Christianity, six in systematic theology, three in moral theology, and 12 in electives.

*Moral Theology:* The concentration in moral theology will involve 15 credit hours in moral theology, nine in a second area, nine in a third area, six in a fourth area, and six in a fifth area. In the fourth semester of course work, students in the area will be required to take a research seminar and prepare to present a research paper in a public format, similar to a scholarly conference, in preparation for future work in the academy.

*Systematic Theology:* The concentration in systematic theology will consist of 15 credit hours in systematic theology, six in biblical

studies, six in history of Christianity, six in liturgical studies, six in moral theology, and nine in electives, including three credit hours in Judaism.

#### *Master's Colloquium*

The master's colloquium is designed both to familiarize M.T.S. students with the methods and content of the five areas of theological study and to develop integrative skills regarding the five areas of theological investigation. A faculty member and a student lead each colloquium from one of the five areas, presenting a topic of interest to the colloquium and leading the ensuing seminar discussion. Attendance is mandatory for all M.T.S. students.

#### *Research Language Requirement*

All M.T.S. students must pass a Graduate Reading Exam in either German or French, usually by the end of their third semester, in order to graduate. Students who already know one of these languages upon admission to the program should take the GRE in that language in their first semester, and acquire a second language during their time in the program, in order to pass an exam in that language as well. The University offers intensive language courses in German and French, free of tuition, every summer, with exams at the end of the course. Students who wish to acquire a language other than French or German during their time in the program may petition the M.T.S. director for a substitution, based entirely on their future research interests. This language may not be one they already know upon admission to the program, as the point of this requirement is to continue to acquire language skills while in the M.T.S. program.

#### *Comprehensive Exams*

The comprehensive exams are administered toward the end of the final semester of course work. M.T.S. students are asked to submit two research papers written in their second year of courses that indicate the nature and direction of their studies. A board of three faculty, appointed by the M.T.S. director on the basis of course work taken by the student, administers a 60-minute oral exam, which explores the student's competency in the area of concentration and the student's ability to think creatively and synthetically.

#### *Prerequisites:*

- a bachelor's degree
- applicants to the M.T.S. program are expected to have a background in the

humanities (preferably including theology or related disciplines) and/or the social sciences

- Graduate Record Examination scores with an aggregate score of at least 1800, or 1200 and 4.5/6 for the new exams

### *Tuition Scholarships*

Students admitted to the M.T.S. program receive full-tuition scholarships for the duration of their program.

### *Applications*

Applications to the M.T.S. program are due February 1 and must include an application form, a statement of intent, transcripts of degrees and course work, three letters of recommendation, and GRE scores. All application materials should be directed to the Graduate School.

To receive more information about the M.A. or the M.T.S. programs, please contact:

Director of the M.A./M.T.S. Programs  
130 Malloy Hall  
Department of Theology  
University of Notre Dame  
Notre Dame, IN 46556-4619  
Telephone: (574) 631-5254  
E-mail: theo.1@nd.edu  
Web: <http://www.nd.edu/~theo>

### *The Master of Divinity Program*

The master of divinity (M.Div.) is a professional theological degree designed to prepare students for learned and effective ministry in the Roman Catholic Church. The studies of Scripture, the history of Christian tradition, systematic theology, liturgy, and Christian ethics are joined to field experience and training in pastoral skills to form a comprehensive ministerial curriculum.

The University of Notre Dame is a special setting for an M.Div. program. The intellectual opportunities and challenges of a major teaching and research university are appropriate backdrops for pastoral studies. Notre Dame is a crossroads for people and programs touching church life, as it attracts representative figures from dioceses and religious movements in all parts of the United States. There is an extensive, well-conceived campus ministry program with its spectrum of liturgical and pastoral opportunities. The Institute for Church Life offers programs in continuing education for bishops, priests, and religious leaders, as well as national programs in liturgy training. The Center for Social Concerns

sponsors many educational initiatives in social justice and direct service to the poor. Because of the size of the Department of Theology at Notre Dame and the significant number of visiting professors, a wide offering of courses is available in all areas of theology.

The M.Div. program includes a variety of students: members of the Congregation of Holy Cross studying for the priesthood, laywomen and laymen, and members of religious congregations. With this community of students, the University furthers the expansion and diversification of ministry and fosters a realistic and helpful context for ministerial education.

### *The Program of Studies*

The program of studies leading to the master of divinity degree normally extends over six semesters and encompasses 83 credit hours. Students may use additional semesters to acquire further theological depth. Credit requirements are usually allocated in the following way:

Biblical studies	12 hours
Historical studies	6 hours
Systematic theology	15 hours
Christian ethics	6 hours
Canon law	3 hours
Liturgy	6 hours
Field education	10 hours
Pastoral studies	14 hours
Elective	9 hours
Synthesis seminar	2 hours

### *Field Education*

Contemporary life is a source of theology as well as the milieu of ministry. The field education program provides an initial joining of service with theological reflection.

To facilitate theological integration and personal appropriation, the field education program consists of: (1) internships in parishes, hospitals, and social agencies; (2) regular individual supervision with a competent authority at this place of work; and (3) weekly seminars at the University in which students analyze case studies based on their work and discuss issues of importance relative to active ministry in the church today. This threefold process unites with the students' concurrent studies in scripture, history, and systematic theology to enable them to develop professional identities in ministry.

### *John S. Marten Program in Homiletics and Liturgics*

Inaugurated in 1985 through an endowment by the John S. Marten family, this program

annually offers courses in both homiletics and liturgical celebration for students whose ministry will involve the preaching of God's word and leadership in worship. Through the Marten program, M.Div. students benefit from symposia and workshops on preaching in contemporary society, and the program occasionally hosts a visiting professor to offer additional courses in those areas. The vision and generosity of the Marten family ensure the continuance of deep spiritual renewal of local faith communities—a major thrust of Vatican II—and adds a significant dimension to theological education at Notre Dame.

### *Lay Ministry and Seminary Formation*

The Lay Ministry Formation Program is a critical part of the comprehensive curriculum of the M.Div. degree. Students preparing for lay ministry participate in weekly prayer, celebration of the Eucharist, and monthly meetings that focus on topics pertaining to the personal, professional, spiritual, and professional development of the aspiring lay minister. The program also fosters a sense of community among the students.

Moreau Seminary, located on the Notre Dame campus, under the direction of the Congregation of Holy Cross, serves as the religious formation house for the congregation's seminarians pursuing their theological studies at Notre Dame. The Congregation of Holy Cross offers a one-year candidate program at Moreau Seminary for college graduates who qualify and who have a strong interest and desire in taking a step toward investigating a vocation in priesthood or brotherhood in Holy Cross.

### *Prerequisites for Admission*

1. The completion of a bachelor's degree;
2. Evidence of a capacity for independent study and scholarship. Such evidence is offered by (a) GRE scores of at least 500 in both verbal and analytical test; (b) a transcript of study for the bachelor's and any graduate degree; and (c) recommendations from three instructors or professors;
3. At least 18 credit hours in philosophy or the equivalent, and 12 credit hours in theology or religious studies;
4. Evidence of a mature personality capable of ministering to others; to this end, one recommendation supporting the candidate's ability for ministerial leadership is to be submitted;
5. At least one year of full-time service work in ministry in the Catholic Church;



6. An autobiography written according to a form specified by the M.Div. director;
7. A letter of intent specific to the M.Div. program that sets forth, first, the goals of the candidate for the Christian ministry, and second, a view of how the M.Div. program will assist the candidate in attaining his or her goals;
8. A personal interview held at the University, with representatives of the M.Div. program.

#### *Tuition Scholarships*

Students admitted to the M.Div. program are eligible for full-tuition scholarships, which are renewable for the duration of the three-year program.

#### *Application*

In order to receive an application to the Graduate School (due February 1), prospective applicants for the M.Div. program must first file a pre-application form directly with the Department of Theology. To receive more information and the pre-application form, visit our Web site at <http://www.nd.edu/~mdiv>.

Applicants are admitted to the M.Div. program according to the norms and procedures of the University's Graduate School. Continuation in the program is based on the student's cumulative grade point average, performance in field education and skills courses, an annual academic review by the theology faculty, and the Graduate School's regulations.

To receive more information about the M.Div. program, please contact:

Director of the M.Div. Program  
131 Malloy Hall  
Department of Theology  
University of Notre Dame  
Notre Dame, IN 46556-4619  
Telephone: (574) 631-4256  
E-mail: [mdiv.1@nd.edu](mailto:mdiv.1@nd.edu)  
Web: <http://www.nd.edu/~mdiv>

#### VOCATIONAL DISCERNMENT

For information regarding discernment of a vocation with the Congregation of Holy Cross, please contact:

Director of Vocations  
Congregation of Holy Cross  
Box 541  
Notre Dame, IN 46556  
Telephone: (574) 631-6385  
E-mail: [vocation@nd.edu](mailto:vocation@nd.edu)  
Web: <http://www.nd.edu/~vocation>

#### *The Doctoral Program*

Doctoral studies at Notre Dame provide the opportunity for advanced study in theology through specialization in one of five areas.

*Christianity and Judaism in antiquity* covers four disciplines: the Hebrew Scriptures; Judaism, especially second temple and early rabbinic Judaism; the New Testament and Graeco-Roman world; and other Christian sources to the early medieval period. These are frequently studied in isolation from one another; in CJA they are studied together for their mutually illuminating interrelationships. At the same time, the integrity of each discipline is respected. Judaism is explored in its own right as well as in its relationship to Christianity. Christianity is explored by itself as well as in its dependence upon Judaism and its conscious emerging distinction from Judaism. Both are explored within the larger contexts of the ancient near East and the Greco-Roman world, which are also studied in their own right.

*History of Christianity* explores the study of the history of Christianity in all its rich complexity. The program focuses on three major periods: ancient, medieval, and Reformation-modern. The University has particularly strong library holdings and faculty resources in the ancient and medieval periods.

*Liturgical studies* advances the study and understanding of the worship life of the Christian church in its various traditions. The program is inspired by the conviction that liturgy, in its several and diverse manifestations, is the key to the church's identity, ethos, and orientation toward God and the world. It integrates three subdisciplines: liturgical history, liturgical theology, and ritual studies.

*Moral theology/Christian ethics* studies a number of subdisciplines including foundational, medical, and social ethics. The program encourages interaction with philosophical ethics. While the program concentrates on the Roman Catholic tradition, it engages and is open to a variety of traditions.

*Systematic theology* engages in the disciplined and critical inquiry into the major tenets of Christian faith, especially as understood within Catholicism. The program addresses a wide range of concerns including the historical development of theology, constructive issues, and comparative theology.

#### *Course of Studies*

##### **1. Residency**

The period of "residency" normally consists of two years of course work for those who have a master's degree in theology. In the rare case of a student admitted without master's-level work, the period of residency is three years.

*Major Fields.* Within the program areas, students concentrate their course work in a major field. These major fields are defined as follows:

- Christianity and Judaism in antiquity  
Hebrew Bible and Judaica  
New Testament and early church
- History of Christianity  
Early church  
Medieval studies  
Reformation and modern studies
- Liturgical studies
- Moral theology/Christian ethics
- Systematic theology

*Course Requirements.* Students are expected to take 14 courses during residency: eight of these must be in the major field of study; three must be outside the major fields; and three are electives.

*Language Requirements.* Students are required to pass examinations in three languages, Greek or Latin, French, and German. The level of competence required is the ability to read standard theological sources pertinent to the area of study with the aid of a dictionary. Students in the history of Christianity program must know the ancient language at an advanced level. Students in liturgical studies are required to know four languages, all at the basic level. Students in Christianity and Judaism in antiquity are required to pass examinations in five languages: one ancient at an advanced level, one ancient at an intermediate level, one ancient at a beginning level, and two modern languages. The language requirement should be fulfilled as soon as possible and must be fulfilled by the end of the second summer of residence.

*Advising.* When a student enters the program, the faculty member who serves as the coordinator for the area of studies will function as a preliminary adviser. During the second semester in residency, each student, after appropriate consultation, selects an adviser in his or her area of research interest.

*Evaluations.* At the end of each semester the entire graduate faculty of the department will

evaluate the progress of students. These evaluations are designed to facilitate the progress of students through the program and to identify both strengths and weaknesses. Area coordinators write letters to the students reporting the conclusions of the evaluation. These provide more specific commendations and recommendations than course grades. If there is serious doubt about the student's ability to complete the Ph.D. degree, he or she may be asked to leave the program.

## 2. Independent Study

After the period of course work, students spend a period of time, normally nine months, of independent study organized around a series of topics. These topics are meant to expand the students' intellectual breadth and skills and involve matters of inquiry that extend beyond their course work. After consultation with the adviser, the student will propose a series of 10 topics, seven in the major field of study and three outside the major field. At least one of the topics in the major field will deal with the subject on which the student intends to write a dissertation. The program of independent study is approved by a committee and forms the basis for candidacy examinations.

## 3. Candidacy Examinations

Offered only twice a year, in October and March, the examinations are usually taken in the second semester after the two-year residency. The exams consist of three days of written examinations and a 90-minute oral examination. Successful completion of the written examinations is required for admission to the oral examination.

## 4. Dissertation Proposal

The dissertation proposal is to be submitted by the beginning of the semester following oral candidacy examinations.

## 5. Dissertation

The completed dissertation must be submitted within eight years from matriculation into the program. After approval by a committee composed of the dissertation adviser and three other readers, the dissertation is defended orally.

### Prerequisites:

- a bachelor's degree;
- a master's degree or the equivalent with a concentration in the proposed field of study;
- cumulative GREs in the pre-October 2002 format of at least 1800; comparable scores in the post-October 2002 format;

- facility in some of the languages required for study in the program: Greek, Latin, Hebrew, French, and German.

The graduate programs are open to all qualified students regardless of religious affiliation.

### Scholarships

The doctoral program requires a full-time commitment. For this and other reasons, each doctoral student receives full funding. The funding may come from the University or an outside source. Funding is full tuition plus a stipend for five years. The University provides three funding programs: department fellowships, minority fellowships, and presidential fellowships. In addition, students receive some benefits for travel to professional conferences and summer dissertation support.

### Applications

Applications to the Ph.D. program are due January 15, and must include an application form, a statement of intent, transcripts of degrees and course-work, three letters of recommendation, and GRE scores. All materials should be directed to the Graduate School. Applicants are accepted for matriculation in the fall semester only.

To receive more information about the doctoral program, please contact:

Director of the Ph.D. Program  
Department of Theology  
University of Notre Dame  
121 Malloy Hall  
Notre Dame, IN 46556-4619  
Telephone: (574) 631-5732  
E-mail: theodgs@nd.edu  
Web: <http://www.nd.edu/~theo>

### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

The courses are offered regularly by the department in the course of any two-year period. They are divided into three categories: (1) master's and doctoral courses; (2) courses specifically for M.Div. students; and (3) advanced or doctoral courses. For a complete

listing of 400-level courses open to graduate students, please refer to the theology section in the *Bulletin of Information*, Undergraduate Programs.

### Master's and Doctoral Courses

#### 500. M.A.-M.T.S. Colloquium

(3-0-0) Zachman

Required for all M.A. and M.T.S. students. (Every semester)

#### 500C. Faith and Traditions

(0-0-3) Miscamble

Required for non-degree-seeking seminarians only. (Every semester)

#### 503. Pentateuch

(3-0-3) Page, Ulrich, VanderKam

Intended primarily for M.A., M.T.S., and M.Div. students, this course promotes close and critical reading of biblical texts and disciplined theological reflection on them. Participants will be expected to read the Pentateuch in its entirety and have a sound idea of its contents and structure. Much of the basic information needed will be acquired through reading; class meetings will concentrate on theological issues arising out of the biblical and secondary reading. Topics include the following: doctrine of creation; holiness and sin; biblical law and Christian ethics; covenant: grace and obligation; Exodus, Passover, liberation; wilderness themes: providence, guidance, institutions; community models. (Every fall)

#### 503A. Introduction to Hebrew Bible

(3-0-3) Ulrich

This course provides an overview and critical study of the Hebrew Scriptures in their literary, historical, and theological contexts. The focus will be principally on reading and gaining an informed understanding of the biblical text, but this will be done against the background of the history, literature, and religions of the magnificent civilizations in the ancient Near East. Further aspects include analysis and use of the tools of historical-critical scholarship; ancient mythology; the processes by which the Scriptures were composed; Old Testament theology; and contemporary theological issues. The course is designed to prepare students both for graduate biblical studies and for intelligent effectiveness in the contemporary church. (Fall)

*504. Prophets*

(3-0-3) Page, Ulrich, VanderKam

We expect to cover the historical development of prophecy in Israel and early Judaism inclusive of early Christianity. Our method of work combines survey by means of set readings and “close readings” of selected prophetic texts. Attention will be given to comparative material in ancient and other cultures and to the sociological coordinates of prophetic phenomena, including ecstasy. Participants will be invited to reflect on the theological significance of prophetic mediation and the place of prophecy in Christian life today. (Alternate spring)

*505. Wisdom*

(3-0-3) Page, Ulrich, VanderKam

The first part of the course offers an introduction to biblical wisdom literature and a study of the books Proverbs, Job, Ecclesiastes, the Wisdom of Ben Sira, and Wisdom. After this comes an analysis of the Book of Psalms. (Alternate spring)

*507A, 507B. Elementary Biblical Hebrew I, II*

(3-0-3) (3-0-3) Anderson, Page

This is a two-semester introductory course in biblical Hebrew; under normal circumstances, the student must complete the first in order to enroll in the second. The fall semester will be devoted to learning the grammar of biblical Hebrew. The spring semester will be divided into two parts. For the first six weeks we will finish and review the grammar. In the remaining part of the course we will read and translate texts from the Hebrew Bible, Qumran, and Rabbinic literature. The course will focus on developing reading and comprehension skills in biblical Hebrew through the study of biblical texts. In addition, students will learn how to use reference grammars, concordances, and apparatus to the *Biblia hebraica*. The course encourages students to think about the grammatical forms and their implications for biblical interpretation. (Summer, each fall, and spring)

*507H. Intermediate Hebrew*

(3-0-3) VanderKam

The course builds on the lessons learned in Elementary Hebrew and offers the opportunity to increase one's knowledge of Hebrew by reading and analyzing passages from the Hebrew Bible. There will also be some reading selections from other texts such as the Dead Sea Scrolls.

*508A. Elementary Greek I*

(3-0-3) Staff

Introduction to the Greek language.

*509A. Aramaic*

(3-0-3) VanderKam

*Prerequisite:* One year of Hebrew or Syriac. In addition to covering the grammar and syntax, the principal goal will be to read the biblical texts in Aramaic (Ezra 4:8-6:18; 7:12-26; Daniel 2:4b-7:28). As time permits, we will also read selections from Old Aramaic monumental inscriptions, Imperial or Achaemenid Aramaic (e.g., Elephantine papyri), and Jewish literary Aramaic from the later period (e.g., Genesis Apocryphon). (Alternate spring, odd-numbered years)

*509B. Greek: Euripides*

(3-0-3) McLaren

This course will consist of in-depth readings of selections from a number of Euripidean plays, along with a detailed examination of the dramatic, literary, religious and philosophical backgrounds against which they were composed, performed and received. We will be primarily concerned with the language and formal characteristics of the works themselves, but will attend also to the ways in which those works helped define the revolutionary intellectual milieu of late fifth-century Athens, and the methods by which they have been analyzed and explained in 19th- and 20th-century scholarship.

*509C. Coptic*

(3-0-3) Sterling

This course introduces students to Coptic, the final descendant of ancient Egyptian. Coptic is important for an who are interested in the historical Jesus, Gnosticism, textual criticism of the New Testament, asceticism, or early Christian history. We will work our way through a grammar, and then read a selection of texts including excerpts from the Gospel of Thomas and some fragments only from the *Martyrdom of Polycarp*. The course is designed to enable students who have no previous training in Coptic to read simple to moderately difficult texts. Its serves to fulfill the third ancient language requirement for Ph.D. students in CJA. (Spring)

*511. Exegesis: Gospels*

(3-0-3) Neyrey

This course aims to assist students in learning to do a critical reading of a gospel, in this case, the Gospel of Matthew. The parameters of this course are: (1) critical investigation of the sources of the gospels, (2) acquaintance with the literary forms which make up the gospels, in particular the elements of the encomium, (3) the literary structure of the gospel in general and the arrangements of its parts, (4) the distinctive understandings

of both God and Jesus in the gospel, and (5) knowledge of the historical and cultural background of Jesus and his interpreters. The focus will be on Matthew, but this means that Mark will also be studied, as well as the Q source and materials in Luke that impinge on Matthew (such as genealogy, birth narratives, resurrection appearances). As Virgil said about the devious Greek who tricked the Trojans to take the horse inside the city, “From one example, you know them all.” Matthew, carefully studied, equips one to read the rest. (Fall)

*512. Gospel of John*

(3-0-3) Aune, D'Angelo, Meier, Neyrey, Sterling

The course will seek to improve exegetical skills, to grasp the structure of the gospel of John, and to explore John's relationship to the letters and its function and history in the community and milieu in which it was written. The course will consider issues of genre, context, and theology, including the wisdom traditions from the gospel's Christology, its understanding of community that affirms the autonomy of the believer, the significance of prophecy in Christology and community life, the ways the women and men participated in the community, the community's combination of resentment toward and relatedness to “the Jews,” and their rejection of the Roman imperial order. (Alternate fall)

*513. Pauline Writings*

(3-0-3) Aune, Neyrey, Sterling

An exploration of the historical Paul and his reception in the early church. The course has four basic units. First, we will reconstruct Paul's life and explore the significance of specific events for his thought. Second, we will work through the uncontested letters highlighting crucial issues. Third, we will attempt to explore Paul's thought systematically. Finally, we will consider the reception of Paul by the early church in the first two centuries. We will use his ancient *Receptionsgeschichte* to raise the issue of his contemporary reception. The course also serves to introduce students to the critical study of ancient texts at a graduate level. This will entail the introduction and use of numerous contemporary methodologies. (Alternate fall)

*514. Prayer, Worship, Priesthood, and Temple*

(3-0-3) Neyrey

This course will necessarily give special attention to the Letter to the Hebrews because of its concern to define Jesus as priest and victim who enters a new temple to offer the

perfect sacrifice. Yet it will take up a social-science model of prayer and use it as the lens for the reading of OT and NT prayer texts; special attention will be given to the various prayers of Jesus, both in the garden and on the cross. Moreover, notions of fixed holy space (temple) and sacrifice will be addressed through the lens of the social sciences. Finally, attention will be given to “sacrifice,” especially the sacrifice of praise celebrated in the New Testament.

519. *Christianity in Africa*

(3-0-3) Kollman

This course will explore the history of Christianity in Africa, beginning with the early church but with heightened attention to the more recent growth of Christianity on the continent. Particular topics to be addressed include: the dynamics of missionary activity before, during, and after the colonial period; the rise of African Independent Churches; the interaction between Christianity and Islam in the past and present; and contemporary issues surrounding Christianity and the African nation-state. We will also investigate theological questions surrounding the relationship between Christianity and culture. In addition to a final exam, students will have the option of one longer research paper or several shorter papers.

520. *Women and the Origins of Christianity*

(3-0-3) D'Angelo

The course will examine the origins of Christianity and the documents of the New Testament from a feminist perspective, analyzing New Testament texts and other sources of early Christianity in order to remember the participation of women in the early Christian movement and to describe the theological stance of each work and author in relation to the inclusion of women in the gospel. It will also look at the ways these texts affect the lives of women today, attempting to be alert to issues of class and race as well as of gender.

521. *Early Christianity: An Introduction*

(3-0-3) Cavadini

This course provides an introduction to the history and thought of the first 500 years of the Christian church. The approach taken will be largely that of social history: we will try to discover not only the background and context of the major theological debates but also the shape and preoccupations of “ordinary” Christian life in late antiquity. Topics to be studied will therefore include canon formation, martyrdom, asceticism, Donatism, Arianism, and Pelagianism. The class will stress the close reading of primary texts.

Requirements include class participation, a final examination, the memorization of a few important dates and places, and two papers, one of which will be an exercise in the close reading of an additional primary source and the other an exploration of early Christian exegesis.

522. *Historical Theology: Medieval*

(3-0-3) Prügl

Development of Christian theology in medieval Western Europe up to the 14th century and medieval theologians from Boethius to Ockham. Themes include monastic, scholastic, apocalyptic theology; “authorities” (e.g., Aristotle, Augustine, Pseudo-Dionysius); and reading of the Bible. (Alternate fall)

523. *Historical Theology: Reformation*

(3-0-3) Zachman

An examination of the theology of such major protestant figures as Luther, Zwingli, Calvin, Melancthon, Simons, and Cranmer in the context of competing Catholic visions of reform. (Alternate spring)

525. *Topics in Early Christianity*

(3-0-3) Cavadini

This course will be an examination of traditions of biblical interpretation in the early church. Since the greatest proportion of exegetical literature in the early church was homiletic, this course will also entail an examination of traditions of preaching. We will devote considerable attention to ancient allegorical schools of interpretation (Origen), to reactions against it (“Antiochene” exegesis), and to Western exegetes (Augustine, Gregory the Great). We will also look at the uses of the Bible in ascetical literature (desert fathers and mothers, etc.).

526. *Topics in Medieval Theology*

(3-0-3) Prügl, Wawrykow

Close examination of a selected important topic in medieval theology. Topic changes yearly.

528. *Jews and Christians throughout History*

(3-0-3) Signer

In October 1965, during the closing days of the II Vatican Council, the document *Nostra Aetate* (*Declaration on non-Christian Religions*) reversed a negative attitude of the Catholic Church toward Judaism and the Jewish people. This remarkable change put an end to nearly two thousand years of Christian contempt for Judaism as “perfidy” and for the Jewish people as “killers of Christ.” *Nostra Aetate* promoted “dialogue” with Jews, and called for positive changes in the ways

in which Judaism was presented in liturgy and catechesis. Reactions from the Jewish communities were diverse: from suspicion to welcoming.

This course assumes no background knowledge in these subjects and will explore a number of issues, which emerge from the history of Christian thought and theology: How did a negative image of Judaism develop within Christianity? In what ways did these unfavorable teachings contribute toward violence against the Jews? What is the relationship between Christian anti-Jewish teachings and anti-Semitism? Is there any correspondence to Christian hostility within Judaism? In what ways have Jewish authors reacted to Christian tradition? To answer these questions we will turn to the history of Jewish-Christian relations in the ancient, medieval and modern periods.

529. *St. Bonaventure: Theology and Spirituality in 13th-Century Scholasticism*

(3-0-3) Prügl

Along with Thomas Aquinas and Albertus Magnus, St. Bonaventure is considered one of the leading and most influential theologians of the high Scholastic period. Although he had to abandon his promising career as a university teacher in order to lead the fledgling Franciscan order as its minister general, Bonaventure continued his theological work until the end of his life. Critical of the growing influence of Aristotelian thought within theology, he deliberately chose the tradition of St. Augustine, Ps.-Denis and Hugh of St. Victor as the basis for his theology. The recent emphasis on his spiritual writings notwithstanding, Bonaventure developed a highly speculative and consistent theology, which spans the whole horizon of scholastic theology. Providing an introduction to Bonaventure's life and writing, the course will focus on central aspects of his theology such as the Trinity, creation, Christology, anthropology, and theological epistemology.

529A. *Boethius: An Introduction*

(3-0-3) Gersh

The course will attempt a study of Boethius, one of the foundational figures of medieval culture, in an interdisciplinary and open-ended manner. Our approach will be interdisciplinary in that we shall simultaneously study philosophical-theological and literary subject matter and simultaneously apply philosophical-theological and literary methods. It will be open-ended in that students will be expected to react creatively to the topics under review in terms of their own

independent studies and research (e.g., in connecting Latin and vernacular materials). During the course we shall read a broad selection of passages in Latin and in English translation drawn from Boethius' work in the fields of science (arithmetic), music, logic, and theology. Part of the course will be devoted to a close study of *De Consolatione*. Philosophers Plato and Aristotle and the Greek scientists Nicomachus and Ptolemy, without forgetting the theology of Augustine. Turning from Boethius to Boethius in quotation marks and Boethius "under erasure," we shall study Boethius read intertextually by glossators, commentators, and other writers from the eighth to the 14th century. Requirement: one final essay (ca. 20 pp.)

530. *Fundamentals of Systematic Theology*  
(3-0-3) Doak

This course is a graduate-level introduction to the nature, tasks, and methods of systematic theology. It will proceed through a focus on 20th-century theological contributions to the doctrine of revelation, with special attention being given to the sources and methods used by major theologians. In addition to refining our understanding of the Christian doctrine of revelation, this study should result in a clearer grasp of such basic theological topics as: the relation of faith and reason, the use of Scripture and tradition as theological sources, the significance of contemporary experiences, and the theological importance of praxis. (Fall)

531. *Hermeneutics: Ancient and Modern*  
(3-0-3) Gersh

The course will be a study of general hermeneutics (with special reference also to philosophical-theological and literary hermeneutics) through the staging of an encounter between classic texts dealing with this subject from the late ancient period and from the 20th century, respectively. From the earlier time-period the texts will include Origen: *On First Principles*; Augustine: *On Christian Teaching*, *On the Literal Interpretation of Genesis*; Proclus: selections from exegetical works dealing with Homer and Plato; from the later time-period Heidegger: *Being and Time*, *What is Called Thinking*; selections from exegetical works dealing with Hölderlin; Gadamer: *Truth and Method*; and Derrida: *Of Grammatology*. In addition to studying the texts carefully—the first requirement of an exegete—we shall constantly ask questions such as the following: What is the relation between hermeneutics and "reality"? Is there a significant difference between philosophical-theological and literary hermeneutics? If so, what

is that difference? In the last analysis, can one have a theory of hermeneutics or merely practice it? Requirement: one final essay (ca. 20 pp.). (Fall)

532. *Christology*  
(3-0-3) Krieg

This course examines the contemporary Christology: the meaning of the doctrine of Chalcedon, the theological significance of the historical Jesus, the theological role of belief in the resurrection of Jesus Christ, and the understanding of Jesus Christ as redeemer. It pursues these issues by studying the Christologies of Karl Rahner, Gerald O'Collins, Brian McDermott, and Jon Sobrino. The course requires the writing of four essays on the assigned texts, secondary literature, and lectures. (Fall)

533. *Ecclesiology*  
(3-0-3) McBrien

An examination of the nature and mission of the church, with special emphasis on the Second Vatican Council, its theological and doctrinal antecedents, and postconciliar developments. (Spring)

534. *The Mystery of God*  
(3-0-3) O'Regan

The general aim of the course is to introduce the student to the Catholic tradition of reflection on the triune God who always remains mysterious even in, or precisely in, his revelation in history and in our lives. The pedagogic aim is familiarity with the tradition that is the church's common possession. (Spring)

535. *Theology of Edward Schillebeeckx*  
(3-0-3) Hillkert

The theological project of Edward Schillebeeckx traces one trajectory in the development of Catholic theology in the 20th century. This course will explore the evolution in Schillebeeckx's thought from an early sacramental and dogmatic theology grounded in the thought of Thomas Aquinas, through the turn to history and eschatology in the mid 1960s, to his later focus on radical suffering ("negative contrast experience") as the necessary starting point for theology today. A second goal of the course will be to provide an overview of major areas of systematic theology that have been the focus of Schillebeeckx's contemporary writings including theology of revelation, sacramental theology, Christology/Soteriology, ecclesiology, and theology of ministry. Requirements: Careful preparation of required reading as preparation for lectures and discussion, midterm and final examinations, and either a research paper of

15-20 pages or three analytical papers based on required readings (5-8 pp.).

536. *Theologians of Grace*  
(3-0-3) Hillkert

Grace, the foundation for Christian faith and life, is both unavoidable and intangible. The context for grace is freedom; its opposite is sin; its concretization, charism. The course looks briefly at this reality described by some writings of the New Testament, then at the controversial history of grace and free will and at major theologians of grace: Augustine, Aquinas, Luther, and Rahner. The extent of grace and realizations of grace in art are touched upon. (Fall)

541. *Contemplation and Action*  
(3-0-3) Ashley

This course will examine the interaction between Christian spirituality and theology. We will do this by considering articulations of the relationship between contemplation and action in certain Reformation spiritualities (particularly that of Ignatius of Loyola), which then had an impact on the development of Latin American liberation theologies, with their distinctive emphasis on action (praxis) for justice. We will begin with a careful analysis of the background and content of Ignatian spirituality; then we will consider those Latin American theologians (including Juan Luis Segundo, Jon Sobrino, and Gustavo Gutiérrez) who have been influenced by Ignatian spirituality and have attempted to produce both a theology and a spirituality of liberation. Requirements: midterm, final, and research paper.

544. *Myth and Story*  
(3-0-3) Dunne

An interpretation of myth starting from the question "What kind of story are we in?" and "What kind of story am I in?" and dealing with (a) the life story, (b) the spiritual adventure, and (c) the journey with God in time. (Spring)

545. *Selected Themes in Comparative Theology*  
(3-0-3) Malkovsky

The metaphysical system of the Hindu monk Shankara (ca. 700 C.E.), which is known as Advaita Vedanta, offers a non-dualistic interpretation of reality based on the revealed Upanishads. This system is important today, not only because Shankara represents the pinnacle of Hindu philosophical theology, but also because his thought is the most widely accepted among Hindu theologians today, and further, because Advaita presents a challenging alternative to the theism of the Semitic religions.

Our course will pursue a twofold goal. First, we will examine some of Shankara's writings in translation to determine the essence of his teaching, but also to uncover the reasons why quite variant interpretations of his thought have been given, especially in recent decades, both by Hindus and by adherents to other faiths. Second, we will compare Shankara's thought with Christian theology on foundational issues, giving special attention to the teaching of Aquinas. We shall examine such themes as theological method, doctrine of the Absolute, ontology, anthropology, and soteriology. We will ask three questions throughout the course: Just what is, finally, nonduality? What significance might the teaching of nonduality have for Christian faith and reflection? How does a specifically Christian interpretation of Shankara's Advaita compare with the assessments of others? (Alternate fall)

#### 547. *Modern Theology*

(3-0-3) Ashley

Nineteenth-century Christian theologians were challenged both to defend the legitimacy of Christian faith and theology in an increasingly secularized intellectual culture and to develop an authentic response to a dark underside of scientific, technological, and economic progress that became more and more apparent as the century progressed. In many ways their successes and their failures still set the agenda for theologians today. This course offers a survey of their responses, with a view to understanding the situation in which theology still has to take its bearings. The primary figures we will cover are Immanuel Kant, G. W. F. Hegel, Friedrich Schleiermacher, Johann Sebastian Drey, Soren Kierkegaard, John Henry Newman, and Karl Barth, but we will also attend to other theologians (anti-theologians), such as Ludwig Feuerbach, D.F. Strauss, and Friedrich Nietzsche. Requirements: short analytical papers on readings, on which class discussions will be based, a midterm, and a final exam.

#### 548. *Religion and Science*

(3-0-3) Ashley

Science and religion are complex phenomena that can be analyzed in terms (at least) of their epistemological, existential, and social dimensions. Both science and religion generate justified beliefs. The criteria and spheres of justification for these beliefs overlap and interrelate in extremely complicated ways that have led both to conflict and to mutual enrichment. This is an upper-division undergraduate- or introductory graduate-level

review of these complicated interrelations. There will be two major divisions to the course. In the first we will take up methodological issues, considering different approaches to correlating science and religion. In the second part of the course we will deal in depth with the correlations between scientific cosmologies and Christian doctrines of creation and of God's providential governance of creation. Requirements: participation in small reading groups outside of class, midterm, final exam, and research paper.

#### 550. *Foundations of Moral Theology*

(3-0-3) Odozor

This course is intended to provide a theoretical and practical introduction to the theory of morality, with a special emphasis on Catholic moral theology. Topics to be studied include the foundations of morality; the conditions of voluntariness; and moral norms and possible exceptions to them. Course requirements will include a midterm and a final examination. (Spring)

#### 551. *Social Ethics*

(3-0-3) Whitmore

Analysis of basic issues and alternatives in Christian social ethics. The nature of the church as moral decision maker, relation between church and society, and the place of social science for social ethics.

#### 553. *Virtue and Sin in the Christian Tradition*

(3-0-3) Porter

There has been considerable interest recently in recovering traditions of reflection on the virtues as a resource for Christian ethics. In this course, we will explore this tradition through an examination of three of its key figures, namely Augustine, Aquinas, and Jonathan Edwards. Through a close reading of primary texts (in English) and contemporary writings on these texts, we will reflect on what these authors understood by virtue, how their theories of virtue both interpret a past tradition and influence their successors, and how those theories might be relevant to Christian ethics today. Course requirements will include several short papers and a longer paper on a topic to be determined in consultation with the instructor.

#### 554. *Christian Ethics and Pastoral Practice*

(3-0-3) Odozor

The relationship between Christian ethics and the contemporary ministry in the church. Following a general review of themes in Christian ethics, including conscience, sin, Scripture and the moral life, natural law,

and the authority of church teaching, we will consider ethical issues that have pastoral dimensions. We will focus on effective pastoral translation of church teaching and moral theology in the areas of bioethics, sexuality, and social justice. We will also study the professional ethics of pastoral leadership. (Fall)

#### 555. *Feminist/Multicultural Theologies*

(3-0-3) Hilkert

An exploration of how the voices of women have helped to reshape theological discourse and to bring to light new dimensions of the living Christian tradition. Like other liberation theologies, feminist theologies take the experience of suffering and missing voices in the tradition as the starting points for theological reflection on the mystery of God and all of reality in relation to God. Using the writings of feminist, womanist, Latina, mujerista, Asian, and Third World theologians, this class will focus on the following questions and areas of theology: the theological task and vocation, the significance of gender and social location in the fields of theological anthropology and Christology, theologies of the cross in the face of contemporary suffering, the mystery of God, and implications of women's spirituality in our day. Students will have the opportunity to join an optional reading group that will focus on classic texts in the development of feminist theologies.

#### 560. *Liturgical History*

(3-0-3) Johnson

Survey of liturgical history and sources with regard to both Eastern and Western rites. Fundamental liturgical sources including basic homiletic and catechetical documents of the patristic period. Basic introduction to the methodology of liturgical study. Requirements will include short papers and exams. (Fall)

#### 561. *Christian Initiation*

(3-0-3) Johnson

This course will trace the development and interpretations of the Rites of Christian Initiation in East and West from the New Testament period to the modern period of ecumenical convergence. In light of this historical investigation some modern forms of these rites (e.g., RCIA, LBW, BCP, etc.) will be considered critically. Requirements include two take-home exams, short papers on assigned questions, and an oral presentation on a selected modern rite. (Fall)

*562. Eucharist*

(3-0-3) Driscoll

The church makes the Eucharist and the Eucharist makes the church. A biblical, historical, systematic, and liturgical treatment of the Eucharist, emphasizing pastoral considerations. (Spring)

*564. Liturgical Theology*

(3-0-3) Staff

The goal of this course is a comprehensive understanding of the nature and development of the Christian Eucharist. In order to accomplish this end, an examination of both the structure and the content of the Eucharistic liturgy will be undertaken. A positive theological method will be employed whereby the Eucharist will be studied from a historical perspective, after which a systematic theological reflection upon various aspects will be undertaken with a commentary on contemporary theory and practice. (Variable)

*565 Liturgical Theology — Word and Sacrament*

(3-0-3) Melloh

“Liturgical theology” is often treated as an exploration of “liturgy as a source of theology,” or “liturgy as *theologia prima*,” approaches that have definite merit. This course, however, will focus on word and sacrament as sacred realities, taking up questions concerning theologies of the word and of the sacraments, and will examine *sacramenta in genere*, as well as theological approaches to the word of God. The starting point will be an examination of the “medieval sacramental synthesis,” but will move from there to contemporary approaches to word and sacraments. Students will have the option of choosing various assignments, but all will prepare a final paper and a “take-home” midterm examination. Depending on class size, students may have the opportunity for in-class “oral presentations.”

*566. Pastoral Rites*

(3-0-3) Staff

The historical, theological, and pastoral dimensions of the occasional offices that minister to life’s journeys and passages: reconciliation, ministry to the sick, Christian marriage, ordination, and Christian burial. An ecumenical approach will be taken but with emphasis on the reformed rites of the Roman Catholic Church. (Spring)

*567. Christian Attitudes Toward War, Peace, and Revolution*

(3-0-3) Baxter

This course is a survey of Christian understandings of war, peace, and revolution from

the time of Christ and the early church to the present. Emphasis will be placed on the way in which theological convictions in the areas of Christology, pneumatology, eschatology, ecclesiology, and so on, have shaped Christian teaching on the nature of peace and the permissibility of using violence. Cases will be used to examine certain aspects of just war theory, with the purpose of addressing the question: is just war theory applicable to warfare in the era of the modern nation state? Other issues will be taken up as well, including the military chaplaincy, ROTC in Catholic colleges and universities, the role of Christian churches in mobilizing for war, and the use of violence in revolution. Texts will include: Reinhold Niebuhr, *Moral Man and Immoral Society*; John Howard Yoder, *Christian Attitudes Toward War, Peace, and Revolution: A Companion to Bainton*; U.S. Catholic Bishops, *The Challenge of Peace*; and others. Undergraduates should receive permission to take this course.

*571. The Vulgate and Related Texts*

(3-0-3) Bower

Readings in the Latin of the *Vulgate*, texts by Jerome associated with his translation and readings from Augustine (*de Doctrina Christiana*) concerning how Scriptures should be read. Latin readings will be at an intermediate level, and some review of grammar will be offered.

*572. Ritual Studies*

(3-0-3) Melloh

The pastoral liturgist is one who fosters critical praxis in the liturgical life of a local church. This course is designed to introduce students to ritual studies through a treatment of ritual, symbol, language, myth and story, time and space, music, and art. Students will discuss and employ a method for analysis of worship events. (Fall)

*597. Directed Readings*

(V-V-V) Staff

Research and writing on an approved subject under the direction of a faculty member.

*599. Thesis Direction*

(V-V-V) Staff

For students doing thesis work for a research master’s degree.

*600. Nonresident Thesis Research*

(0-0-1) Staff

Required of nonresident master’s degree students who are completing their theses in absentia and who wish to retain their degree status.

*Courses Specifically for Master of Divinity Students**500B, 500C. Faith and Traditions I, II*

(3-0-3) (3-0-3) Miscamble

Required of all C.S.C. candidates.

*576. Foundations of Pastoral Care*

(1-0-1) Vachon

Self-assessment of skills for ministry. This is a required course for first year M.Div. students. (Fall)

*577B. Health Care Chaplaincy*

(1-0-0.5) Bowman

This course will provide an introduction to pastoral ministry within acute and long-term health care settings. Both theoretical and practical resources will be addressed. Spiritual assessment, grief and crisis ministry, prayer, Scripture, sacraments, and ministry with older adults are selected areas that will be addressed. (Spring)

*577E. Ministry to the Poor Weekend Workshop*

(1-0-.5) John Roberto

*Nurturing the Faith of Families throughout the Entire Life Span—at Home and in the Parish.*

This weekend workshop will provide participants in all ministries with practical directions for promoting family faith development at home and in the parish. Explore a variety of strategies, in-home activities, and resources for empowering families at each stage of the family life cycle to share, celebrate, and live their faith at home and in the world. Discover ways to address family needs and reach families at home. Discover ways that parish ministries and programs can become more family-friendly, creating a family-involving parish community and family-friendly ministries. (Spring)

*577H. Liturgical Music*

(1-0-0.5) Connors

A basic introduction to the fundamentals of liturgical music, especially in a parish setting. (Spring)

*578A. Hispanic Ministry Weekend Workshop*

(1-0-.5) Zapata

An introduction to the practical fundamentals of Christian ministry among Hispanic populations. (Fall)

*578B. Youth Ministry Weekend Workshop*

(1-0-.5) Staff

The development and implementation of youth ministry programs. (Fall)

*578C. Marriage Preparation*

(V-V-V) Dillon

This course addresses practical approaches to the ministry of preparing couples for the sacrament of marriage. (Spring)

*578D. Social Justice Weekend Workshop*

(V-V-V) Clark

This workshop addresses the theory and practice of the church's social justice ministries, especially in the parish. (Fall)

*579B. Grief and Loss Counseling Weekend Workshop*

(1-0-.5) Connors

This workshop will address issues concerning terminal illness, death, and loss. (Spring)

*579C. Campus Ministry Weekend Workshop*

(1-0-.5) Staff

Introduction and analysis of the challenges of ministry in a higher-education setting. (Spring)

*581. Images and Models of Ministry I*

(1-0-1) Connors

*Note:* First-year M.Div. students only.

Through supervision and seminars, the tools of field education will be developed. Focus will be on diagnosing skills, clarifying goals, concretizing objectives, identifying methods of learning, and understanding theology implied therein. Students are required to keep a ministry journal; write a contract, a critical incident, and a two-page reflection paper on readings; and the end-of-the-semester evaluation of field placement. (Fall)

*582. Images and Models of Ministry II*

(2-0-2) Connors

Through supervision and seminars, the tools of field education will be developed. Focus will be on diagnosing skills, clarifying goals, concretizing objectives, identifying methods of learning, and understanding the theology implied therein. Students are required to keep a ministry journal; write a contract, a critical incident, and a two-page reflection paper on readings; and the end-of-the-semester evaluation of field placement. (Spring)

*583. Articulating Faith I*

(2-0-2) J. Poorman

*Note:* Second-year M.Div. students only.

In conjunction with supervised ministerial placements, students examine operative ecclesiologies, pastoral strategies, and practical theologies of ministry. (Fall)

*584. Articulating Faith II*

(2-0-2) J. Poorman

*Note:* Second-year M.Div. students only.

Field Education is an integral component of education for ecclesial ministry. Through field education, students pursue the integration of theological competence with pastoral skill in a developing identity as a public minister. The goal of the second year of field education is facility in articulating the Christian faith, particularly as understood in Roman Catholic tradition, and in fostering the development of faith with others. The goal is approached through a threefold constellation of learning contexts: field work in a ministry placement, supervision of that work, and a field education seminar. The primary learning dynamic for the seminar is dialogical and includes conversation about assigned texts and critical incidents as reported by participants using the prescribed case study method for this course. Requirements:

- An approved filed placement consisting of 4-8 hours of active involvement per week, including supervision, preparation, and travel time.
- Reflection/conversation with the placement supervisor for approximately 30 minutes per week or one hour every other week.
- A learning contract (following the form outlined in the *Student Handbook*), signed by student and supervisor, and submitted for approval by mid-September.
- Attendance at the Wednesday seminar, reading of all assigned texts, and active participation in all class conversation.
- One critical incident report per semester using the prescribed case study method, a brief oral presentation of the incident, and facilitation of group discussion of the incident during a Wednesday class session.
- One class session with full or paired responsibility for facilitation of group discussion of assigned texts.
- Submission of all semester-end documents: student interim report, supervisor's interim report (see *Student Handbook*), and a ministry log.
- A three-way meeting, scheduled during early December, and including the student, the instructor for this course, and the placement supervisor.

(Spring)

*585. Leadership and Authority*

(2-0-2) Connors

*Note:* Third-year M.Div. students only.

Through supervised field experience and seminars, students treat issues inherent in their exercise of authority. In particular they analyze the theology displayed by their actions. Students are required to write a contract, case study, two-page book review, weekly journal, and end-of-year report of field placement. Course requirements include four to six hours weekly at placement site, journal, etc. as above, weekly supervisory sessions of 30 minutes, attendance at weekly field education seminars, and three interviews with instructor. (Fall)

*588. Pastoral Administration*

(1-0-1) Jarret

A basic introduction to the administrative dimensions of pastoral ministry, including staff development, planning, programming, and finances. This is a required skills course for second-year M.Div. students. (Fall)

*591. Canon Law*

(3-0-3) Smith, OFM

*Note:* M.A.-M.Div. students only.

The purpose of this course is to provide students studying for ministry with an introduction to the law of the Roman Catholic Church. General principles for the interpretation of canon law as well as its history, and its relationship to theology and pastoral praxis are discussed. Although attention is given to the laws and canonical jurisprudence concerning marriage, other selected canonical topics of value to those in ministry are considered as well. (Fall)

*592A. Liturgical Celebration and Ministry I*

(1-0-2) Melloh

A study of the structure of the Eucharistic Rite and the Liturgy of the Hours with emphasis on ministerial roles. (Fall)

*592B. Liturgical Celebration and Ministry II*

(1-0-1) Melloh

A study of the structure of the Eucharistic Rite and the Liturgy of the Hours with emphasis on ministerial roles. (Spring)

*593A. Preaching I*

(1-0-2) Melloh

An introduction to homiletics. (Fall)

*593B. Preaching II*

(1-0-2) Melloh

A continuation of Preaching I, this course treats exegesis for preaching, methods of homily preparation and delivery. (Fall)



*593C. Preaching III*

(2-0-2) Melloh

A continuation of Preaching II, with emphasis on the theological dimensions of preaching. The main work of the course will be preparation, delivery, and review of homilies. Assigned readings to be discussed in class. In addition to preaching and reading assignments, each student will prepare a short paper on a theology of preaching. (Spring)

*594. Reconciliation Ministry*

(1-0-1) Weiss

Reconciliation Ministry is designed to: (1) introduce ministry students to the history and theology of the sacrament of reconciliation; (2) provide an initial "confessional experience" (practicum) from which students can benefit from guidance, supervision, and constructive criticism; (3) assist students in understanding the importance of penance/reconciliation in the life and ministry of the church. (Fall)

*596. Synthesis Seminar*

(2-0-2) Connors

*Note:* Third-year M.Div. students only.

The Synthesis Seminar is both a point of arrival and a point of departure—arrival, in that it seeks to ingratiate the course of formal studies with one's theology of ministry, and departure in that it is provisional, leaving one with questions for the journey.

Each participant chooses a topic that will serve as a focus for synthesis. Synthesis is the operative word; this is not research on an entirely new topic. Synthesis should illustrate both theological and ministerial preparedness. In developing the topic, attention is to be paid to at least three theological areas (Scripture, ecclesiology, patristics, ethics, and practical theology). Class notes, papers, and examinations may provide a basis for research. (Spring)

*600. Nonresident Thesis Research*

(0-0-1) Staff

Required of nonresident master's degree students who are completing their theses in absentia and who wish to retain their degree status.

*Advanced or Doctoral Courses**603. Hebrew Bible Seminar*

(3-0-3) Page, Ulrich, VanderKam

Investigation of historical, literary, and theological aspects of the Hebrew Bible. (Offered with varying topic each fall)

*603J. Judaica Seminar: Early Jewish Hermeneutics*

(3-0-3) Najman

This course focuses on the development of biblical interpretation in ancient Judaism. In the first part of the course we will consider pre-rabbinic traditions (e.g., texts from the Hebrew Bible, Qumran, Greek-speaking Judaism). We will then turn to various rabbinic collections and examine continuities and discontinuities in scriptural interpretation. There will be some consideration of the rabbinic hermeneutical principles and discussion of interpretive method within rabbinic traditions. In the final section of the course we will look at later interpretive traditions in Judaism from the geonic and early medieval periods. Students will develop an understanding of interpretive continuity between the biblical and post-biblical periods and they will develop an appreciation for Jewish understanding of inspired interpretation and revelation in a post-destruction context.

*604. Hebrew Bible Seminar*

(3-0-3) Page, Ulrich, VanderKam

Investigation of historical, literary, and theological aspects of the Hebrew Bible. (Offered with varying topic each spring)

*605. Judaica Seminar: The Jewish-Christian Debate in the High Middle Ages*

(3-0-3) Signer

The growth of urban centers in Europe and Iberia during the Middle Ages rekindled the literary debates between Jews and Christians that began in the early church. Both Jews and Christians constructed images of the other that were grounded in earlier arguments from Scripture and augmented them with the new tools of reason and linguistic knowledge. Our seminar will read both Jewish and Christian documents analyzing them in light of the work of modern historians such as Gilbert Dahan, Jeremy Cohen, David Berger, and Gavin Langmuir. In addition to reading disputation literature we shall analyze papal policy, noble patronage, and canon law.

*610A. Advanced Greek*

(3-0-3) Aune, D'Angelo, Sterling

For Ph.D. candidates who require Greek as a major research language. Others should consult instructor before registering. (Fall)

*610B. Advanced Hebrew*

(3-0-3) Najman, Page, Ulrich, VanderKam

For Ph.D. candidates who require Hebrew as a major research language. Others should consult instructor before registering.

*611. New Testament Seminar: "The Neglected Factor in the New Testament: GOD"*

(3-0-3) Neyrey

In the early 1970s Nils Dahl published a small but potent article "The Neglected Factor in New Testament Theology: God." This seminar seeks to un-neglect God in the following ways: (1) Greco-Roman philosophy developed a formula for its god-talk, which is very influential in reading Paul; (2) many NT writers talk about the nature of God: [a] God's two attributes—mercy and justice, and [b] God's two powers—creative and executive; (3) the social sciences are indispensable for considering: [a] "be ye holy as I am holy"; [b] honor, glory, and praise; and [c] patron/benefactor and client. (4) In addition, one must consider God in terms of providence (Acts) and debates over theodicy. (5) Always lurking are issues of God's justice (faithfulness and loyalty). (6) No consideration of God is complete without attention to worship: prayer, sacrifice, doxology. Finally, who else is called "god"? Moses in Exod 7:1, but also Jesus in John and Hebrews. This course then has two foci: un-neglect about what is said about God (survey of documents, themes, etc.) and creative research by seminar members to aid in un-neglecting God.

*612. New Testament Seminar*

(3-0-3) Aune, D'Angelo, Meier, Neyrey,

Sterling

Investigation of historical, literary, and theological aspects of the New Testament. (Offered with varying topic each semester)

*621. Early Christianity Seminar: Trinitarian Theology of the Cappadocian Fathers*

(3-0-3) Daley

Seminar on a selected theological topic in the patristic period.

*622. Early Christianity Seminar*

(3-0-3) Cavadini, Daley, Leyerle

Studies of selected patristic texts and early Christian history. (Offered with varying topic each spring)

*634. Historical Seminar: Medieval*

(3-0-3) Signer, Wawrykow

Seminar on a selected theological topic in the medieval period.

*635. Historical Theology: The Theology of Soren Kierkegaard*

(3-0-3) Zachman

This course will examine the development of Kierkegaard's understanding of the genuine Christian life from the time of his first works written after his breakup with Regine Olsen,

to his final statement of the ideal of being a Christian just before his final “attack on Christendom.” We will focus in particular on those works that discuss his understanding of sin and faith in Christ. The works to be read will include his *Journals* (edited by Hannay), *Fear and Trembling*, *The Concept of Anxiety*, *Philosophical Fragments*, *Concluding Unscientific Postscript*, *Works of Love*, *The Sickness Unto Death*, and *Practice in Christianity*. We will also use the new biography of Kierkegaard written by Hannay. The written requirements may be fulfilled either by a series of six-page essays on the different readings for the semester, or a short paper and one longer research paper on a theme or work of Kierkegaard’s.

642. *Systematic Seminar: Doctrine of God*

(3-0-3) O’Regan

This seminar focuses on contemporary understandings of the Trinity that operate in terms defined by Rahner’s paradigm shift to the economy of salvation. Besides Rahner’s classic work, *The Trinity*, we will read works by LaCugna, Moltmann, Balthasar, Pannenberg, and Milbank. The selection of authors is made with a view to underscoring the variety of emphases that this paradigm shift allows, their varying degrees of hospitality to talk of the immanent Trinity, and in the event of hospitality their different emphases in figuration. Given the economic turn in contemporary discussion of the Trinity, a leitmotif in the course is the topic of divine possibility. Does the economic turn make it either necessary or advisable to surrender, or at least to seriously qualify, the patristic axiom of divine impassability?

643. *Systematic Seminar: Christ*

(3-0-3) Krieg

Seminar on selected topics concerning Jesus.

644. *Systematic Seminar: Grace*

(3-0-3) Hilkert

Seminar on selected topics and theologians concerning sin, grace, and salvation.

646. *Systematic Seminar: Topics in Systematic Theology*

(3-0-3) Cunningham

Seminar on selected sources and theologies about systematic theology.

647. *Systematic Seminar: Theological Anthropology*

(3-0-3) Hilkert

This seminar treats the Christian understanding of human life in relation to the triune God. It delves into the themes of creation, sin, grace, and the coming of God’s new creation.

651. *Ethics Seminar: Methods*

(3-0-3) Baxter, Porter, Ryan, Whitmore

A selection of American, European, and Latin-American authors, with emphasis on ecumenical interaction and consensus-formation within the discipline. (Topic changes each fall.)

652. *Ethics Seminar: Modern Moral Thought*

(3-0-3) Herdt

In the wake of 16th-century confessional strife, ethical reflection was typified by an attempt to prescind from theological controversies and to model ethics on scientific and mathematical theories. At the same time, thinkers worked from inherited understandings of the virtues, divine commandments, and natural law. In the first half of the semester, we will focus on the tradition of modern natural law in the 17th century, contrasting it with earlier natural law thinking and considering the reasons for its decline after Locke. In the second half, we will turn to the 18th-century moral sense school, exploring the ways it sought to avoid problematic aspects of modern natural law theory, in particular its theological voluntarism and its elitism. Throughout, we will seek to delineate how the issues that emerged in this period set the terms for all subsequent moral thought, and reflect on the ways in which this period defined moral philosophy over against moral theology. In addition to primary readings taken from J. B. Schneewind’s *Moral Philosophy* from Montaigne to Kant and Jonathan Edwards’ *The Nature of True Virtue*, we will read selected chapters from Schneewind’s *The Invention of Autonomy*, along with short selections by Bonnie Kent, G. Scott Davis, and Alasdair MacIntyre.

657A. *Theological Perspectives in Medical Ethics*

(3-0-3) Ryan

This seminar will explore contemporary questions in medical ethics in the context of Christian theological commitments. The seminar will focus, in part, on methodology and the issues surrounding the use of religious language in policy debates within a pluralistic society. We will also consider a set of problems in medicine that raise important theological as well as ethical questions, e.g., developments in reproductive and genetic technologies.

658. *History of Theology/Ethics/Social Order*

(3-0-3) Staff

The aim of this course is to do close readings in the history of theological social theory and

to ask how the theological, ethical, and social claims are related by the writer(s) in question.

661. *Philosophical Theology*

(3-0-3) Burrell

How does free creation challenge a reigning worldview? What key philosophical issues are at stake, and why? We shall trace the debate that ensued among Jewish, Christian, and Muslim thinkers, beginning with al-Farabi and Ibn Sina, and then filtered through Moses Maimonides to Aquinas. By exploring their attempts to secure the primacy of actuality over possibility, in their efforts to formulate the creator as a cause-of-being—a notion novel to the Greeks and apparently less than intelligible to moderns—we hope to unveil the specific challenges which classical and contemporary attempts to formulate the creator/creature relation pose to conventional philosophical discourse, suggesting a relation between faith and reason more internal than often suspected.

671. *Early Christian Liturgy*

(3-0-3) Johnson

An introduction to the liturgical sources, ancillary documents, and methodologies for the study of Christian liturgy in the churches of the first four centuries of the Christian era. The course concentrates on the Eucharist and its anaphora, the rites of Christian initiation, the origins and early evolution of the liturgical year, and the Liturgy of the Hours.

672. *Eastern Liturgies*

(3-0-3) Staff

Topics vary from year to year.

679. *Reformation Liturgy Seminar*

(3-0-3) Mitchell

This course will explore the most important Christian liturgies that appeared during the Reformation(s) of the 16th and 17th centuries in Europe. Beginning with a discussion of Martin Luther’s writings on sacramental theology (plus his proposals, in Latin and German, for liturgical reform), the course will move to a study of Reformed liturgy (Zwingli, Bucer, Calvin, Knox); Anglican liturgy (the 1549 and 1552 prayer books of Edward VI and subsequent [e.g., Elizabethan] revisions of the *Book of Common Prayer*); the response of the “Catholic Reformation” (sometimes called the “Counter-Reformation”); and the Puritan liturgy (Middleburg, John Cotton, the Westminster director). Following these historical investigations, individual rituals will be examined in greater detail, among them: the rites of Baptism and Confirmation, Eucharist, Marriage, and Christian Burial.

**680. Modern Liturgies Seminar**

(3-0-3) Mitchell

The purpose of this course is to introduce students to the movements, documents, issues, and personalities that gradually coalesced to form what is commonly called (in Europe and North America) "the modern liturgical movement." The period covered stretches from ca. 1600 to 2000 C.E., and deals with historical developments in both post-Reformation Europe and North America, and among both Roman Catholic and Protestant churches.

**681, 684. Liturgical Theology**

(3-0-3) Driscoll, Johnson

Topics vary from year to year.

**682. Ritual Studies**

(3-0-3) Melloh

Analysis of the levels of meaning to be found in an observed rite in light of selected ritual theorists.

**683. Sacramental Theology**

(3-0-3) Staff

Topics vary from year to year.

**685. Liturgical Theology**

(3-0-3) Amar

Topics vary from year to year.

**689. Dissertation Research Seminar**

(3-0-3) Staff

For students in final semester of course work to begin collegially the basic research for their dissertation topics. Required for liturgy students; elective for others. (Spring)

**690. CJA Research and Resources Seminar**

(3-0-3) Sterling

A 12-week seminar designed to introduce advanced students to the critical texts, indices, reference works, journals, linguistic tools, systems of abbreviation, searching strategies, textual methods, and electronic resources available for the study of the four fields encompassed by the Christianity and Judaism in antiquity section of the Theology Department. Three weekly sessions will be devoted to each of these four fields: Hebrew Bible, Judaism, New Testament, and early Christianity. Seminar sessions will be run by faculty members with expertise in the area of students represented during that session. The grade for the successful completion of this course will be "S" (satisfactory), and it is open for students from other areas who wish to take one, two, or three of the three-week segments. This seminar is required of all CJA students.

**Other Graduate Courses****697. Directed Readings**

(0-0-V) Staff

Research and writing on an approved subject under the direction of a faculty member.

**699. Research and Dissertation**

(V-V-V) Staff

Research and dissertation for resident doctoral students.

**700. Nonresident Dissertation Research**

(0-0-1) Staff

Required of nonresident graduate students who are completing their dissertations in absentia and who wish to retain their degree status.

**Faculty**

Gary Anderson, *Professor*. B.A., Albion College, 1977; M.Div., Duke Divinity School, 1981; Ph.D., Harvard Univ., 1985. (2003)

J. Matthew Ashley, *Director of Graduate Studies for Theology Master's Degree Programs, Associate Professor, and Fellow in the Center for Social Concerns*. B.S., St. Louis Univ., 1982; M.T.S., Weston School of Theology, 1988; Ph.D., Univ. of Chicago Divinity School, 1993. (1993)

David Aune, *Professor*. B.A., Wheaton College, 1961; M.A., *ibid.*, 1963; M.A., Univ. of Minnesota, 1965; Ph.D., Univ. of Chicago, 1970. (1999)

Rev. Michael Baxter, C.S.C., *Assistant Professor and Fellow in the Kroc Institute for International Peace Studies*. B.A., Allegheny College, 1977; M.Div., Univ. of Notre Dame, 1983; Ph.D., Duke Univ., 1996. (1999)

Joseph Blenkinsopp, *the John A. O'Brien Professor Emeritus of Old Testament Studies*. B.A., Univ. of London, 1948; S.T.L., International Theological Inst., Turin, 1956; D.Phil., Oxford Univ., 1967. (1970)

Rev. Paul F. Bradshaw, *Professor and Director, Undergraduate London Program*. B.A., Cambridge Univ., 1966; M.A., *ibid.*, 1970; Ph.D., Kings College, Univ. of London, 1971; D.D., Oxford Univ., 1994. (1985)

Rev. David B. Burrell, C.S.C., *the Rev. Theodore M. Hesburgh, C.S.C., Professor of Arts and Letters, Professor of Theology and Philosophy, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. A.B., Univ. of Notre Dame, 1954; S.T.L., Gregorian Univ., 1960; Ph.D., Yale Univ., 1965. (1964)

John C. Cavadini, *Chair and Associate Professor of Theology, and Executive Director of the Institute for Church Life*. B.A., Wesleyan Univ., 1975; M.A., Marquette Univ., 1979; M.A., Yale Univ., 1981; M.Phil., *ibid.*, 1983; Ph.D., *ibid.*, 1988. (1990)

Rev. Michael E. Connors, C.S.C., *Director of M.Div. Program and Assistant Professor*. B.A., Illinois College, 1977; M.Div., Univ. of Notre Dame, 1983; Th.D., Regis College, Toronto School of Theology, 1997. (1997)

Lawrence S. Cunningham, *the John A. O'Brien Professor of Theology*. A.B., St. Bernard College, 1957; S.T.L., Gregorian Univ., 1961; M.A., Florida State Univ., 1963; Ph.D., *ibid.*, 1968. (1987)

Rev. Brian Daley, S.J., *Director of Graduate Studies in Early Christian Studies and the Catherine F. Huisiking Professor of Theology*. B.A., Fordham Univ., 1961; B.A., Oxford Univ., 1964; M.A., *ibid.*, 1967; Ph.D., Loyola Seminary, 1966; Lic. Theo., Hochschule Sankt Georgen, Frankfurt, 1972; D.Phil., Oxford Univ., 1979. (1996)

Mary Rose D'Angelo, *Associate Professor*. B.A., Fordham Univ., 1969; M.Phil., Yale Univ., 1972; Ph.D., *ibid.*, 1976. (1994)

Mary Doak, *Assistant Professor*. B.A., Loyola Univ. of Chicago, 1987; M.A., Univ. of Chicago, 1988; Ph.D., *ibid.*, 1999. (1999)

Rev. Michael S. Driscoll, *Associate Professor*. B.A., Carroll College, 1969; S.T.B., Gregorian Univ., 1977; S.T.L., San Anselmo, 1980; S.T.D., Inst. Catholique de Paris, 1986; Ph.D., Sorbonne, Paris, 1986. (1994)

Rev. John S. Dunne, C.S.C., *the John A. O'Brien Professor of Catholic Theology*. A.B., Univ. of Notre Dame, 1951; S.T.D., Gregorian Univ., 1957. (1957)

Keith J. Egan, *Adjunct Professor*. Ph.B., Mt. Carmel College, 1952; M.A., Catholic Univ. of America, 1959; Ph.D., Cambridge Univ., 1965. (1983)

Rev. Virgilio Elizondo, *Visiting Professor of Latino Studies, Associate Director of Latino Theology and Pastoral Concerns, and Fellow in the Kellogg Institute for International Studies*. B.S., St. Mary's Univ., 1957; M.A., Ateneo Univ., Manila, 1969; S.T.D./Ph.D., Inst. Catholique, 1978. (2000)

Josephine Massyngbaerde Ford, *Professor Emerita*. B.A., Univ. of Nottingham, 1957; B.Div., King's College, Univ. of London, 1963; Ph.D., Nottingham Univ., 1965. (1965)

- Rev. Charles Gordon, C.S.C., *Assistant Professor*. B.A., Univ. of Notre Dame, 1978; M.Div., *ibid.*, 1986; Ph.D., Cambridge Univ., 1999. (1996)
- Rev. Eugene Gorski, C.S.C., *Professional Specialist*. M.M., Univ. of Notre Dame, 1953; M.M., *ibid.*, 1955; S.T.L., Gregorian Univ. Rome, 1961; S.T.D., Inst. Catholique de Paris, 1971. (1999)
- Jennifer Herdt, *Associate Professor*. B.A., Oberlin College, 1989; M.A., Princeton Univ., 1991; Ph.D., *ibid.*, 1994. (1999)
- M. Catherine Hilkert, *Associate Professor*. B.A., Univ. of Dayton, 1971; M.A., Catholic Univ. of America, 1979; Ph.D., *ibid.*, 1984. (1996)
- Maxwell Johnson, *Professor*. B.A., Augustana College, 1974; M.Div., Wartburg Seminary, 1978; M.A., St. John's Univ., 1982; M.A., Univ. of Notre Dame, 1989; Ph.D., *ibid.*, 1992. (1997)
- M. Cathleen Kaveny, *the John P. Murphy Foundation Professor of Law and Professor of Theology*. A.B., Princeton Univ., 1984; M.A., 1986; M.Phil., 1990; J.D., 1990; Ph.D., 1991, Yale Univ.. (1995)
- Robert A. Krieg, *Professor and Fellow in the Nanovic Institute for European Studies*. B.A., Stonehill College, 1969; Ph.D., Univ. of Notre Dame, 1976. (1977)
- Rev. John Lahey, C.S.C., *Associate Professional Specialist*. A.B., Univ. of Notre Dame, 1966; M.Th., *ibid.*, 1969; D.Min., Andover-Newton, 1974; J.C.B., Catholic Univ. of America, 1979; J.C.L., *ibid.* 1981; J.C.D., *ibid.*, 1988. (1982)
- Blake Leyerle, *Associate Professor and Concurrent Associate Professor of Classics*. B.A., Yale Univ., 1982; M.A., Duke Univ., 1988; Ph.D., *ibid.*, 1991. (1990)
- Bradley J. Malkovsky, *Associate Professor*. B.A., St. John's Univ., 1975; M.A., Univ. of Tübingen, 1983; Ph.D., *ibid.*, 1994. (1992)
- Rev. Edward A. Malloy, C.S.C., *President of the University and Professor of Theology*. B.A., Univ. of Notre Dame, 1963; M.A., *ibid.*, 1967; M.Th., *ibid.*, 1969; Ph.D., Vanderbilt Univ., 1975. (1974)
- Timothy Matovina, *Director of the Cushwa Center for the Study of American Catholicism and Associate Professor*. B.A., Indiana Univ., 1978; M.Div., Toronto School of Theology, St. Michael's College, 1983; Ph.D., Catholic Univ. of America, 1993. (2000)
- Rev. Richard P. McBrien, *the Crowley-O'Brien-Walter Professor of Theology*. A.B., St. Thomas Seminary, Conn., 1958; M.A., St. John Seminary, Mass., 1962; S.T.L., Gregorian Univ., 1964; S.T.D., *ibid.*, 1967. (1980)
- Gerald McKenny, *Director of the Reilly Center for Science, Technology, and Values, and Associate Professor*. B.A., Wheaton College, 1979; M.Div., Princeton Theological Seminary, 1982; Ph.D., Univ. of Chicago, 1989. (2001)
- John Meier, *the William K. Warren Professor of Catholic Theology*. B.A., St. Joseph's Seminary, 1964; S.T.L., Gregorian Univ., 1968; S.S.D., Biblical Inst., Rome, 1976. (1999)
- Rev. John Allyn Melloh, S.M., *Coordinator of the John S. Marten Program in Homiletics and Liturgics and Professional Specialist*. B.A., Univ. of Dayton, 1965; B.S., Ed., *ibid.*, 1966; M.A., Univ. of Notre Dame, 1972; Ph.D., St. Louis Univ., 1974. (1978)
- Rev. Leon Mertensotto, C.S.C., *Associate Professor*. B.A., Univ. of Notre Dame, 1953; S.T.L., Gregorian Univ., 1957; S.T.D., Univ. of Fribourg, 1961. (1961)
- Nathan Mitchell, *Associate Director and Professional Specialist and in the Center for Pastoral Liturgy and Concurrent Professional Specialist in Theology*. B.A., Meinrad School of Theology, 1966; M.Div., *ibid.*, 1970; M.A., Indiana Univ., 1971; Ph.D., Univ. of Notre Dame, 1978. (2001)
- Hindy Najman, *the Jordan Kapson Professor of Jewish Studies and Assistant Professor*. B.A., Stern College, Yeshiva Univ., 1989; Ph.D., Harvard Univ., 1998 (1998)
- Rev. Jerome Neyrey, S.J., *Professor*. B.A., St. Louis Univ., 1963; M.A., *ibid.*, 1964; M.Div., Regis College, 1972; M.Th., *ibid.*, 1972; M.A., Yale Univ., 1975; Ph.D., *ibid.*, 1977; S.T.L., Weston School of Theology, 1987. (1992)
- Rev. Thomas F. O'Meara, O.P., *the William K. Warren Professor Emeritus of Theology*. Bacc. Phil., St. Thomas College, 1958; Lic.Phil., *ibid.*, 1959; M.A., Aquinas Inst., 1963; M.Div.Theo., *ibid.*, 1963; Ph.D. Theology, Ludw. Max. Univ., Munich, 1967. (1981)
- Cyril O'Regan, *Professor*. B.A., Univ. College Dublin, Ireland, 1974; M.A., *ibid.*, 1978; M.A., Yale Univ., 1983; M.Phil., *ibid.*, 1984; Ph.D., *ibid.*, 1989. (1999)
- Rev. Hugh Rowland Page Jr., *Director of the Program in African and African American Studies and Associate Professor*. B.A., Hampton Inst., 1977; M.Div., Pittsburgh Theological Seminary, 1980; S.T.M., General Theological Seminary, 1983; A.M., Harvard Univ., 1988; Ph.D., *ibid.*, 1990. (1992)
- Rev. Mark Poorman, C.S.C., *Vice President for Student Affairs and Associate Professor*. B.A., Univ. of Illinois, 1976; M.Div., Univ. of Notre Dame, 1980; Ph.D., Graduate Theological Union, Berkeley, 1990. (1990)
- Jean Porter, *the John A. O'Brien Professor of Moral Theology*. B.A., Univ. of Texas at Austin, 1976; M.Div., Weston School of Theology, 1980; M.A., Yale Univ., 1981; Ph.D., *ibid.*, 1984. (1990)
- Thomas Prügl, *Assistant Professor*. B.A., Univ. of Munich, 1984; Lic.Theo., *ibid.*, 1988; Th.D., *ibid.*, 1994. (2001)
- Maura A. Ryan, *Associate Provost of the University and Associate Professor*. B.A., St. Bonaventure Univ., 1979; M.A., Boston College, 1987; M.Phil., Yale Univ., 1990; Ph.D., *ibid.*, 1993. (1992)
- Rabbi Michael A. Signer, *the Abrams Professor of Jewish Studies and Fellow in the Nanovic Institute for European Studies*. B.A., Univ. of California, Los Angeles, 1966; M.A., Hebrew Union College-JIR, 1970; Ph.D., Univ. of Toronto, 1978. (1992)
- Gregory E. Sterling, *Associate Dean of Arts and Letters and Professor of Theology*. A.A., Florida College, 1974; B.A., Houston Baptist Univ., 1978; M.A., Pepperdine Univ., 1980; M.A., Univ. of California, Davis, 1982; Ph.D., Graduate Theological Union, Berkeley, 1990. (1989)
- Eugene C. Ulrich, *the Rev. John. A. O'Brien Professor of Old Testament Studies*. Litt.B., Xavier Univ., 1961; Ph.L., Loyola Univ., 1964; M.Div., Woodstock College, 1970; M.A., Harvard Univ., 1967; Ph.D., *ibid.*, 1975. (1973)
- James C. Vanderkam, *the John A. O'Brien Professor of Old Testament Studies*. A.B., Calvin College, 1968; B.D., Calvin Theological Seminary, 1971; Ph.D., Harvard Univ., 1976. (1991)
- Joseph P. Wawrykow, *Director of Graduate Studies and Associate Professor*. B.A., Univ. of Manitoba, 1978; M.A., *ibid.*, 1980; M.A., Yale Univ., 1981; M.Phil., *ibid.*, 1984; Ph.D., *ibid.*, 1987. (1986)
- Todd D. Whitmore, *Associate Professor and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.S., Wabash College, 1979; M.Div., *ibid.*, 1985; Ph.D., Univ. of Chicago, 1990. (1990)
- Randall C. Zachman, *Associate Professor*. B.A., Colgate Univ., 1975; M.Div., Yale Divinity School, 1980; Ph.D., Univ. of Chicago, 1990. (1991)

# The Division of Science

In the Division of Science, programs in graduate study leading to the degree of doctor of philosophy are offered in the fields of biological sciences, biochemistry, chemistry, mathematics, and physics. Programs leading to the degree of master of science are also available in these departments.

In its programs of research and instruction, the Division of Science proposes: (1) to educate ethically grounded scientists of disciplined intelligence who can participate fruitfully in the affairs of human society; (2) to conduct research dedicated to the discovery and integration of truth and to train additional scientists with comparable skills and ideals; and (3) to interpret the principles and discoveries of science, with their implications and significance, by lectures, research, articles, and books.

Graduate students in the Division of Science are encouraged to cross departmental lines of instruction and to participate in interdisciplinary programs to broaden their outlook and promote the integration of the sciences in areas of overlap.

## Biological Sciences

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### *Chair:*

Charles F. Kulpa Jr.

### *Director of Graduate Studies:*

Gary A. Lamberti

Telephone: (574) 631-6552

Fax: (574) 631-7413

Location: 107 Galvin Life Sciences Center

E-mail: biosadm@nd.edu

Web: <http://www.science.nd.edu/biology>

### *The Program of Studies*

The graduate program in biological sciences is designed to provide students with depth of knowledge and insight into their particular areas of interest and a broad background in the whole area of biology. Special efforts are made to place the students' areas of interest into proper perspective with the other areas of biology and with cognate sciences. The goal is to train the students to be professional biologists in every good sense of the word "professional."

To achieve this goal, all students are encouraged to take appropriate courses in other departments as well as in biological sciences. Formally structured interdisciplinary programs are available in biochemistry and biophysics (see program description in this *Bulletin*), and with the Department of Civil Engineering and Geological Sciences and the Department of Chemical and Biomolecular Engineering.

The Department of Biological Sciences is housed in the Galvin Life Sciences Center. The facilities are excellent for most types of

laboratory research in biology. They include controlled environment rooms, photographic facilities and an optical facility (scanning and high-resolution transmission electron microscopes, plus confocal imaging system), radioisotope rooms with specialized equipment, ultracentrifuges, centralized automated sequencing and imaging systems, sterile transfer rooms, computing equipment, and facilities for behavioral and electrophysiological research. The recently completed Hank Center for Environmental Science adds more than 20,000 square feet of state-of-the-art research space for aquatic ecology and environmental biology that includes greenhouses, wet laboratories, a field sample processing room, and a fully equipped shop.

In addition, the Freimann Life Science Center provides a modern animal care facility for research and teaching. Two lakes on campus, several nearby natural areas, and the University's 7,500-acre Environmental Research Center (UNDERC) in northern Wisconsin and the upper peninsula of Michigan offer a wide variety of habitats for ecological, limnological, and entomological field studies.

A specialized teaching and research library is housed in the Life Sciences Center as a branch of the campus library. The department maintains and operates a PC-based Local Area Network (LAN) and a Macintosh LAN. The LANs are connected to University-wide networks. The department's Greene-Nieuwland Herbarium contains about 250,000 specimens. The Radiation Laboratory, a University institute for high-energy radiation studies, and the Center for Environmental Science and Technology also provide

facilities and specialized instrumentation for biological research. In addition, the University maintains a Bioscience Core Facility to provide basic biochemical support for cellular and molecular biology. The University publishes the journal *The American Midland Naturalist*.

Because there are many opportunities for fruitful research in areas that tend to bridge gaps between subdisciplines of biology or between biology and other disciplines, the areas of concentration are not rigidly defined. Special programs exist in aquatic ecology, evolution and environmental biology, cellular and molecular biology, developmental biology, microbiology, parasitology, physiology, and vector biology, but even within each of these programs there is considerable flexibility in the choice of courses. Students are expected to plan, with their advisory committee, a program of courses and research appropriate to their individual needs.

In addition to the University-wide requirements of the Graduate School, applicants for admission to graduate studies in this department should be adequately prepared in general biology, physics, organic chemistry, mathematics through calculus, and one or more areas of the life sciences. Course deficiencies in these certain areas and prerequisites for advanced graduate courses may be made up at Notre Dame.

The master's degree is a 24-credit-hour program requiring the satisfactory completion of a minimum of 18 credit hours of course work, passing a research proposal review, and

completing a suitable master's thesis. A student must include six of the 24 credit hours in thesis research.

For the degree of doctor of philosophy, the student is expected to complete a 72-credit-hour requirement. This is composed of at least 24 credit hours of course work and the remainder as thesis research. The student must pass a comprehensive examination consisting of both an oral and a written examination, write and officially have approved a dissertation on research conducted under the direction of an adviser and committee, and pass a defense of the dissertation.

Students in the doctoral degree program must also fulfill a one-year teaching requirement that usually involves assisting in the instruction of undergraduate or graduate laboratory courses. This requirement may be automatically fulfilled if the student has a graduate assistantship for financial aid.

Incoming graduate students may be assigned an interim faculty adviser by the director of graduate studies. These assignments are made with consideration of the specific academic interests of the student. It is the responsibility of the interim adviser to guide the student's program until a research adviser is selected. By the end of the first semester of the second year of residence the Ph.D. student must have chosen a faculty member as a research adviser and have begun a research program. The master's student should choose an adviser by the end of the first year of residence. The student, in consultation with his or her adviser, selects an advisory committee. The members of this committee will contribute guidance, expertise, and stimulation to the student in his or her graduate program and will serve as the examining committee for the candidacy examinations and for the final defense.

#### *Financial Assistance*

Students are offered financial assistance on a competitive basis, with consideration given to grades, GRE examination scores, recommendations, and other factors. The University offers three types of support to full-time graduate students: fellowships, graduate and research assistantships, and tuition scholarships. Students may receive one type of support or a combination of types. A number of fellowships for women and minorities are available. To be considered, Biological Sciences requires that all application materials must be received by the Graduate Admissions Office by February 1.

Most graduate students in Biological Sciences are awarded full-tuition scholarships and are supported as teaching or research assistants (TAs or RAs). A student supported by a teaching assistantship typically works 10 to 12 hours per week. Typical duties include teaching in an undergraduate laboratory section, setting up the laboratory, and grading papers. The student also takes classes and is expected to carry on thesis research. TA appointments are for nine months and are generally supplemented with a two- or three-month summer stipend from individual faculty research grants and/or departmental funds. A student supported by a research assistantship registers for some classes and carries out thesis research under a faculty research adviser. RA support comes from government, industrial, or private grant funds. RA appointments are generally for 12 months.

#### *Course Descriptions*

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

#### *504. Developmental Genetics*

(3-3-4) Staff

*Prerequisite:* An introductory genetics (BIOS 250 or BIOS 303) or equivalent.

Selected topics in developmental genetics dealing with mechanisms of gene action. Consideration of the role of genes in the embryology, morphology, physiology, and behavior of organisms. (On demand)

#### *508. Population Genetics*

(3-0-3) Hollocher

*Prerequisite:* Introductory genetics (BIOS 250 or BIOS 303) or equivalent.

This course will describe and mathematically analyze the processes responsible for genetic change within populations. (On demand)

#### *511. Protozoology*

(3-3-4) Staff

*Prerequisite:* A parasitology course (BIOS 415) or equivalent, or consent of instructor. Emphasis on developmental biology and evolutionary trends, analysis of mechanisms involved in host-parasite relations and disease, and epidemiology of parasitic protozoa. (On demand)

#### *514. Field Parasitology*

(2-1-3) Adams

*Prerequisites:* BIOS 241, 250 and 415, 415L or equivalent, and consent of instructor.

This is a course using current and classical methods of identification of parasites in natural populations. Field collection will be done during fall break at UNDERC for subsequent molecular and morphological laboratory analysis. Special attention will be given to applying modern approaches to studying the common symbiotic relationships of fish, amphibians, and mollusks at UNDERC. The UNDERC participation is mandatory to take this course. (On demand)

#### *515. Vector Genetics*

(3-0-3) Besansky and Severson

*Prerequisite:* A course in genetics (BIOS 250 or 303) or equivalent, and consent of instructor.

The principles of genetics as they apply to arthropod vectors of disease agents. (On demand)

#### *516. Physiological Chemistry of Animal Parasites*

(2-3-3) Staff

*Prerequisites:* Biochemistry (CHEM 420 or equivalent) and consent of instructor.

Biochemistry and comparative biochemistry of animal parasites. Emphasis on intermediary metabolism, enzymology, antiparasitic agents, and host-parasite relationships. (On demand)

#### *518. Cell Variation and Growth*

(3-3-4) Staff

*Prerequisite:* Cell biology (BIOS 241 or 341) or equivalent.

A comparison of developmental processes, e.g., growth and differentiation in single-cell and metazoan animals at the cell and cell organelle levels of organization. Systems analyzed are embryonic, regenerative, normal, and neoplastic. Laboratory: tissue culture, organ culture, cell reaggregation, microscopy, bright-field cytochemistry, phase; fluorescence. (On demand)

#### *520. Arbovirology*

(2-0-2) Grimstad

*Prerequisite:* Consent of instructor.

A study of the methods and mechanisms of transmission of viruses by arthropod vectors and of the life histories of the vectors as they pertain to viral transmission. (On demand)

*520L. Arbovirology Laboratory*

(0-3-1) Grimstad

*Prerequisite:* BIOS 520 or concurrent.

Laboratory studies on arthropod-borne viruses. (On demand)

*524. Ichthyology*

(3-3-4) Staff

*Prerequisite:* Consent of instructor.

The evolution, taxonomic classification, anatomy, physiology, aquaculture, and zoogeography of fishes, with an examination of the life history of selected species. (On demand)

*524L. Ichthyology Laboratory*

(0-3-1) Staff

*Corequisite:* BIOS 524 and consent of instructor.

An examination of fish species reflecting lecture topics. (On demand)

*525. Community Ecology*

(3-0-3) Lodge

*Prerequisite:* General Ecology (BIOS 312) or equivalent, and consent of instructor.

Community ecology concepts, historical development, philosophical, and methodological approaches. Emphasis is on competition, predation, temporal, and spatial variability, exotic species, and food webs. (On demand)

*527. Stream Ecology*

(3-3-4) Lamberti and Tank

*Prerequisite:* General ecology (BIOS 312) or equivalent, and consent of instructor.

This course explores the interaction of biological, chemical, and physical features of streams and rivers. Quantitative analysis of stream biota and periodic physical features is conducted during field laboratory sessions. Human impacts on flowing waters are explored, along with current theory of stream ecology. (On demand)

*528. Environmental Microbiology*

(2-0-2) Kulpa

*Prerequisite:* Consent of instructor.

A characterization of the roles of microbes in natural and manmade environments; their interrelations with each other, with higher organisms, and with human affairs. (On demand)

*529. Theoretical Population Ecology*

(3-0-3) Belovsky

*Prerequisite:* Consent of instructor

An in-depth discussion of issues in population ecology from the analytical and theoretical points of view. (On demand)

*530. Immunobiology of Infectious Disease*

(3-0-3) Staff

*Prerequisite:* BIOS 462, 415, 435, or consent of instructor.

This course provides a critical overview of various infectious organisms and how they interact with their host. Examples will include intracellular and extracellular pathogens, generation of toxins, molecular mechanisms of invasion, and immune activation and protection. Students will be expected to give oral presentations based on critical review of primary literature as well as written reports. (On demand)

*531. Molecular Biology I*

(3-0-3) Huber

*Prerequisite:* BIOS 156, 202, CHEM 224, 248 or equivalent, or consent of instructor.

The first of a two-semester sequence that will provide an introduction to molecular biology, molecular genetics, and nucleic acid biochemistry. Lecture topics include physical chemistry of nucleic acids, bacterial genetics, principles of cloning, DNA replication and recombination, prokaryotic and eukaryotic transcription, and RNA processing and translation. Listed also as CHEM 531. (Fall)

*532. Molecular Biology II*

(3-0-3) O'Tousa

*Prerequisite:* BIOS 531

The second semester of the sequence. Lecture topics include: transposable elements, yeast genetics, gene families, molecular aspects of development, animal viruses, and computer-assisted analysis of nucleic acids and proteins. Listed also as CHEM 532. (Spring)

*533. Proteins and Nucleic Acids*

(3-0-3) Staff

The structure, stability, and interactions of proteins and nucleic acids will be discussed. The chemical rules by which these biological macromolecules operate will be examined. (On demand)

*535. Comparative Endocrinology*

(3-0-3) Boyd

*Prerequisite:* Consent of instructor.

A systematic comparative analysis of chemical mediation in biological systems with special emphasis on vertebrate species. A study of the structure and function of endocrine tissues, the biochemistry of hormones and their effects on the physiology and behavior of organisms. (On demand)

*536. Advanced Virology*

(3-0-3) Fraser

*Prerequisite:* Consent of instructor.

Current molecular aspects of virology including diagnosis, prevention, therapy, and genetic manipulation. (On demand)

*538. Neurobiology*

(3-0-3) Staff

*Prerequisite:* Consent of instructor.

Morphology and function of the different nervous systems found in animals. The role of receptors and effectors shall be discussed. Special attention will be given to questions of neuronal control of behavior patterns. (On demand)

*539. Advanced Cell Biology I*

(3-0-3) Staff

*Prerequisite:* Consent of instructor.

An upper-level course directed at graduate students and advanced undergraduates with previous background in cell and molecular biology. The course focuses on the molecular basis and regulation of cell structure and function, covering key topics that include membrane structure, function, and transport, cellular energetics, organelle biogenesis, protein trafficking, vesicular transport, signaling, and cytoskeletal function. (On demand)

*540. Advanced Cell Biology II*

(3-0-3) Staff

*Prerequisite:* Consent of instructor.

A continuation and expansion of topics presented in Advanced Cell Biology I. (On demand)

*543. Ethics and Science*

(3-0-3) Shrader-Freschette

*Prerequisite:* Consent of instructor.

Use of four ethical theories and five classical logical/analytical criteria to ethically evaluate case studies in contemporary science. Problems analyzed via contemporary science include practical issues of plagiarism, attribution, peer reviewing, data sharing, data ownership, collaborative science, scientific misconduct, paternalism, whistleblowing, conflicts of interest, secrecy in science, and advocacy in science. Methodological issues to be dealt with include scientists misrepresenting their opinions with confirmed science, cooking and trimming their data, failure to attend to the purposes for which their research may be used or misused, and scientists' use of evaluative presuppositions, questionable inferences and default rules, question-begging validation and benchmarking, and misleading statistics. (On demand)

554. *Biological Research Applications of Computers*

(3-2-4) Hellenthal

*Prerequisite:* Consent of instructor.

Data processing techniques that have direct application to biological research and teaching. Emphasis is on the use of computers for the solution of specific biological data handling and analysis of problems. (On demand)

556. *Histology*

(3-3-4) Staff

*Prerequisite:* Consent of instructor.

An in-depth examination of the normal structure of vertebrate animal tissues and cells. Histological techniques (fixation, embedding, staining) will be taught in the laboratory. (On demand)

558. *Biological Electron Microscopy*

(3-3-4) Staff

*Prerequisite:* Consent of instructor.

Characteristics and biological applications of transmission and scanning electron microscopy. Current methods in ultrastructural preparation and analysis. (On demand)

560. *Environmental Physiology and Biochemistry*

(3-0-3) Duman

*Prerequisite:* Consent of instructor.

A course concentrating on physiological and biochemical adaptations that enable organisms to exist under extremes of such environmental variables as temperature, oxygen concentration, osmotic concentration, pressure, water availability, pH, etc. (Fall: on demand)

561. *Advanced Aquatic Ecology*

(3-3-4) Lamberti and Lodge

*Prerequisite:* An ecology course and consent of instructor.

Population interactions, community analysis, biogeochemical cycles, and ecosystem structure and functioning in streams, lakes, and oceans. (On demand)

562. *Aquatic Insects*

(3-3-4) Hellenthal

*Prerequisite:* A course in entomology, invertebrate zoology, or ecology and consent of instructor.

The taxonomy and ecology of insects having aquatic stages in their life cycles. (Spring: on demand)

563. *Wetland Ecology*

(3-0-3) Staff

*Prerequisites:* BIOS 312, 312L, or equivalent and consent of instructor.

Cycling of nutrients and carbon, plant communities, hydrology, successional development, and management in wetland ecosystems will be explored. Several Saturday field trips are mandatory. (On demand)

564. *Behavioral Ecology*

(3-0-3) Lodge

*Prerequisite:* An ecology course and consent of instructor.

Emphasis is placed on the behavioral components of species interactions and their importance in natural selection and population regulation. Topics include adaptations and natural selection, group and kin selection, sociality and cooperations, sexuality and mating systems, predator and prey behavior, behavior of competitors, territoriality, coevolutionary arms races, signals, thermoregulation, and habitat selection. (On demand)

568. *Introduction to UNDERC*

(1-0-1) Belovsky

Open only to students previously accepted into the UNDERC program. (Spring)

569. *Practicum in Aquatic Biology*

(V-V-6) Staff

Practical training in aquatic and environmental biology through lecture and field experience at the University's environmental research facility located in northern Wisconsin and the upper peninsula of Michigan. Course includes an independent research project. (Summer)

570. *Topics in Cell Biology*

(V-V-V) Staff

*Prerequisite:* Consent of instructor.

Subject matter changes depending on students' needs. Prospective subjects include bioisotopes or chemistry of cell organelles. (On demand)

571. *Topics in Physiology*

(V-V-V) Staff

*Prerequisite:* Consent of instructor.

Subject matter changes depending on students' needs. Prospective subjects include invertebrate and vertebrate physiology. (On demand)

571A. *Physiology Practicum*

(V-V-V) Staff

Subject matter changes depending on students' needs. (On demand)

572. *Topics in Botany*

(V-V-V) Staff

*Prerequisite:* Consent of instructor.

Subject matter changes depending on stu-

dents' needs. Prospective subjects include plant taxonomy or biology of lower plants. (On demand)

573. *Topics in Ecology*

(V-V-V) Staff

*Prerequisite:* Consent of instructor.

Subject matter changes depending on students' needs. Prospective subjects include systems analysis in ecology or biogeography. (On demand)

574. *Topics in Evolutionary and Systematic Biology*

(V-V-V) Staff

*Prerequisite:* Consent of instructor.

Subject matter changes depending on students' needs. Prospective subjects include numerical taxonomy and population genetics. (On demand)

575. *Topics in Developmental Biology*

(V-V-V) Staff

*Prerequisite:* Consent of instructor.

Subject matter changes depending on students' needs. Prospective subjects include developmental physiology, determination and differentiation, extracellular matrix, and invertebrate development. (On demand)

576. *Topics in Biocomputing*

(V-V-1) Staff

*Prerequisite:* Consent of instructor.

A specific area concerning the use of computers in biology will be covered each time the course is given. Lectures, demonstrations, and laboratory are variable, depending upon the subject treated. (On demand)

577. *Topics in Genetics/Molecular Biology*

(V-V-V) Staff

*Prerequisites:* Consent of instructor.

Selected topics in molecular biology as reflected by the current literature. (On demand)

578. *Scientific Writing*

(3-0-3) Boyd

*Prerequisite:* Consent of instructor.

Students are instructed in the skills needed to write publication-quality manuscripts. (On demand)

579. *Topics in Parasitology and Vector Biology*

(V-V-V) Staff

*Prerequisite:* Consent of instructor.

Subject matter changes depending on students' needs. Prospective topics include specific diseases (e.g., Malaria, dengue), molecular genetics of vectors, bioinformatics, and others. (On demand)



**580. Seminars**

(1-0-1) Staff

Advanced level, current topics in the areas listed below. An introductory course in the area or consent of the instructor is usually required.

- A. Ecology
- B. Developmental Biology
- C. Physiology/Neurobiology/Behavior
- D. Genetics/Molecular Biology
- E. Parasitology/Vector Biology
- F. Cell Biology/Microbiology

**599. Thesis Direction**

(V-V-V) Staff

Research and direction for resident master's students. (Every semester)

**600. Nonresident Thesis Research**

(0-0-1) Lamberti

Students away from campus register for one credit hour each semester during regular academic year only. (Every semester)

**611. Experimental Parasitology**

(3-3-4) Adams

*Prerequisite:* Consent of instructor.

A seminar and laboratory on current methods used in parasitological research. Protozoan, helminth, and arthropod parasites will be considered. (On demand)

**622. Advanced Immunology**

(3-0-3) Staff

*Prerequisites:* Principles of microbiology, immunology, biochemistry, or consent of instructor.

A course concerned with the immunochemistry of antigens, antibodies, and their interaction. Antibody biosynthesis and the cellular aspects of the immune response are also considered. (On demand)

**663, 664, 665. Methods in Cellular and Molecular Biology**

(V-V-V) Staff

*Prerequisite:* Consent of instructor.

Laboratory instruction in biochemical, molecular biological, and immunological techniques. The course is divided into three nine-week sections: protein purification and modification, gene cloning and expression, and immunochemistry and cellular immunology. Students will learn a wide range of methodologies intended to prepare them for research. (On demand)

**671. Special Problems I**

(V-V-V) Staff

Special topics in the field of interest of individual graduate students. (Every semester)

**680. BBMG Seminar**

(V-V-V) Staff

Special seminar series for MBP participants.

**699. Research and Dissertation**

(V-V-V) Staff

Research and dissertation for resident doctoral students. (Every semester)

**700. Nonresident Dissertation Research**

(0-0-1) Lamberti

Students away from campus register for one credit hour each semester during regular academic year only. (Every semester)

Other graduate courses taught on an irregular basis:

**501. Advanced Molecular Genetics****502. Genetics of Lower Eukaryotes****503. Advanced Microbial Physiology****506. Cytogenetics****509. Plant Anatomy****510. Experimental Parasitology****512. Helminthology****517. Biological Microtechniques****523. Practicum in Environmental Biology****526. Invertebrate Pathology****534. Plant Physiology****537. Microbial Genetics****541. Physical Chemistry for Biologists****565. Nutrition****590. Seminar in Microbial Genetics****672. Special Problems II****681. Special Problems in Microbiology****Faculty**

John H. Adams, *Associate Professor*. B.A., Hendrix College, 1978; M.Sc., Univ. of Illinois, 1982; Ph.D., *ibid.*, 1986. (1991)

Gary E. Belovsky, *the Gillen Director of UNDERC and Professor*. B.B.A., Univ. of Notre Dame, 1972; M.F.S., Yale Univ., 1972; Ph.D., Harvard Univ., 1977. (2001)

Harvey A. Bender, *Professor*. B.A., Western Reserve Univ., 1954; M.S., Northwestern Univ., 1957; Ph.D., *ibid.*, 1959. (1960)

Nora J. Besansky, *Professor*. B.S., Oberlin College, 1982; M.S., M.Phil., Yale Univ., 1987; Ph.D., *ibid.*, 1990. (1997)

Sunny K. Boyd, *Associate Professor*. A.B., Princeton Univ., 1981; M.S., Oregon State Univ., 1984; Ph.D., *ibid.*, 1987. (1987)

Frank H. Collins, *the George and Winifred Clark Professor of Biological Sciences*. A.B., Johns Hopkins Univ., 1966; M.A., Univ. of East Anglia, 1973; M.S., Univ. of California, Davis, 1980; Ph.D., *ibid.*, 1981. (1997)

Crislyn D'Souza-Schorey, *the Walther Cancer Institute Assistant Professor*. B.Sc., Univ. of Bombay, India, 1986; M.Sc., *ibid.*, 1988; Ph.D., Univ. of Texas, San Antonio, 1992. (1998)

John G. Duman, *the Martin J. Gillen Professor of Biological Sciences*. B.S., Pennsylvania State Univ., 1968; Ph.D., Univ. of California, San Diego (Scripps Institute of Oceanography), 1974. (1974)

Jeffrey Feder, *Associate Professor*. B.A., Pomona College, 1980; Ph.D., Michigan State Univ., 1989. (1993)

Michael T. Ferdig, *Assistant Professor*. B.S., Univ. of Nebraska, Lincoln, 1987; M.S., *ibid.*, 1990; Ph.D., Univ. of Wisconsin, Madison, 1997. (2001)

Malcolm J. Fraser Jr., *Professor*. B.S., Wheeling College, 1975; M.S., Ohio State Univ., 1979; Ph.D., *ibid.*, 1981. (1983)

Paul R. Grimstad, *Assistant Chair and Associate Professor*. B.A., Concordia College, 1967; M.S., Univ. of Wisconsin, 1972; Ph.D., *ibid.*, 1973. (1976)

Kristin M. Hager, *Assistant Professor*. B.Sc., Univ. of Illinois, 1989; Ph.D., Univ. of Alabama, Birmingham, 1996. (2000)

Ronald A. Hellenthal, *Assistant Chair and Professor*. A.A., Los Angeles Valley College, 1965; B.A., California State Univ., Northridge, 1967; Ph.D., Univ. of Minnesota, 1977. (1977)

Edward H. Hinchcliffe, *Assistant Professor*. B.Sc., Univ. of Dayton, 1989; Ph.D., Univ. of Minnesota, 1995. (2001)

Hope Hollocher, *the Clare Boothe Luce Associate Professor*. B.A., Univ. of Pennsylvania, 1982; Ph.D., Washington Univ., St. Louis, 1991. (2000)

David R. Hyde, *the Navari Family Director of the Center for Zebrafish Research and Professor*. B.S., Michigan State Univ., 1980; Ph.D., Pennsylvania State Univ., 1985. (1988)

Alan L. Johnson, *Professor*. B.A., Univ. of Vermont, 1972; M.S., *ibid.*, 1975; Ph.D., Cornell Univ., 1979. (1993)

Charles F. Kulpa Jr., *Chair and Professor*. B.S., Univ. of Michigan, 1966; M.S., *ibid.*, 1968; Ph.D., *ibid.*, 1970. (1972)

Gary A. Lamberti, *Director of Graduate Studies, Assistant Chair, and Professor*. B.S., Univ. of California, Berkeley, 1975; Ph.D., Univ. of California, Berkeley, 1983. (1989)

David M. Lodge, *Professor and Fellow of the Joan B. Kroc Institute for International Peace Studies*. B.S., Univ. of the South, 1979; D.Phil., Oxford Univ., England, 1982. (1985)

Lei Li, *Associate Professor*. B.S., Shandong Univ., China, 1985; Ph.D., Georgia State Univ., 1995. (2003)

Mary Ann McDowell, *Assistant Professor*. B.S., Univ. of Nebraska, Lincoln, 1988; M.S., *ibid.*, 1990; Ph.D., Univ. of Wisconsin, Madison, 1995. (2001)

Rev. James J. McGrath, C.S.C., *Assistant Chair and Associate Professor*. A.B., Univ. of Notre Dame, 1955; M.A., Univ. of California, 1963; Ph.D., *ibid.*, 1966. (1965)

Kenneth R. Olson, *Adjunct Professor*. B.S., Univ. of Wisconsin, LaCrosse, 1969; M.S., Michigan State Univ., 1970; Ph.D., *ibid.*, 1972. (1975)

Joseph E. O'Tousa, *Professor*. B.S., Univ. of California, Irvine, 1976; Ph.D., Univ. of Washington, Seattle, 1980. (1985)

Jeanne Romero-Severson, *Associate Professor*. B.S., Univ. of Wisconsin, Madison, 1974; M.S., *ibid.*, 1975; Ph.D., *ibid.*, 1984. (2003)

Jeffrey S. Schorey, *Assistant Professor*. B.Sc., Southeast Missouri State Univ., 1985; Ph.D., Univ. of Texas Health Science Center, San Antonio, 1992. (1998)

David W. Severson, *Professor*. A.A., Rochester Community College, 1970; B.A. Winona State Univ., 1975; M.Sc., Univ. of Wisconsin, LaCrosse, 1978; Ph.D., Univ. of Wisconsin, Madison, 1983. (1997)

Neil F. Shay, *Associate Professor*. B.S., Univ. Massachusetts, Amherst, 1976; M.A.T., *ibid.*, 1979; Ph.D., Univ. Florida, 1990. (2000)

Jennifer L. Tank, *the Galla Assistant Professor*. B.S., Michigan State Univ., 1988; M.S., Virginia Polytechnic Institute and State Univ., 1992; Ph.D., *ibid.*, 1996. (2000)

Martin P. Tenniswood, *the Coleman Professor of Life Sciences*. B.Sc., Trent Univ., Ontario, 1973; Ph.D., Queen's Univ., Kingston, 1979. (1998)

Kevin T. Vaughan, *Assistant Professor*. B.A., Hamilton College, 1984; M.S., State Univ. New York, Buffalo, 1986; Ph.D., Cornell Medical College, 1992. (1998)

JoEllen J. Welsh, *Professor*. B.A., Rutgers Univ., 1975; Ph.D., Cornell Univ., 1980. (1998)

## Chemistry and Biochemistry

### Chair:

Marvin J. Miller

### Director of Graduate Studies:

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### The Program of Studies

The graduate programs in chemistry and biochemistry at Notre Dame are directed toward the master's and Ph.D. degrees. Applications are taken from students seeking a degree in either chemistry or biochemistry.

The Ph.D. program is designed to prepare the student for a career in research or college-level teaching in chemistry, biochemistry, and related fields. Advanced courses in several areas of chemistry and biochemistry are available (see list below) along with regular seminars and special topics courses. Students usually begin active research during the spring semester of their first year. Admission to candidacy for the doctoral degree occurs after completion of written and oral examinations in the area of specialization.

The department considers teaching an integral part of the education of a graduate student. Teaching performance, therefore, is considered as part of the semiannual graduate student evaluations. A minimum of one year of teaching experience is required of all advanced degree-seeking students.

Both the Ph.D. and master's degrees require a dissertation based upon experimental and/or theoretical research. The department participates in interdisciplinary programs involving the Departments of Biological Sciences, Physics, and Engineering. These programs include the Keck Transgene Center, the Walther Cancer Research Center, the Radiation Laboratory, the Center for Environmental Science and Technology, and the Center for Nano Science and Technology. A student normally selects his or her area of research and thesis adviser by the end of the first semester.

The Department of Chemistry and Biochemistry has excellent facilities for research, including most modern instruments for investigations in the major areas of chemistry and biochemistry. In addition to equipment

found in the research laboratories of individual faculty members, department facilities include the Lizzadro Magnetic Resonance Research Center, the Molecular Structure and Mass Spectrometry Facilities, and the Surface Science Laboratory. The latter is maintained jointly by the Department of Chemistry and Biochemistry and the Department of Electrical Engineering. In addition to holdings in Hesburgh Library, all the major chemical, biochemical, and biophysical specialty journals are available in the Chemistry-Physics Research Library located in Nieuwland Science Hall. Other relevant holdings are found in the Life Sciences Library located in Galvin Life Sciences Center. The Radiation Research Laboratory, which is operated by the U.S. Department of Energy, is one of the world's leading research centers in radiation chemistry and draws scientists from all over the world to the Notre Dame campus. The laboratory has a staff of approximately 20 research scientists, two of whom have joint appointments in the Department of Chemistry and Biochemistry (see Radiation Laboratory in this *Bulletin*).

Currently, there are over 140 graduate students and approximately 45 postdoctoral investigators in the department. Visiting scientists from the United States and foreign countries are often in residence.

### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

#### 420. Principles of Biochemistry (3-0-3) Staff

A general treatment of the various areas of modern biochemistry; including protein structure and function, bioenergetics, molecular basis of genetic and developmental processes, cellular mechanisms and intermediary metabolism. (Fall and spring)

#### 443. Inorganic Chemistry (3-0-3) Sevov

Group Theory, Molecular Orbital Theory, structure, and spectroscopy are used as vehicles for the introduction of molecules from inorganic, organometallic, solid state, and organic chemistry. (Fall)

*521. Fundamentals of Biochemistry*

(3-0-3) Nowak

The chemical properties of biological molecules such as amino acids, proteins, nucleotides, carbohydrates, lipids, and enzymes. Physical and chemical principles are utilized to understand biological processes. (Fall)

*522. Intermediary Metabolism*

(3-0-3) Staff

*Prerequisite:* CHEM 521.

A study of the chemical reactions characteristic of living systems: mechanisms, regulation, and energetics of metabolism. (Spring)

*531. Molecular Biology I*

(3-0-3) Huber

The first of a two-semester sequence that provides an introduction to molecular biology, molecular genetics, and nucleic acid biochemistry. Topics include: physical chemistry of nucleic acids, bacterial genetics, principles of cloning, DNA replication and recombination, prokaryotic and eukaryotic transcription, and RNA processing and translation. Listed also as BIOS 531. (Fall)

*532. Molecular Biology II*

(3-0-3) Staff

The second semester of the sequence. Lecture topics include: yeast genetics and molecular biology; retroviruses and transposable elements; transgenic mice; and special topics covering cell cycle regulation, oncogenes, development in *Drosophila*, signal transduction, and cloning of human disease genes. (Spring)

*535. Medicinal Chemistry*

(3-0-3) Staff

*Prerequisite:* CHEM 224 or equivalent.

The chemical, biological, and medical aspects of medicinal agents. The course will include CNS depressants, CNS stimulants, benzodiazepines, cardiovascular agents, analgesics, cascades (arachidonic acid, renin, peptides) antibiotics, cancer, transmitters, teratogens, metabolism, drug design, cholesterol, anti-inflammatory agents, antiulcer agents, Alzheimer's and Parkinson's diseases. (Every other fall)

*599. Thesis Direction*

(V-V-V) Staff

Research and reading for master's students.

*601, 602. Seminar in Chemistry*

(V-0-0) (V-0-0) Staff

*Prerequisite:* Registration as graduate student in chemistry.

Lectures by invited speakers.

*610. Organometallic Chemistry*

(3-0-3) Brown

Structure and reactions of organometallic compounds and applications to synthetic and catalytic reactions. (Every other fall)

*611, 612. Seminar in Inorganic Chemistry*

(1-0-1) (1-0-1) Staff

Lectures on the topic of inorganic chemistry.

*615. Inorganic Mechanisms*

(3-0-3) Brown, Fehlner

A general treatment of the mechanisms of inorganic reactions, including an examination of the sources of mechanistic data. (Every other fall)

*616. Solid State and Cluster Chemistry*

(3-0-3) Sevov, Fehlner

A survey of synthesis, structure (geometric and electronic), spectroscopic, dynamic properties, and reactivity of solid state and molecular cluster compounds of the main group and transition metal elements. (Spring)

*617, 618. Special Topics in Inorganic Chemistry*

(V-0-V) (V-0-V) Staff

Recent offerings have included: Advanced Laboratory Techniques in Inorganic Chemistry; MOs in Organometallics x-ray Crystallography.

*620. Bioinorganic Chemistry*

(3-0-3) Scheidt

The role of metals in biological systems. (Every other spring)

*621, 622. Seminar in Biochemistry*

(1-0-1) (1-0-1) Staff

Lectures on the topic of biochemistry.

*623. Enzyme Chemistry*

(3-0-3) Nowak

*Prerequisite:* CHEM 522.

Physical and chemical properties and mechanism of action of enzymes and their role in metabolic processes. (Every other spring)

*624. Advanced Biochemical Techniques*

(2-6-4) Staff

*Prerequisite:* Permission of instructor.

Advanced laboratory in biochemical techniques with emphasis on protein purification, enzyme kinetics, carbohydrate analysis, and DNA cloning and sequencing. (Spring)

*626. NMR Spectroscopy in Chemistry and Biochemistry*

(3-0-3) Serianni

A survey of modern NMR methods used to determine molecular structure and conformation, study chemical and biochemical

reactivity, and probe metabolic processes in biological systems. 1D, 2D, and 3D spectroscopy and MRI/MRS are treated. (Every other year)

*627, 628. Special Topics in Biochemistry*

(V-0-V) (V-0-V) Staff

*Prerequisite:* Permission of instructor.

Recent offerings have included: Glycoconjugates; Spectroscopy in Biochemistry; Chemistry and Biology of RNA.

*631, 632. Advanced Organic Chemistry I, II*

(3-0-3) (3-0-3) Wiest, Miller

The theoretical basis of organic reaction mechanisms and a detailed study of the preparation and reactions of organic functional groups. (Fall and spring)

*634. Structure Elucidation*

(3-0-3) Staff

The interpretation of data from NMR, IR, MS, UV, and x-ray methods with an emphasis on the practical as opposed to the theoretical point of view. (Spring)

*635, 636. Seminar in Organic Chemistry*

(1-0-1) (1-0-1) Staff

Lectures on the topic of organic chemistry.

*637, 638. Special Topics in Organic Chemistry*

(V-0-0) (V-0-0) Staff

Recent offerings have included: Advanced Physical Organic Chemistry; Computers in Chemistry; Enzymes in Organic Synthesis; Chemical Basis of Gene Expression.

*639. Synthetic Organic Chemistry*

(3-0-3) Taylor

*Prerequisite:* CHEM 632.

A systematic and critical study of the synthetic methods of modern organic chemistry including the development of multistage syntheses and organometallic reagents. (Fall)

*641. Statistical Mechanics I*

(3-0-3) Gezelter

Foundations of statistical mechanics; canonical, microcanonical, and grand canonical ensembles; thermodynamic properties of chemical substances in terms of partition functions; chemical equilibrium; thermal radiation; quantum statistics; and chemical kinetics and the approach to equilibrium. (Spring)

*642. Chemical Kinetics*

(3-0-3) Jacobs

Rates and mechanisms of chemical reactions in the condensed phase; formalisms, theory. (Fall)

643, 644. *Seminar in Physical Chemistry*  
(1-0-1) (1-0-1) Staff  
Lectures on the topic of physical chemistry.

645, 646. *Seminar in Radiation Chemistry*  
(1-0-1) (1-0-1) Staff  
A continuing informal discussion of areas in radiation chemistry currently active either at Notre Dame or elsewhere.

647, 648. *Special Topics in Physical Chemistry*  
(V-0-V) (V-0-V) Staff  
Current topics of modern theoretical and experimental physical chemistry. A recent offering is: Computer Simulation of Organic and Biological Molecules.

649. *Quantum Mechanics*  
(3-0-3) Gezelter  
A chemically oriented survey of quantum mechanics at an intermediate level; wave packets, commutator relations, angular momentum, central field problems, harmonic oscillators, and approximation methods. Some relevant mathematical concepts are developed: matrix algebra orthogonal functions. (Every other fall)

650, 651. *Computational Chemistry I, II*  
(3-0-3) (3-0-3) Gezelter, Wiest  
An overview of the fundamental theory, methodology, and applications of computational chemistry. Topics include simulation techniques such as molecular dynamics and Monte Carlo as well as a wide range of quantum chemistry methods. Applications center on organic molecules and biological systems such as proteins and DNA. Hands-on computer experience is an integral part of these courses. (Fall and spring)

652. *Molecular Spectroscopy*  
(3-0-3) Hartland  
*Prerequisite:* CHEM 649 or permission of instructor.  
A study of the interaction of light with matter, at the single- and multi-photon level. Topics include group theory, molecular vibrational analysis, nonseparability of electronic, vibrational, and rotational motion, angular momenta coupling, and time-independent and time-dependent perturbation theory. (Every other year)

653. *Surface Chemistry*  
(3-0-3) Kandel, Jacobs, Lieberman  
The chemistry and physics of surfaces and interfaces. Topics include scanning probe microscopy, atomic force microscopy, near-field scanning optical microscopy, image analysis and surface templating.

655. *Chemical Reaction Dynamics*  
(3-0-3) Jacobs  
*Prerequisite:* CHEM 649 or permission of instructor.

An overview of experiments and theories that examine the detailed mechanisms by which atoms and molecules react. Topics include potential energy surfaces, impact parameters, energy consumption and disposal, classical trajectory simulations, and quantum scattering methods. (Every other year)

680. *Seminar in Biochemistry, Biophysics and Molecular Biology*  
(1-0-1) Staff  
Lectures on the topics of biochemistry, biophysics, and molecular biology.

697. *Directed Readings*  
(V-V-V) Staff  
Reading and research on specialized topics that are immediately relevant to the student's interests and not routinely covered in the regular curriculum.

699. *Research and Dissertation*  
(V-V-V) Staff  
Research and dissertation for resident doctoral students.

699Z. *Visiting Student Research*  
(V-V-V) Staff  
Research for visiting students.

700. *Nonresident Dissertation Research*  
(0-0-1) Staff  
Required of nonresident graduate students who are completing their dissertations in absentia and who wish to retain their degree status.

#### Faculty

Brian Baker, *Assistant Professor*. B.S., New Mexico State Univ., 1992; Ph.D., Univ. of Iowa, 1997. (2001)

J. Eli Barkai, *Assistant Professor*. B.S., Tel-Aviv University, 1991; M.S., *ibid.*, 1994; Ph.D., *ibid.*, 1998. (2002)

Subhash Chandra Basu, *Professor*. B.S., Calcutta Univ., 1958; M.S., *ibid.*, 1960; Ph.D., Univ. of Michigan, 1966; D.Sc., Univ. of Calcutta, 1976. (1970)

Seth N. Brown, *Associate Professor*. B.S., Massachusetts Institute of Technology, 1988; Ph.D., Univ. of Washington, 1994. (1996)

Francis J. Castellino, *Dean Emeritus of Science, the Kleiderer-Pezold Professor of Biochemistry, and Director of the Keck Center for Transgene*

*Research*. B.S., Univ. of Scranton, 1964; M.S., Univ. of Iowa, 1966; Ph.D., *ibid.*, 1968. (1970)

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## Mathematics

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### The Program of Studies

The purpose of the doctoral program in mathematics is to assist students in developing into educated, creative, and articulate mathematicians. The program consists of basic courses in the fundamentals of algebra, analysis, geometry, logic, and topology; more advanced topics and seminars; and approximately two to three years of thesis work in close association with a member of the faculty. Limited enrollment and the presence of active groups of strong mathematicians provide excellent opportunities for research in algebra, complex analysis, partial differential equations, logic, algebraic geometry, differential geometry, topology, and applied mathematics. Most students complete the program within five years; some finish in four years; a few in three.

Students are supported by fellowships and teaching assistantships. Students' teaching responsibilities are integrated into their professional development as mathematicians.

First-year students have no teaching duties and usually devote themselves full time to courses. The oral candidacy examination is taken during the second year. A reading knowledge of one approved language, in addition to English, is required.

The Department of Mathematics has its own building with good computer facilities and a comprehensive research library of nearly 35,000 volumes that subscribes to 275 current journals. Graduate students are provided with comfortable office space and are assured a stimulating and challenging intellectual experience.

## Areas of Research

### Applied Mathematics

The Department of Mathematics has about half-a-dozen faculty members actively involved in a variety of areas of mathematics and its applications to physics, engineering, biology, and problems arising from industry. The research disciplines they are pursuing, often in conjunction with members of other departments at Notre Dame, include the following: numerical analysis of PDE and of polynomial systems, nonlinear dynamical systems and partial differential equations, control theory, mathematical biology, optimization theory, interior point algorithms, coding theory, and cryptography.

1. *Applied PDE*. Partial differential equations arise from various applications in the real world; the important role of mathematical analysis and numerical study is to provide qualitative and quantitative information about the system being considered. The objectives are: to study the existence, uniqueness, convergence, and asymptotic behaviors of the solution; to establish mathematical theory about the model; to study the special properties of the solution.

There are many exciting examples of such problems where faculty at Notre Dame are involved.

(1) Free boundary problems (a PDE problem where the domain is moving) appear in material with solid and liquid states, in cell growth problems from biology, in semiconductor manufacturing through film growth.

(2) Homogenization problems. Many systems from engineering and industry have two or more different scales which are treated through Homogenization technique, an important technique which is very useful for obtaining important features of the system.

(3) Blowup problems. In many reaction diffusion systems with nonlinear source terms, finite time blowup may occur. Understanding the exact behavior of the blowup will be very helpful in understanding the system.

2. *Coding and Cryptography*. In collaboration with several faculty in the electrical engineering department we investigate the algebraic properties of block codes and convolutional codes. Coding theory is concerned with the storage and transmission of information and the ability to recover the information as completely as possible even if some of the

data are lost. A good example is the genetic code stored in a DNA molecule or the ISBN used by book publishers. Coding theory is widely applied in data communication and mathematically it is interconnected with algebraic geometry on the algebraic side and with information theory on the analytic side. For about three years, one to two faculty members and several graduate students have been working on the construction of new one-way trapdoor functions to be used in the next generation of public key cryptography.

3. *Computation and Numerics.* One on-going project, being carried on with mathematicians and engineers at other institutions, is the development of the new area of numerical algebraic geometry. This area is to algebraic geometry what numerical linear algebra is to linear algebra. Its goal is the development of efficient numerical algorithms to solve systems of polynomials in several variables. This amounts to the development of numerical techniques to manipulate algebraic varieties. The approach taken is to numerically model the classical notion of generic points by random points on irreducible components of the solution set. Classical interpolation techniques combined with homotopy continuation techniques are used to numerically do what elimination theory does in computer algebra programs. One recent success is the development of numerical techniques to decompose a complex algebraic variety into its irreducible components. In particular, this gave the first homotopy algorithm to find the exact set of isolated solutions of a system of polynomials: previous homotopy algorithms find a finite set of solutions containing the isolated solutions, but often also containing solutions from positive dimensional components.

Another project, involving mathematicians, engineers, and scientists from Notre Dame and elsewhere, is the development of numerical and analytical techniques for the solution of free boundary and boundary value problems. Such problems arise in fluid mechanics (free surface fluid flows), biology (tumor and blood vessel growth), and electromagnetics and acoustics (direct and inverse scattering of radiation from complicated geometries), to name just a few. The techniques currently being investigated are geometric perturbation theory (the “small parameter” is the deformation of the free or complicated boundary from a canonical geometry) coupled with analytic continuation techniques (e.g., Pade approximation). This area of research involves

rigorous mathematical analysis for the justification of the proposed perturbation series coupled with numerical implementation of these algorithms and large-scale computational simulations to gain new insight into the underlying physical models.

4. *Mathematical Biology.* Several members of the department are participating in an interdisciplinary biocomplexity program at Notre Dame which is supported by NSF. Biocomplexity is the study of the unique complex structures and behaviors that arise from the interaction of biological entities (molecules, cells, or organisms). While physical and chemical processes give rise to a great variety of spatial and temporal structures, the complexity of even the simplest biological phenomena is infinitely richer.

The biocomplexity group, which consists of researchers from the physics, mathematics, and computer science and engineering departments, studies multicellular aggregates, such as embryonic and mature tissues, which often share the properties of “excitable media” and “soft matter,” familiar to modern condensed matter physics and dynamical systems theory. Changes in tissue shape and form during development and repair, skeletal formation, gastrulation, segmentation, are well suited to analysis by physical and mathematical concepts, particularly in conjunction with modern knowledge of cells’ adhesive forces and the molecular composition and rheology of cytoplasm and extracellular matrix.

5. *Optimization.* Optimization is an interdisciplinary area of applied mathematics. Recently there have been breakthrough developments in the area of interior-point algorithms of optimization which enabled researchers to solve important large scale problems in electrical engineering, mechanical engineering, portfolio allocation, protein folding, and many other areas. Most of the departments in the University have faculty who use optimization as an important tool for solving problems.

#### *Algebraic Geometry and Commutative Algebra*

The roots of algebraic geometry and commutative algebra are to be found in the 19th-century study of algebraic equations in relation to the geometry of their solutions. Such a line of investigation goes back at least to Descartes and the idea of coordinatizing the plane. Commutative algebra and algebraic geometry study the solutions of those equations by forming an algebraic object, called a

ring, given by polynomial functions on the set of solutions. While commutative algebra deals with the algebraic structure of such a ring, algebraic geometry focuses on the geometry of solution sets. Such sets include parabolas, spheres, Euclidean space, projective spaces, and a vast array of beautiful and intricate concrete curves, surfaces, and higher dimensional sets. For example, to study the set of solutions of the parabola  $y=x^2-3x+1$  in  $C^2$ , we construct the ring  $C[x,y]/(y-x^2+3x-1)$  where  $C$  represents the complex numbers. This ring represents polynomial functions on the parabola. In the same way we study the solution set of a system of any number of polynomial equations by relating the algebraic structure of its ring of polynomial functions to the geometry of the set.

In the Department of Mathematics research is conducted in many parts of this subject, including adjunction theory, Castelnuovo theory, curve theory, various aspects of the projective classification of varieties, the study of group actions, liaison theory, minimal free resolutions, Rees algebras, and the numerical analysis of polynomial systems. There is also activity in nearby areas dealing with coding theory, cryptology and nonlinear partial differential equations. (See the section on interdisciplinary mathematics.)

The main areas of focus in research on algebraic geometry and commutative algebra include:

1. *Theory of Infinitesimals.* This study involves using polynomials to construct the “simplest possible” geometric object obeying certain restraints; for example, a surface containing certain points and having specified tangents and curvatures. This has immediate application to the study of infinitesimal interpolation in science overall, as well as to the analysis of singularities and deformations in algebraic geometry.

2. *Commutative Noetherian Rings.* Properties of ideals in a commutative Noetherian ring  $R$  are studied; more precisely, with invariants associated to an ideal as well as to structures of various algebras associated to an ideal as the Blowup algebras. These are algebraic constructions that are related to an essential step in the process of desingularization, the blowup of a variety along a subvariety. For example, a curve that has a singular point (such as the solution set of  $-y^2=x^3$  in the plane) may be “treated” by blowing up the point (in this case the origin).

3. *Liaison Theory*. This deals with the idea that when the union of two solution sets is especially nice, then a good deal of information about one may be gleaned from information about the other. Several aspects of liaison theory (also called linkage theory) are studied in our department. It is an old theory, but developments of the last five years or so have reestablished it as an exciting area.

4. *Minimal Free Resolutions*. The minimal free resolution of an ideal describes all the generators of the ideal, all the relations among the generators, the relations among the relations, etc. Current interest includes finding the minimal free resolutions for ideals of generic forms and ideals of fat points.

### *Differential Geometry*

The striking feature of modern differential geometry is its breadth, touching so much of mathematics and theoretical physics. It uses a wide array of techniques from areas as diverse as differential equations, real and complex analysis, topology, Lie groups, and dynamical systems. Activity at Notre Dame covers the following areas at the forefront of current research:

1. *Submanifold Geometry*. The geometry of a space is often reflected in its distinguished classes of submanifolds. Our research in this area includes minimal submanifolds, surfaces of constant mean curvature, isoparametric submanifolds, and volume minimizing cycles. Such submanifolds are themselves of physical interests (membranes, soap films, soap bubbles, and supersymmetric cycles). Umbilic points of immersed surfaces have also been extensively studied. This theory has connections to compressible plane fluid flow and general relativity.

2. *Global Differential Geometry*. One of the most important areas of differential geometry is the study of how curvature influences the topological and analytic structures of Riemannian or Kähler manifolds. Our research in this area includes results on the Euler number of Kähler manifolds, complex surfaces of positive bi-sectional curvature, A-genus and metric of positive scalar curvature, Witten genus and metric of positive Ricci curvature, spectrum of the Laplace operator, connections between manifolds of negative curvature, dynamical systems and ergodic theory, closed geodesics and marked length spectrum, harmonic functions on non-compact spaces with Gromov's hyperbolicity, splitting theorems, isoperimetric inequalities, minimal volume

and CR-structures on spaces with non-positive curvature.

3. *Partial Differential Equations and Riemannian Geometry*. Many geometric problems are equivalent to problems in the theory of partial differential equations. Indeed, some properties of partial differential equations are best interpreted in a geometric way. Prescribing the curvature of surfaces in three-dimensional space, the isometric imbedding problem, variational problems in Riemannian geometry such as the Yamabe problem—all of these are geometric questions which involve a deep understanding of nonlinear partial differential equations.

4. *Gromov-Witten Invariants and Quantum Cohomology*. String theory has been a great source of inspiration for many exciting new developments in mathematics, one of which is the theory of Gromov-Witten invariants and quantum cohomology. It has profound applications in symplectic geometry, algebraic geometry, and integrable systems. Our research here has been focused on the generating function of Gromov-Witten invariants and its relation with the Virasoro algebra.

### *Algebra—Lie Theory*

The notion of a Lie group had its origins in the study of the “continuous symmetries” of differential equations. Lie theory has subsequently become an enormously rich and beautiful theory with fundamental applications in mathematics (e.g., group theory, differential equations, topology, harmonic analysis, differential geometry), physics, and chemistry.

The algebra group at Notre Dame studies the representation theory, structure and geometry of semisimple Lie groups and Lie algebras, Kac-Moody Lie algebras and groups, finite and algebraic groups, and quantum groups, using a variety of algebraic, geometric and combinatorial methods. Our research involves the detailed study of specific representations (e.g., constructing and parametrizing representations, determining their dimensions, tensor products, extensions, etc), the study of spaces with Lie group actions and their connections to representations, and the study of global properties of representation categories.

1. *Detailed Study of Representations*. The character table of a finite group provides a rich collection of invariants of the group; classically, the “characters” correspond to ordinary (complex) representations. Of course,

modular representations provide even more invariants. Some aspects of the classification of finite simple groups relied on the availability of precise information about the nature of representations for the finite Lie type groups. A finite Lie type group is closely related to the group of rational points of a simple algebraic group over a field of positive characteristic. We study mainly the “rational” representation theory of these algebraic groups; one may typically obtain from such study information on the modular representations of the corresponding finite Lie type groups.

2. *Representation Theory and Geometry*. One can often study representations of a group by constructing the group as the symmetries of a geometrical object and considering some class of functions on the object. For example, the rotation group in three variables may be regarded as the symmetry group of the two-dimensional sphere, and the representations of the rotation group arise from decomposing functions on the sphere according to the action of the Laplace operator. In more sophisticated settings, representations are associated to geometric objects with singularities, and it is a subtle and interesting question to understand the relation between the singularities and the corresponding representations.

One can also study the reverse problem and use representation theory to study geometrical problems, including classical 19th-century intersection theory. In particular, a certain kind of geometric structure called a Poisson structure yields a new approach to intersection theory problems. The Poisson structure is closely related to quantum groups.

3. *Global Structure of Lie Representation Categories*. There are many important relationships which have emerged in recent years between categories of finite or infinite-dimensional representations of algebraic groups, affine Lie algebras, and quantum groups. In all these theories, an important role is played by the Weyl group, which is a crystallographic Coxeter group. We have initiated the study of certain representation theories naturally associated to (possibly non-crystallographic) Coxeter groups and begun to study, for crystallographic Coxeter groups, the relationships of such categories with categories of representation-theoretic or geometric interest in Lie theory. We have also begun to study certain very similar representation categories which are less directly related to classical Lie theory.

### *Partial Differential Equations*

Partial differential equations is a many-faceted subject. Our understanding of the fundamental processes of the natural world is based largely on partial differential equations. Examples are the vibrations of solids, the flow of fluids, the diffusion of chemicals, the spread of heat, the interactions of photons and electrons, and the radiation of electromagnetic waves. Today partial differential equations have developed into a vast subject that interacts with many other branches of mathematics such as complex analysis, differential geometry, harmonic analysis, probability, and mathematical physics.

The Laplace equation and its solutions, the harmonic functions, form a link between partial differential equations and complex analysis, since analytic functions are the solutions to the Cauchy-Riemann equations. Boundary behavior of analytic functions on a domain is studied through the Neumann problem, which is a boundary value problem for an elliptic (Laplace-like) operator. Furthermore, nonelliptic equations appear as natural objects in the study of manifolds that are boundaries of domains. These equations are similar to the degenerate elliptic equations arising in sub-Riemannian geometry and diffusion processes. Solvability and regularity of solutions to such equations form an active direction of research. The methods involved include subelliptic estimates and microlocal analysis.

Another direction of research is devoted to nonlinear elliptic partial differential equations with emphasis on second order equations. Differential geometry provides a rich source of such equations. Examples are the minimal surface equation and the Monge-Ampere equation. One important property studied by researchers in this field is the regularity of solutions, in particular the impact of regularity of coefficients and boundary values on that of solutions. An active area is the study of properties of geometric objects associated to solutions, e.g., level sets of solutions. Studies are focused on the geometric structure of these sets, and methods are from geometric measure theory.

Yet another direction involves the study of nonlinear evolution equations arising in mathematical physics such as the Euler equations of hydrodynamics or various infinite dimensional analogues of completely integrable Hamiltonian systems like the Korteweg-de Vries equation. A large amount of work

is devoted to the study of the corresponding Cauchy problem for such equations. Recent developments in the area involve the use of harmonic analysis techniques to establish existence and uniqueness of solutions under low regularity initial data.

In fact, there is a very close connection between partial differential equations and harmonic analysis, starting with Fourier series and the heat equation and continuing with fundamental solutions, the construction of inverses to elliptic equations and pseudo-differential equations, the solution to wave equations and Fourier integral operators, to spectral analysis, and asymptotic techniques methods. Harmonic analysis techniques form a major part of the modern theory of linear and nonlinear partial differential equations.

The research of the partial differential equations group also includes the study of free boundary problems, reaction-diffusion equations, variational inequalities, homogenization problems, and other equations arising from industrial applications.

### *Logic*

The research in mathematical logic at Notre Dame is mainly in two broad areas: computability theory and model theory. Computability theory concerns computability and complexity, often measured by Turing degree. A set is computable if there is a program for computing its characteristic function on an ideal computer that never crashes. Set  $A$  is Turing reducible to set  $B$  if there is a program for computing the characteristic function of  $A$  on a computer equipped with a CD-ROM giving the characteristic function of  $B$ . Turing reducibility is a partial ordering on the set of subsets of the natural numbers, and the Turing degrees are the equivalence classes of the corresponding equivalence relation. A set is computably enumerable if it is the range of a computable function, or, equivalently, the domain of a partial computable function. The set  $E$  of all computably enumerable subsets of the natural numbers forms a lattice under the operations of union and intersection. Soare showed that the collection of “maximal” sets is a definable orbit in  $E$ . There is ongoing work on automorphisms and the relation between complexity and structural properties, definable in the lattice.

Well-known theorems may pose interesting problems in computability. This is true, in particular, for Ramsey’s theorem, on which

there is recent work. There has been quite a lot of work on computability and complexity in familiar kinds of mathematical structures—groups, linear orderings, Boolean algebras, etc. Much of this work has involved connections between definability and complexity. There has also been work on complexity of models of arithmetic. The standard model, consisting of the natural numbers with addition and multiplication, is computable; i.e., the operations are computable. Tennenbaum showed that no non-standard model can be computable. A recent result says that for any non-standard model there is an isomorphic copy of strictly lower Turing degree.

The other broad area of active work is model theory, particularly classification theory and o-minimality. In recent years, methods developed in the context of stability theory have been used to analyze structures such as pseudofinite fields, pseudo-algebraically closed fields, difference fields, and quadratic forms over finite fields. This research has yielded applications to arithmetic number theory. Model-theorists now have a good understanding of how these dependence relations fit in a general framework. Ongoing work generalizes techniques from the geometrical stability theory of superstable theories to this broader class. This research is likely to give insight into the model-theoretic properties of bilinear forms and groups definable in structures such as those mentioned above.

The standard example of an o-minimal structure is the field of real numbers. In the early 1980s, it was noticed that many properties of semi-algebraic sets (sets definable in the field of reals) can be derived from a very few axioms, essentially the axioms defining o-minimal structures. After Wilkie proved that the exponential field of real numbers is o-minimal, the subject has grown rapidly. From a model-theoretic point of view, these structures resemble strongly-minimal structures, and many tools and methods of classification theory can be adapted to o-minimal structures. This remarkable combination of tools from stability theory and methods of semi-algebraic and subanalytic geometry provides elegant and surprisingly efficient applications not only in real algebraic and real analytic geometry, but also in analytic-geometric categories (e.g., groups of Lie type) over arbitrary real closed fields.



### Topology

There is a large topology group at Notre Dame, and the research of its members covers a wide area of currently active areas. For a more detailed view of our current research one can consult the departmental Web page and its information about individual faculty members.

Basic algebraic topology is one active area of research here. Research continues on various types of homotopy theory, both stable and unstable, often from an axiomatic point of view. One area of application is to the study of Lie groups by homotopy theoretic methods. Other problems in homotopy theory under active consideration are problems that elucidate the influence of topology on differential geometry. A particular interest is in questions of which manifolds support metrics, the curvature of which is positive in various senses and of how many such metrics there are.

Controlled topology is another area of active research. One direction concerns various aspects of rigidity, which loosely means describing the ways that a discrete group can act on Euclidean space. This problem is a rich source of inspiration and has led to groundbreaking work on stratified spaces by many people, not just at Notre Dame. Work on various foundational issues in controlled topology leads to the study of stratified spaces.

Basic geometric topology is an area that overlaps some of the above. Work not previously mentioned includes work on how algebraic invariants of a manifold affect the homotopy type of its group of topological or differentiable symmetries. This leads to further problems in algebraic topology and in algebra. There is also research on the classification of various geometrically interesting manifolds.

Algebraic K-theory is an active area of research as well. Ongoing research investigates the link between algebra and topology that lies at the center of K-theory. Contributions have been made to the study of L-theory, the quadratic analogue of K-theory that figures prominently in applications of topology to the study of manifolds and stratified spaces.

Research in low-dimensional manifolds is yet another area represented at Notre Dame. Research in gauge theory is applied to the study of four dimensional manifolds as well as more traditional techniques applied to the algebraic topology of four manifolds, their topological

classification, and their differentiable classification. There is also research in three manifolds and the four manifolds they bound using gauge theory, especially the invariants based on the Sieberg-Witten equations.

### Course Descriptions

The following course descriptions give the number and title of each course. Basic sequences 601–610, seminars 671–686, and reading and research courses 698–700 are offered every year. The courses numbered 512–522 and 621–666 are topics courses. Each year topics courses are offered in algebraic geometry, differential geometry, algebra, partial differential equations, complex analysis, topology, logic, and applied mathematics. The particular topics change (probably never repeating), and the instructors rotate within groups. Thus, students are exposed to a variety of topics in which various members of the faculty have interest and expertise. The list below includes the courses offered every year, plus a typical selection of topics courses. Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

#### 513. Coding Theory

(3-0-3) Migliore, Rosenthal

An introductory seminar with the ultimate goal being the recent developments in algebraic coding theory involving the interconnection between algebraic curves over finite fields and Goppa codes.

#### 517. Foundations of Computational Mathematics

(3-0-3) Staff

The course is a solid theoretical introduction to numerical analysis. Topics covered include polynomial interpolation, least squares, numerical integration, numerical linear algebra, and an introduction to numerical solutions of ordinary and partial differential equations.

#### 521, 522. PDE and Applied Mathematics

(3-0-3) (3-0-3) Hu

Basic estimates, fixed point theorems, and the theory of elliptic second order partial differential equations. Second semester these tools are used to study problems in applied mathematics, such as free boundary problems and variational inequalities.

#### 597. Directed Readings

(V-V-V) Staff

Readings not covered in the curriculum which relate to the student's area of interest.

#### 600. Differentiable Manifolds

(3-0-3) Staff

Topics covered will include: differentiable manifolds, vector fields, differential forms, and tensor analysis; inverse and implicit function theorems, transversality, Sard's theorem, Morse theory, integration on manifolds, Stokes Theorem, de Rham cohomology.

#### 601, 602. Basic Algebra

(3-0-3) (3-0-3) Staff

Standard results in group theory and ring theory; modules, linear algebra, multilinear algebra; Galois theory; Wedderburn theory; elements of homological algebra; introduction to an advanced topic in algebra.

#### 603, 604. Basic Real Analysis

(3-0-3) (3-0-3) Staff

Rigorous review of the calculus of several variables; measure and integration on the real line and in general measure spaces; Haar measure; Banach spaces; Fourier series.

#### 605, 606. Basic Complex Analysis

(3-0-3) (3-0-3) Staff

Analytic functions; Cauchy's theorem; Taylor and Laurent series; singularities, residue theory; complex manifolds; analytic continuation; conformal mappings; entire functions; meromorphic functions.

#### 607, 608. Basic Topology

(3-0-3) (3-0-3) Staff

Topological spaces and metric spaces; the fundamental group and covering spaces; homology theory; basic theorems in algebraic topology.

#### 609, 610. Basic Modern Logic

(3-0-3) (3-0-3) Staff

Propositional calculus and predicate logic, completeness, compactness, omitting types theorems, results on countable models; recursive and recursively enumerable sets, Turing degrees, the Friedberg-Muchnik theorem, minimal degrees; axioms of ZFC, ordinals and cardinals, constructible sets.

#### 611. Geometric Methods for Dynamical Systems

(3-0-3) Alber

This class reviews the linear and nonlinear dynamical systems, such as Duffing's, Van der Pol's and Lorentz equations, geometry of the phase space, symplectic structures, variational methods, nonlinear Hamiltonian systems,

integrable systems, quasiperiodic motion, averaging method, discrete dynamical systems, and the logistic function.

We also cover bifurcation phenomena and transition to chaos and theory of patterns. These include Hamiltonian vector fields, normal forms, stable and unstable manifolds, structural stability, Poincaré maps, Liapunov exponents, power spectra, Hopf bifurcation, Smale diffeomorphism, perturbations of nonlinear systems, the geometric structure of the perturbed phase space, chaos and non-integrability in Hamiltonian systems, KAM theory, perturbation of homoclinic orbits, Poincaré-Melnikov method; for example, Arnold diffusion, symbolic dynamics, hyperbolic sets, strange attractors, numerical route to chaos. Theory of patterns include fractals, the Julia and Mandelbrot sets, lattice-based models, pattern dynamics in physics and biology, pattern inference, pattern recognition, and metric pattern theory.

#### 612. *Discrete Mathematics*

(3-0-3) Rosenthal

The course will provide an introduction into different subjects of discrete mathematics. Topics include (1) Graph Theory: Trees and graphs, Eulerian and Hamiltonian graphs; tournaments; graph coloring and Ramsey's theorem. Applications to electrical networks. (2) Enumerative Combinatorics: Inclusion-exclusion principle, Generating functions, Catalan numbers, tableaux, linear recurrences and rational generating functions, and Polya theory. (3) Partially Ordered Sets: Distributive lattices, Dilworth's theorem, Zeta polynomials, Eulerian posets. (4) Projective and combinatorial geometries, designs and matroids.

#### 613. *Optimization*

(3-0-3) Faybusovich

Vector spaces and convex sets; convex Hull; theorems of Caratheodory and Radon; Helly's Theorem; convex sets in Euclidean space; the Krein-Milman theorem in Euclidean space; extreme points of polyhedra; applications; the moment curve and the cyclic polytope; the cone of nonnegative polynomials; the cone of positive semidefinite matrices; the idea of semidefinite relaxation; semidefinite programming; cliques and the chromatic number of a graph; the Schur-Horn theorem; and the Toeplitz-Hausdorff theorem.

#### 614. *Applied Analysis*

(3-0-3) Hu

Laplace equations: Green's identity, fundamental solutions, maximum principles, Green's functions, Perron's methods. Parabolic equations: Heat equations, fundamental solutions, maximum principles, finite difference and convergence, Stefan Problems. First order equations: characteristic methods, Cauchy problems; vanishing of viscosity-viscosity solutions. Real analytic solutions: Cauchy-Kowalevski theorem, Holmgren theorem.

#### 621, 622. *Topics in Algebraic Geometry*

(3-0-3) (3-0-3) Sommese

Topics from recent years include geometry of compact complex surfaces, complex adjunction theory, intersection theory of algebraic schemes.

#### 625. *Differentiable Manifolds*

(3-0-3) Hingt

Foundation to begin studying differentiable manifolds, forms, and vector bundles; brief introduction to Morse theory; Riemannian manifolds.

#### 647, 648. *Differential Geometry*

(3-0-3) Staff

This course provides an introduction to modern differential geometry. Topics include: Riemannian manifolds, connections, parallel translation, geodesics, the exponential map, the torsion and curvature, Jacobi fields, first and second variation of arc length, cut loci and conjugate locus, and elementary comparison theorem.

#### 651, 652. *Topics in Algebra*

(3-0-3) (3-0-3) Dyer

Basic properties of polytopes and polyhedra with an emphasis on counting the numbers of faces using techniques from commutative algebra and representation theory.

#### 653, 654. *PDE Methods in Complex Analysis*

(3-0-3) (3-0-3) Shaw

Methods of solving partial differential equations in complex analysis. Central questions: solutions of Cauchy-Riemann equations in several variables, regularity of solutions up to the boundary, and solvability and estimates for tangential Cauchy-Riemann equations on the boundaries.

#### 655, 656. *Topics in Complex Analysis*

(3-0-3) (3-0-3) Stanton

Complex manifolds. Hermitian and Kähler manifolds. Connections, curvature, Chern classes on holomorphic vector bundles, Hodge theorem. Sheaf Theory. Kodaira Embedding Theorem.

#### 657. *Topics in Topology*

(3-0-3) Dwyer

Emphasizes homotopy theory. Dual purpose: to impart to the student a certain amount of basic information (fibre bundles, spectral sequences, cohomology operations, etc.) and to teach the student how to grapple with the existing and extensive advanced material in an inquiring but skeptical way.

#### 658. *Ends of Manifolds and Maps*

(3-0-3) Connolly

The initial solutions of the question as to when a manifold is the interior of a compact manifold with boundary (by Browder-Livesay, Levine, and Siebenman); the recasting of this theory by Quinn with its far-reaching consequences.

#### 661. *Topics in Logic: Computable Structures and the Hyperarithmetical Hierarchy*

(3-0-3) Knight

Results connect definability in computable structures with bounds on complexity. The results apply to familiar kinds of mathematical structures (vector spaces, orderings, Boolean algebras). The proofs involve priority constructions, arbitrarily nested, and forcing.

#### 662. *Topics in Logic—Finite Model Theory*

(3-0-3) Buechler

An overview of the model theory of classes of finite structures. 0-1 laws, Fagin's Theorem, Ehrenfeucht games and ultra-products of finite structures. Generic structures and limits of finite structures are discussed.

#### 665. *Elements of Symplectic Geometry and Nonlinear Integrable Problems*

(3-0-3) Alber

Methods of symplectic geometry; those that use interesting examples from the applications of analysis and those that serve as links between geometry and modern analysis; unexpected results in both pure and applied mathematics via the application of such methods to nonlinear Hamiltonian systems.

#### 666. *Topics in Differential Geometry*

(3-0-3) Staff

This is an advanced topics course in differential geometry. The following topics were taught in previous years: geometry of submanifolds; minimal surfaces; manifolds of non-positive curvature; analysis on symmetric spaces; symplectic geometry; and complex differential geometry and spectral geometry.

The actual topics studied in courses numbered 671 through 686 will appear on the student's transcript when possible.

671, 672. *Seminar in Algebra*  
(V-0-V) (V-0-V) Staff  
Topics vary by semester.

673, 674. *Seminar in Analysis*  
(V-0-V) (V-0-V) Staff  
Topics vary by semester.

675, 676. *Seminar in Complex Analysis*  
(V-0-V) (V-0-V) Staff  
Topics vary by semester.

677, 678. *Seminar in Topology*  
(3-0-3) (3-0-3) Staff  
Topics vary by semester.

681, 682. *Seminar in Mathematical Logic*  
(V-0-V) (V-0-V) Staff  
Topics vary by semester.

683, 684. *Seminar in Number Theory*  
(V-0-V) (V-0-V) Staff  
Topics vary by semester.

685, 686. *Seminar in Geometry*  
(V-0-V) (V-0-V) Staff  
Topics vary by semester.

#### Other Graduate Courses

697. *Directed Readings*  
(V-0-V) Staff  
Readings not covered in the curriculum which relate to the student's area of interest.

699. *Research and Dissertation*  
(V-V-V) Staff  
Research and dissertation for resident graduate students.

700. *Nonresident Dissertation Research*  
(0-0-1) Staff  
Required of nonresident graduate students who are completing their dissertations in absentia and who wish to retain their degree status.

#### Faculty

##### Algebra

Katrina D. Barron, *Assistant Professor*. A.B., Univ. of Chicago, 1987; Ph.D., Rutgers Univ., 1996. (2001)

Matthew J. Dyer, *Associate Professor*. B.Sc., Sydney Univ., 1983; M.Sc., *ibid.*, 1985; Ph.D., *ibid.*, 1988. (1989)

Samuel Evens, *Associate Professor*. P.A. and B.A., Haverford College, 1984; Ph.D., Massachusetts Institute of Technology, 1988. (1999)

Alexander J. Hahn, *Director of the Kaneb Center for Teaching and Learning, Professor of Mathematics, and Fellow of the Nanovic Institute for European Studies*. B.S., Loyola Univ., Los Angeles, 1965; M.S., Univ. of Notre Dame, 1968; Ph.D., *ibid.*, 1970. (1972)

George McNinch, *Assistant Professor*. B.S., Samford Univ., 1990; Ph.D., Univ. of Oregon, 1996. (1996)

Timothy O'Meara, *Provost Emeritus of the University and the Rev. Howard J. Kenna, C.S.C., Professor Emeritus of Mathematics*. B.Sc., Univ. of Capetown, 1947; M.S., *ibid.*, 1948; Ph.D., Princeton Univ., 1953. (1962)

Richard Otter, *Professor Emeritus*. A.B., Dartmouth College, 1941; Ph.D., Indiana Univ., 1946. (1947)

Barth Pollak, *Professor Emeritus*. B.S., Illinois Institute of Technology, 1950; M.S., *ibid.*, 1951; Ph.D., Princeton Univ., 1957. (1963)

Warren J. Wong, *Professor Emeritus*. B.S., Univ. of Otago, 1954; M.S., *ibid.*, 1955; Ph.D., Harvard Univ., 1959. (1964)

##### Algebraic Geometry

Mario Borelli, *Associate Professor*. B.S., Scuola Normale di Pisa, 1956; Ph.D., Indiana Univ., 1961. (1965)

Karen Chandler, *Assistant Professor*. B.S., Dalhousie Univ., 1987; Ph.D., Harvard Univ., 1992. (1995)

Alan Howard, *Professor*. B.A., Rutgers Univ., 1953; Ph.D., Brown Univ., 1965. (1968)

Juan C. Migliore, *Professor*. B.A., Haverford College, 1978; Ph.D., Brown Univ., 1983. (1989)

Claudia Polini, *Assistant Professor*. B.S., Università degli Studi di Padova, 1990; Ph.D., Rutgers Univ., 1995. (2001)

Dennis M. Snow, *Professor*. B.S., Merrimack College, 1975; M.S., Univ. of Notre Dame, 1977; Ph.D., *ibid.*, 1979. (1982)

Andrew J. Sommese, *the Vincent J. Duncan and Annamarie Micus Duncan Professor of Mathematics*. B.A., Fordham Univ., 1969; Ph.D., Princeton Univ., 1973. (1979)

##### Applied Mathematics

Mark S. Alber, *Professor*. M.S., Moscow Institute of Technology, 1983; Ph.D., Univ. of Pennsylvania, 1990. (1990)

Leonid Faybusovich, *Professor*. M.S., Leningrad Polytechnic Institute, 1978; Ph.D., Harvard Univ., 1991. (1991)

Michael Gekhtman, *Associate Professor*. B.S., M.S., Kiev State Univ., 1985; Ph.D., Ukrainian Academy of Science, 1990. (1999)

Brian Hall, *Associate Professor*. B.A. and B.S., Cornell Univ., 1988; Ph.D., *ibid.*, 1993. (1999)

Bei Hu, *Professor*. B.S., East China Normal Univ., 1982; M.S., *ibid.*, 1984; Ph.D., Univ. of Minnesota, 1990. (1990)

Cecil B. Mast, *Associate Professor Emeritus*. B.S., DePaul Univ., 1950; Ph.D., Univ. of Notre Dame, 1956. (1959)

Gerard K. Misiolek, *Associate Professor*. M.S., Warsaw Univ., 1987; Ph.D., State Univ. of New York, Stony Brook, 1992. (1993)

David P. Nicholls, *Assistant Professor*. B.S., Univ. of Illinois, Urbana, 1993; Sc.M., Brown Univ., 1995; Ph.D., *ibid.*, 1998. (2001)

Joachim J. Rosenthal, *Professor of Mathematics and Concurrent Professor of Electrical Engineering*. Vordiplom, Univ. Basel, 1983; Diplom, *ibid.*, 1986; Ph.D., Arizona State Univ., 1990. (1990)

Michael Sigal, *the Rev. Howard J. Kenna, C.S.C., Memorial Professor of Mathematics*. Ph.D., Tel Aviv Univ., 1976. (2003)

##### Complex Analysis

Jeffrey Diller, *Associate Professor*. B.S., Univ. of Dayton, 1988; Ph.D., Univ. of Michigan, 1993. (1998)

Wilhelm F. Stoll, *the Vincent J. Duncan and Annamarie Micus Duncan Professor Emeritus of Mathematics*. Ph.D., Univ. of Tubingen, 1953. (1960)

Pit-Mann Wong, *Professor*. B.Sc., National Taiwan Univ., 1971; Ph.D., Univ. of Notre Dame, 1976. (1980)

##### Differential Equations

Matthew Gursky, *Associate Professor*. B.S., Univ. of Michigan, 1986; Ph.D., California Institute of Technology, 1991. (2001)

Qing Han, *Associate Professor*. B.S., Beijing Univ., 1986; M.S., Courant Institute, 1991; Ph.D., *ibid.*, 1993. (1994)

A. Alexandrou Himonas, *Associate Chair and Professor*. B.S., Patras Univ., 1976; M.S., Purdue Univ., 1982; Ph.D., *ibid.*, 1985. (1989)

Mei-Chi Shaw, *Professor*. B.S., National Taiwan Univ., 1977; M.S., Princeton Univ., 1978; Ph.D., *ibid.*, 1981. (1987)

Nancy K. Stanton, *Professor*. B.S., Stanford Univ., 1969; Ph.D., Massachusetts Institute of Technology, 1973. (1981)

### *Differential Geometry*

Jianguo Cao, *Professor*. B.S., Nanjing Univ., 1982; M.S., *ibid.*, 1985; Ph.D., Univ. of Pennsylvania, 1989. (1996)

Richard Hind, *Assistant Professor*. B.A., Cambridge Univ. U.K., 1993; Ph.D., Stanford Univ., 1997. (2000)

François Ledrappier, *the John and Margaret McAndrew Professor of Mathematics*. B.S., École Polytechnique, 1968; Ph.D., Univ. Paris, 1975. (2002)

Xiaobo Liu, *Associate Professor*. B.S., Tsinghua Univ., P.R. China, 1987; Ph.D., Univ. of Pennsylvania, 1994. (1999)

Brian Smyth, *Professor*. B.S., National Univ. of Ireland, 1961; M.S., *ibid.*, 1962; Ph.D., Brown Univ., 1966. (1966)

Frederico J. Xavier, *Professor*. B.S., Univ. Federal De Pernambuco, 1971; M.S., *ibid.*, 1973; Ph.D., Univ. of Rochester, 1977. (1985)

### *Logic*

Steven A. Buechler, *Chair and Professor*. B.A., B.S., Eastern Illinois Univ., 1975; M.A., Univ. of Maryland, 1977; Ph.D., *ibid.*, 1981. (1987)

Peter Cholak, *the John and Margaret McAndrews Associate Professor of Mathematics*. B.A., Union College, 1984; M.A., Univ. of Wisconsin, 1988; Ph.D., *ibid.*, 1991. (1994)

Abraham Goetz, *Associate Professor Emeritus*. M.S., Univ. of Wroclaw, 1949; Ph.D., *ibid.*, 1957. (1964)

Julia F. Knight, *Director of Graduate Studies and the Charles L. Huisiking Professor of Mathematics*. B.A., Utah State Univ., 1964; Ph.D., Univ. of California, Berkeley, 1972. (1977)

Sergei Starchenko, *Associate Professor*. M.S., Univ. of Novosibirsk, 1983; Ph.D., *ibid.*, 1987. (1997)

Vladeta Vuckovic, *Associate Professor Emeritus*. M.S., Univ. of Belgrade, 1949; Ph.D., *ibid.*, 1953. (1963)

### *Topology*

Francis X. Connolly, *Professor*. B.S., Fordham Univ., 1961; M.S., Univ. of Rochester, 1963; Ph.D., *ibid.*, 1965. (1971)

John E. Derwent, *Associate Professor*. B.S., Univ. of Notre Dame, 1955; Ph.D., *ibid.*, 1960. (1963)

William G. Dwyer, *the William J. Hank Family Professor of Mathematics*. B.A., Boston College, 1969; Ph.D., Massachusetts Institute of Technology, 1973. (1980)

Liviu Nicolaescu, *Associate Professor*. B.S., Univ. Al. I. Cuza, Iasi, Romania, 1987; Ph.D., Michigan State Univ., 1994. (1998)

Stephan A. Stolz, *the Rev. John A. Zahm, C.S.C., Professor of Mathematics*. B.S., Univ. of Bielefeld, 1975; M.S., Univ. of Bonn, 1979; Ph.D., Univ. of Mainz, 1984. (1988)

Laurence R. Taylor, *Professor*. B.A., Princeton Univ., 1967; Ph.D., Univ. of California, Berkeley, 1971. (1973)

E. Bruce Williams, *Professor*. B.S., Massachusetts Institute of Technology, 1967; Ph.D., *ibid.*, 1972. (1975)

## **Physics**

### *Chair:*

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### *The Program of Studies*

The graduate program in physics is a combination of course work and research designed to prepare the student for a career in university, industrial, or governmental research or in college or university teaching. There is a sequence of basic courses in the fundamental areas of physics. In addition, the student will take advanced courses and seminars in specialized areas. The research work of the student is emphasized and he or she is required to join in a physics research program of the department within the first year.

The graduate program is primarily a doctoral program, leading to the degree of doctor of philosophy, and the department ordinarily will not accept students who intend to

complete only the master's degree. However, a program leading to the degree of master of science is available; it involves satisfactory completion of graduate course work without any thesis requirement.

The master of science nonresearch program requires 24 credit hours of approved course work and passage of an oral Master's examination. Each program of course work is chosen in consultation with a faculty adviser.

Interdisciplinary programs between physics and chemistry or biology are also available.

All incoming graduate students are given interviews to determine their preparation for and to assist in planning their course work. Courses 503, 505, 506, 507, 508, 510, 601, 602, 603, and three from among 605, 607, 609, 613, and 617 (or their equivalents) are required for admission to Ph.D. candidacy. In addition, students must pass a qualifying examination on undergraduate physics, which is given early in the fall and spring terms, prior to being invited to take the candidacy examination. The candidacy examination is normally taken after the end of the fourth semester. There is no foreign language required for a Ph.D. in physics. Students are expected to begin research in their second semester.

The major areas of research are as follows:

### *Astrophysics, Cosmology, and Astronomy*

The Notre Dame program in astrophysics, cosmology, and astronomy combines observational and theoretical tools to investigate the origin and evolution of matter in the universe. Active areas of research run the gamut from the first instants of cosmic expansion, through the birth and development of the solar system, to the present complex interactions of stars and gas in galaxies.

### *Theoretical Astrophysics*

**Cosmology.** We investigate the origin of the physical universe, with an eye to understanding how events early in the Big Bang may have left observable relics today. An example of such an event is cosmological inflation, the extremely rapid expansion of the very early universe driven by vacuum energy. We study models of inflation and how these models are tested by observations of fluctuations in the cosmic microwave background radiation. We also study ways in which the cosmic vacuum energy or "dark energy" are manifest in the present universe. We also study how the formation of light elements during the epoch of primordial nucleosynthesis can be used to

constrain the physical conditions occurring earlier during the Big Bang and we study the possible imprint of cosmic phase transitions directly on the microwave background.

Moving from the early to the adolescent universe, we study the formation and evolution of galaxies. We are developing detailed simulations that describe how stars form and re-emit heated enriched gas while the galaxy collapses into a halo and disk. Such studies probe the galaxy formation process and can be used to derive more reliable estimates of the age of the universe. We also are investigating the nature and origin of the dark matter that makes up most of the mass of the universe. We have ongoing studies of neutrino dark matter, as well as the formation and evolution of stellar remnants, which may provide the source for the observed microlensing.

**Numerical Relativity.** We investigate Einstein's general relativity through computer simulations of the full (3+1) dimensional relativistic equations. For example, we model the merger of a binary pair of neutron stars. This is a system that should provide one of the strongest signals for gravity wave detectors. These highly energetic merger events may also provide a means to explain the occurrence of cosmological gamma ray bursts. We also model the accretion of material onto a neutron star or black hole as a source of x-ray bursts.

**Nucleosynthesis in Stellar Explosions and Stellar Evolution.** We study the evolution of a massive star as its core collapses to form a type II supernova. Just before collapse the critical mass of the core is determined by numerous weak nuclear decays that decrease the electron pressure and remove energy in the form of neutrinos. We calculate these rates. As the collapse ensues, we study the effects of changes in the nuclear equation of state, such as a transition to quark-gluon plasma. Some changes affect the evolution of the explosion and the neutrino signal. This probes physical properties of matter at high temperature and density. After the collapse, we study the cooling and neutrino emission from the proto-neutron star. These neutrinos provide important extra energy to the explosion and an environment in which heavy elements can be synthesized.

We also study hydrodynamic models for the evolution of nova outbursts and x-ray bursters with extensive nuclear reaction networks, and the synthesis of elements in various phases of stellar evolution.

**Observational Astronomy and Astrophysics Cosmic Rays.** A recently completed extensive air shower (EAS) array allows the experimental study of cosmic rays. The particle energies studied are from 30 to 300 GeV with a single muon trigger and ultra high energies (UHE) from 100 TeV (100 Trillion electron Volts) to a 100,000 TeV with a shower trigger. The spectrum and composition of cosmic rays at UHE is an area of intense interest. The unique use of proportional wire chamber detectors together with absorbers allows the measurement of the angle of each secondary track and its identification as a muon or electron, thus distinguishing the shower as gamma (muon poor) or hadronic. The tracking chambers provide high angular resolution; together with the muon identification, they allow a sensitive search for stellar or galactic point sources of UHE gamma rays. Extrapolating muon trajectories backward reveals their height-of-origin; this height is sensitive to the nature of the cosmic ray primary and thus enables a measurement of the atomic composition of primary cosmic rays. The single muon trigger allows a high statistics study of cosmic ray anisotropies (Compton-Getting effect) and space and angle correlations with gamma ray bursts detected by satellite experiments. We are also examining the association of UHE photons arriving with low-energy gamma ray bursts.

**Supernovae and Cosmology.** The history and content of the universe is one of the most pressing questions in astrophysics. We are part of a team using supernovae to probe the expansion history of the universe and we have recently found evidence of a new form of energy that is causing the expansion to accelerate. Some types of supernovae make precise distance indicators, and their brightness means they can be seen at early epochs when the expansion was different than its current rate. We are also studying the variations in properties of nearby supernovae to understand their limitations as cosmological probes.

**Understanding the Process of Disk and Planet Formation Around Young Stars.** Planet formation has been known for many years to be tied to the accretion and evolution of gas and dust in disks around young HAeBe and T Tauri stars. During this early phase of star formation, the cold shell around an embedded star collapses to form a preplanetary disk of dust and dirty ices and reveals a pre-main-sequence star representative of the Sun when our solar system was forming. Over the next million years or so, these ices condense

to make comets and perhaps initiate planet formation. Because the young disk around a star is often heavily obscured by dust, the early stage of the preplanetary disk evolution is poorly understood. In this research, we use the abundance of the molecular gases and their isotopes to provide important information concerning the amount of thermal and chemical processing of icy grains as well as clues as to how comets formed during the early history of our solar system. Are comets loose "rubble piles" of planetesimals or are comets uniform chunks of ices and dirt like very large "dirty snowballs"? In our studies of comets, we have used the high resolution imaging capabilities of the Hubble Space Telescope to investigate the structure of the "cores" of tidally fragmented comet Shoemaker-Levy 9. Understanding the structure of these comets will provide a better understanding of how comets formed and of the initial accretion conditions that were present in the early solar nebula.

How planets are formed in these disks is even less well understood. This observational research program uses high-resolution spectra of ices, dust, and gas phase molecules in the disks of pre-main sequence stars to study the physical conditions in planet forming regions. Specifically, infrared observations of gas phase molecules such as CO, H<sub>2</sub>, H<sub>3</sub><sup>+</sup>, and H<sub>2</sub>O can be used to understand the chemical processes, environment, and dynamical evolution of 'other solar systems' that may be in the process of planet formation. The abundance and excitation of these molecules can be used to clarify the time scales and initial conditions for planet building and may also provide a new technique to find protoplanets. Infrared spectroscopic data are obtained from the Infrared Telescope (IRTF) and the 10 meter Keck Telescope on Mauna Kea.

**The Search for Gravitational Microlensing.** We are actively participating in the MACHO Project survey of the Large Magellanic Cloud. This survey is one of the first that can detect "dark matter" in the form of massive compact objects (otherwise invisible) via "gravitational microlensing," the general relativistic amplification of background starlight. The analysis of this data set of more than eight million stellar light curves has evidenced many microlensing events with an average timescale of about 2.5 months. This single data set comprises more observations of individual stars than have been made during the entire history of astronomy prior to this survey. The simplest interpretation of these results is that a previously unknown population of objects

that comprise about 50 percent of the total mass of the galactic halo causes the micro-lensing. The typical mass of these objects is roughly half a solar mass, suggesting that they may be predominantly white dwarfs. These results are the first positive detection of dark matter in our galaxy and provide important constraints on cosmology (see above) as well as new insight into galactic structure and dynamics.

We are also using this gravitational micro-lensing technique to search for planets orbiting stars located toward the galactic center.

### *Atomic Physics*

Atomic physics research at Notre Dame involves the experimental and theoretical study of atomic structure as it relates to the understanding of electroweak, quantum electrodynamic (QED), and relativistic many-body interactions. Experimental measurements in high  $Z$  ionic systems are motivated by the desire to test QED corrections in atomic theory. Precision measurements of forbidden transition strengths, hyperfine structures, and atomic lifetimes test many-body calculations important to the interpretation of parity nonconservation (PNC) in atoms and atomic structure in general. The similarity of our interests strongly enhances the interaction between the theoretical and experimental atomic physics groups at Notre Dame.

### *Lifetimes in Alkali-like Systems*

This research program focuses on measurements of excited state lifetimes in neutral alkali and alkali-like charged systems. Precision measurements of atomic lifetimes are important to the analysis of data from many fields and provide fundamental atomic structure information. Scientists in astrophysics, geophysics, and plasma fusion depend on lifetime measurements as means for calibrating relative values of oscillator strengths. From a theoretical point of view, alkali-like atoms provide the simplest open shell systems for detailed comparisons between experiment and theory. In addition, the interpretation of parity nonconservation experiments requires accurate knowledge of the atomic structure including radial matrix elements. Through initial experiments in cesium, we have developed an apparatus for measuring atomic lifetimes by laser excitation of a fast atomic beam. This technique is extremely versatile and can be applied to a wide variety of atomic systems. The experiments are carried out

at the Atomic Physics Accelerator Laboratory (APAL) at Notre Dame. The delayed photon coincidence technique is also being investigated as an alternative approach for measuring atomic lifetimes. A recent study of the transition rate between the  $6s$  and  $7p$  states in cesium has yielded one of the most precise atomic measurements of the neutral weak charge, an important parameter of the Standard Model of weak and electromagnetic interactions. Further work is proceeding.

### *Other Atomic Structure Measurements*

We are studying the rare and highly excited sextet systems of ionized 5-electron systems. In these states, the five electrons all have their spins aligned in one sense, resulting in highly excited states well above the normal ionization limit. Their stability makes them favorable as possible upper states for x-ray laser systems. Previous work in this area has been full of ambiguities. Standard fast-beam-foil experiments are being used to measure energies and transition rates for electric dipole transitions.

### *Measurements of Forbidden Transition Amplitudes*

The occurrence of parity nonconservation (PNC) in atoms provides a mechanism for testing the Standard Model of electroweak interactions at energies inaccessible to high-energy accelerators. The detailed interpretation of PNC experiments requires accurate knowledge of atomic structure. This program focuses on measurements of atomic transition amplitudes that are important to the interpretation of PNC experiments. Measurements of the magnetic dipole and electric field induced amplitudes in the cesium  $6s\ 2S_{1/2}$ - $7s\ 2S_{1/2}$  transition provide direct calibrations of PNC experiments. The measurement techniques developed for cesium will be extended to other atoms of interest for testing the Standard Model and atomic theory.

### *Forbidden Transitions in Helium*

Following our theoretical results, which show a dependence of magnetic dipole transitions (M1) on the negative energy states of the relativistic atomic system, we are attempting excitation of the  $2s3S$ - $3s3S$  transition at 427 nm. In addition, the two-photon transition rate between the same two states will be measured. These measurements and other forbidden transition rate measurements provide sensitive tests of many-electron relativistic atomic theory, such as the work of the theoretical group at Notre Dame.

### *Buckyball Collisions with Multicharged Heavy Ions*

A “buckyball” molecule is made up of 60 carbon atoms in a spherical shell, with the structure of a “soccer ball,” and is the most stable molecule known. When colliding with multicharged heavy ions, many electrons are transferred from target to projectile, and other electrons are scattered away. We continue a collaborative work with a group in Lyon, France, to study the dynamic processes involved. Of particular interest is the stability of the carbon-cage once it is ionized—for example up to five times ionized  $C_{60}$  can be stable with sufficiently low internal energy. The stability of these associated molecules depends sensitively on the internal energy, which is typically supplied in the multicharged ion collision. These experiments, which detect all fragments and electrons in each collision, can help develop and test theories of ion-molecule interactions. The collisions are also used to search for photon decays from the fragments of the collisions.

### *Hyperfine Structure Measurements*

Studies of hyperfine structures in neutral and ionized atoms are made in a Doppler-free geometry of laser induced fluorescence studies of atoms accelerated in the APAL facility. Initial studies in the rare gas isoelectronic sequence include measurements in the singly charged alkali atoms where configuration interaction in low-lying metastable levels is considerable. Studies are also beginning in several rare-earth systems as part of an investigation of PNC in atoms.

### *Atomic Structure of Highly Charged Ions*

Spectroscopic measurements of fine structure transition energies in highly charged ions are performed to test our understanding of relativistic atomic structures in few-body systems. Experiments are performed at heavy-ion facilities: the Tandem Laboratory at Notre Dame, the ATLAS facility at Argonne National Laboratory, and the GSI facility in Germany. Our recent measurements of  $n=2$  state energies in  $Ar^{16+}$  using beam-foil spectroscopy have provided sensitivity to high-order QED terms in helium-like ions which have not yet been calculated. Experiments are underway for precise fine structure measurements in heavier He-like and Li-like ions.

### *Rydberg Spectroscopy of Few Electron Ions*

The atomic structures of high angular momentum Rydberg states in highly charged ions are sensitive to long-range electron-ion interactions for these highly excited states that are not seen in normal atomic structures. Our spectroscopic measurements of Be-like  $\text{Si}10+$ ,  $\text{S}12+$ , and  $\text{Cl}13+$  ions have provided Rydberg state structures up to principal quantum numbers  $n > 10$ . A new measurement of the Be-like  $\text{N}3+$  Rydberg structures has been performed using laser-stimulated recombination spectroscopy at the heavy-ion storage ring (TSR) in Heidelberg, Germany. Extensions of these measurements to more highly excited states in heavier ions are planned.

### *Theoretical Atomic Physics*

Relativistic and correlation effects in heavy atoms are studied using various methods, including relativistic Hartree-Fock theory, relativistic many-body perturbation theory, configuration interaction methods, and iterative all-order methods. Applications are made to predict accurate energies, transition rates, and hyperfine constants for low-lying levels of atoms and ions with one, two, and three valence electrons. Specialties of the group include atomic structure calculations done in support of experiments on violations of fundamental symmetries in atoms. Radiative corrections to energy levels of simple systems, including higher-order QED corrections in neutral helium, are also among current research topics.

### *Biological Physics/Biophysics*

Biological physics applies the quantitative methodology of physics to study complex biological processes. Research in the Department of Physics includes experiment, theory, and computer simulation. We also collaborate and share facilities with the Department of Biological Sciences. Students with an interest in biological physics are eligible for the Molecular Biosciences Program, which provides additional fellowship support and broader course choices. We aim to design clean, simple, quantitative experiments that distinguish individual physical mechanisms. Examples of current research include cell sorting and neural networks.

### *Cell Sorting*

Cell-type dependent surface adhesion molecules (e.g., cadherins) participate in many cellular processes from gastrulation to cancer metastasis. The contact energy between cells depends on these molecules, and because cells diffuse, mixtures of different cell types rearrange to minimize their boundary energies.

This reorganization is one of the mechanisms by which cells migrate long distances during embryonic development and wound healing.

The interaction between two cells during sorting is determined only by their surface adhesion and membrane fluctuations. We use the Potts model computer simulation to analyze simple, random cell aggregates. Over short times, cells behave almost as ideal molecules, performing biased random walks in a rough energy landscape.

### *Neural Networks*

Despite recent advances in the application of electronic neural networks, we understand little about the way the brain actually performs computations. Certain areas of the brain have well-defined specialized functions; others seem able to perform several different types of computation in overlapping regions. How does this segregation of information occur? Does the connection pattern allow different numbers of neurons to perform the same computation?

The dynamics of factually coupled map lattices (a simplified model of neural networks) have different spatial patterns from those of either locally or globally connected lattices, suggesting that fractal connectivity allows the brain to use the same region of association cortex for several different tasks. In collaboration with the Biological Sciences Department, we distinguish, experimentally, essential characteristics from accidental. In amphibians, the number of neurons in the brain varies inversely with the polyploid number. During development the brain compensates for differences in the number of neurons, possibly by increasing the number of synapses per neuron. Measuring the three-d connection patterns in *Xenopus* has shown that the neurons of the regions in the frog's brain that integrate multiple sensory inputs fall into classes of differing shapes and connectivity described by fractal scaling exponents as predicted by simulations.

Understanding the dynamics of lung inflation is an important problem with applications in respiratory physiology. Lungs are branching structures in which the dynamics of air motion is rather complex and often irregular. We develop statistical mechanics models to describe the closure and opening of airways and the respiratory patterns associated with these processes. Also, ongoing research addresses the breathing patterns of preterm infants, the goal being to develop theoretical models to capture the irregularity of the infant breathing cycle.

### *Facilities*

The Department of Physics has sterile cell culture capability, video microscopy, and neuron tracing equipment. Shared facilities with the Department of Biological Sciences include a complete animal care facility, Fluorescent Scanning Confocal Microscopy, Electron Microscopy, general histology, intracellular recording, and voltage sensitive dye imaging.

### *Condensed Matter Physics*

Condensed matter research at Notre Dame involves the experimental and theoretical study of novel materials systems. These serve both as models for understanding fundamental condensed matter physics and as prototype materials for technical applications. Close collaborations exist between the experimental and theoretical groups in this effort. Work involves the preparation and analysis of these systems both on and off campus, and includes close collaborations with faculty in other departments such as electrical engineering and chemical and biomolecular engineering at Notre Dame. An element characteristic of experimental condensed matter research is the ability of a student to personally conduct his or her own experiment through all stages with the help of an adviser, including sample preparation, experiment, and analysis. Specific areas of interest are discussed below.

### *Magnetism*

Magnetic materials are examined by a variety of techniques to understand the fundamental nature of many-body magnetism and to investigate the possibility of applications. Examples include colossal magnetoresistance compounds that change resistance by orders of magnitude when placed in a magnetic field, and dilute magnetic semiconductors.

### *Mesosopic Physics*

Few-atom clusters, fullerenes, and other exotic systems probe the basic mechanisms of systems of few atoms. Single-electron charging effects and related phenomena are explored. Motivated by several recent experimental discoveries, the vortex states of submicron superconducting disks are studied theoretically. In particular, we are interested in the microscopic structure of the multi-quantum giant vortex, a novel state of vortex matter occurring in strongly confined superfluids.

### *Semiconductor Physics*

Thin-film II-VI semiconductor samples are prepared by molecular beam epitaxy, including heterostructures and quantum wells. These, as well as bulk samples, are studied by a variety of experimental techniques includ-

ing laser spectroscopy, x-ray and neutron scattering, and electron transport. Work on heterostructures includes the development of blue-light semiconducting lasers. Theoretical efforts involve the study of magnetic frustration in diluted magnetic semiconductors, the analysis of strain distributions and stability of heterostructures and alloys. In addition, Monte Carlo simulations are used to investigate the dynamics and morphology of surface growth by MBE, phase diagrams of semiconductor alloy systems, and the interplay between elastic interactions and ordering/phase separation of lattice-mismatched alloys.

#### *Structural Studies*

X-ray absorption fine structure (XAFS) and x-ray scattering are used to study the surfaces and internal interfaces of solids and liquids, phase transformations and ordering phenomena in condensed-matter systems, the atomic-scale structure of semiconductors, and through collaborations, the structure of metalloproteins, catalysts, and environmentally-relevant systems. Because of the unique advantages of synchrotron radiation, these experiments are conducted at the MRCAT beamlines at the Advanced Photon Source at Argonne National Laboratory, where Notre Dame is a major participant.

#### *Superconductivity*

High-temperature superconductors are studied from the perspective of microwave absorption and other techniques with a view to probing fundamental mechanisms. These include investigations of the response of high-temperature superconductor thin-film systems to ultra-short duration, far-infrared light to evaluate potential applications for and the intrinsic electronic properties of these novel materials. Theoretical work includes studies of two-dimensional antiferromagnets, their relationship to high temperature superconductors, and the degree to which this potential relationship may be tested by experiments such as photoemission, neutron scattering, scanning tunneling spectroscopy, and tunneling in planar junctions. Our theoretical research program also includes the study of the recently discovered high temperature superconductor, magnesium diboride (MgB<sub>2</sub>). This compound seems to be a prime example of a two-band superconductor. Our theoretical study is aimed at revealing novel phenomena that could be present in MgB<sub>2</sub>, such as new Josephson-like effects and unconventional electronic structure around a spin impurity. The tools employed in this area include finite-temperature field theory, with functional integrals and Feynman diagrams providing systematic approximation methods.

#### *Additional Theoretical Research*

In addition to the research discussed above, theoretical condensed matter physics research includes the following areas. The basic properties of non-equilibrium systems are investigated with application to surface and growth phenomena and vortex dynamics. Tools include continuum stochastic equations, renormalization group, and numerical simulation.

#### *High-Energy Physics*

Notre Dame has a substantial presence in both experimental and theoretical high-energy physics, as detailed below. It should be noted that the research of the theoretical and experimental group members shows parallel interests in several areas, such as heavy quark and Higgs physics and supersymmetry. This leads to a more cohesive interaction between theory and experiment at Notre Dame. In addition, we have an extensive effort in education and outreach through QuarkNet, a collaboration of particle physics research groups located at 60 U.S. universities and laboratories. This program partners students and teachers with experiments conducting research at the energy frontier and at the world's most powerful accelerators, located at CERN in Switzerland, Fermilab in Illinois, and Stanford in California.

#### *Experimental High-Energy Physics*

Experimental research in high-energy physics at Notre Dame centers on a number of projects. Notre Dame is involved in the study of weak vector bosons and heavy quarks at the Fermilab Tevatron collider, the search for the Higgs boson and super-symmetry at the CERN LHC and the study of CP violation in B meson decay at Stanford Linear Accelerator Center (SLAC). Modern high-energy physics detector development is also an important part of the program.

The study of weak vector bosons, heavy quarks, and QCD phenomena at the Fermilab Tevatron collider is carried out with the DØ detector. A major upgrade to the detector has recently been completed. The upgrade improves the detector's ability to study top and beauty quarks by providing magnetic tracking in addition to the detector's outstanding calorimetry. The DØ group was a co-discoverer of the top quark and will now take advantage of the Tevatron's unique capabilities as the world's current sole source of top quarks. The collider is also one of the few facilities in which the W boson, responsible for the well-known charged weak interactions, can be produced and studied.

The study of electroweak symmetry breaking and a search for new phenomena is in preparation, utilizing the Large Hadron Collider (LHC) under construction at CERN, near Geneva, Switzerland. A consortium of U.S. and foreign physicists is building two large multipurpose detectors, and Notre Dame is involved with one of these called CMS. CMS is specialized to study the massive Higgs boson, an essential part of the standard model responsible for mass generation, and the spectra of super-symmetric particles. Notre Dame is an active member of the hadronic calorimetry subgroup of CMS.

The study of CP violation in B meson decay is being performed with the BaBar detector at the PEP II storage ring currently running at SLAC. Our understanding of CP violation, which up until recently had only been observed in the decay of the neutral K meson, is rather limited. Large CP violating effects have now been found in the decay of B mesons. CP violation is a subtle effect in which nature distinguishes between matter and antimatter and such an effect is needed to understand the prevalence of matter over antimatter in our world. The studies demand precision measurements of very large samples of B mesons. Notre Dame is involved in the tracking and event reconstruction and analysis for BaBar.

Detector development at Notre Dame includes the development of new scintillators and waveshifters, and the development of optical fibers as particle detectors. Several of our experiments have used optical fiber technology for tracking or for calorimetry. The need to read out these devices accurately and quickly has led to a number of advances in fast scintillators and in visible-light photon detectors. The Notre Dame group has pioneered developments in these detector technologies, and was proposer and coleader of the construction effort for the Central Fiber Tracker (CFT) for the DØ experiment at Fermilab.

#### *Education and Outreach*

QuarkNet is a federally funded national program partnering high school teachers with particle physicists working on high-energy colliding beam experiments at Fermilab, CERN and SLAC and on non-accelerator and fixed target experiments. Notre Dame is directly involved in the management of the National QuarkNet Program and also operates the Notre Dame QuarkNet Center located adjacent to the campus where high school teachers and students can participate "hands-on" in construction of state-of-the-art particle physics detectors.



### *Theoretical High-Energy Physics*

Theoretical high-energy physics at the University of Notre Dame runs the gamut from the very phenomenological to the very abstract. The research areas of particular interest include violations of discrete symmetries, rare decays, particle-antiparticle oscillations, quantum field theoretic problems, supersymmetry and grand unification, astroparticle physics and cosmology, symmetry groups and algebras, and topological questions. While the methods used and the systems studied vary considerably, the goals in the end are similar: explaining what really makes our universe tick and understanding at a deep level the theories that allow such an explanation.

A violation of time reversal (T) invariance has been observed in the decays of neutral kaons. Its role as a fundamental element of nature's grand design has been fully appreciated, yet we lack a real theoretical understanding of it—not surprisingly, since T violation is connected with central mysteries of the Standard Model, namely the problem of mass generation and family replication. One predicts with considerable confidence that the decays of beauty mesons will exhibit truly large T asymmetries. The phenomenology of beauty and charm hadrons is extended with the goal of determining the size of the fundamental weak-interaction parameters and arriving at predictions for T asymmetries with as much quantitative precision as possible. This involves extracting the fundamental quark dynamics from the observable hadron dynamics. Novel field-theoretic methods based on heavy-quark expansions have been developed for this task; they are continually refined.

One broad area of research at Notre Dame is supersymmetry (SUSY), a symmetry relating bosons and fermions that could explain many puzzles such as the origin of fundamental interactions or the longevity of our universe. While many compelling arguments suggest that nature is, at some level, supersymmetric, there are as yet no complete and convincing supersymmetric standard models. Different assumptions about the mechanism by which SUSY is broken lead to different ways of meeting present experimental constraints and generate rich phenomenologies for future experiments. Some applications of SUSY under study at Notre Dame are unified theories of the strong and electroweak forces; flavor symmetries that can explain the observed quark and lepton mass hierarchies and predict new effects such as rare decays and neutrino oscillations, and novel signatures in Higgs

boson interactions. Testing the various theories, either directly at high-energy colliders or indirectly using rare phenomena and precise predictions of low-energy parameters, is of great interest to theorists and experimentalists alike.

Another active area of study is the overlap of particle physics with astrophysics and cosmology. When new theories are formulated to explain experimental observations or the origin of existing theories, inevitably new and exotic particles and interactions are predicted; these can radically change the early evolution of the universe, the behavior of stellar objects, or even the vacuum itself. Astrophysical observations can, in turn, dramatically constrain such theories, often bounding their parameters far more stringently than terrestrial experiments. Properties of massive neutrinos, of supersymmetric particles, and of more exotic relics, such as quintessence, which may explain the mysterious dark energy observed by astronomers, are some examples of current research.

On a more mathematical, abstract level, research is in progress on various aspects of symmetries and their applications. The role of symmetries in physics cannot be overstated; indeed, all of high-energy physics is founded on symmetry principles of various sorts. Two examples, CP and supersymmetry, were mentioned above. Another area of active study is infinite-dimensional Lie algebras, in particular Kac-Moody, Virasoro, and W-algebras applicable to conformal field theories and integrable systems, and the algebras corresponding to the group of maps from spheres and tori to compact simple Lie groups. The cohomology of these groups and the Lie algebras, and their connection with the problem of anomalies in current algebras, are being examined. Relativity groups (Galilean and Poincare) in  $< 4$  dimensions and their projective unitary representations and physical applications is another area of interest. Finally, the topology of a space, and not just its symmetry properties, determines its physics. One topic of current research is the role that topology plays in determining the relationship between a particle's spin and the quantum statistic it obeys.

### *Nuclear Physics*

The nucleus is a unique many-body quantum system of fermions (neutrons and protons) interacting under the strong, electromagnetic, and weak interactions. It is therefore an excellent laboratory for the study of the fundamental forces as exhibited in various nuclear properties. Research in nuclear physics at

Notre Dame is built around a broad program in low energy experimental nuclear science that overlaps with the highest-priority scientific objectives in modern nuclear physics. Work is typically carried out at the accelerator facilities in our own laboratory as well as at a variety of accelerators in locations throughout the world. Our main research areas include radioactive ion beams, nuclear astrophysics, nuclear structure, fundamental symmetries, and weak interactions.

### *Nuclear Structure Laboratory*

The Nuclear Structure Laboratory at the University of Notre Dame is one of only three medium scale accelerator laboratories in the United States funded by the National Science Foundation. At present, we operate two accelerators in our laboratory—a model FN Tandem Van de Graaff accelerator capable of an acceleration potential in excess of 10 MV and a model KN single-ended Van de Graaff 3 MV accelerator capable of producing the high intensity particle beam currents necessary for the study of nuclear astrophysics phenomena. A third accelerator, a model JN single-ended Van de Graaff 1 MV accelerator, is presently being installed to extend the nuclear astrophysics research program to the very low energy regime.

Having our own accelerator laboratory offers our students a tremendous advantage in that they are trained to operate all the equipment within the laboratory, including the accelerators. This “hands-on” experience is simply not possible at larger national accelerator facilities, and is a key component of the education of our students.

The KN and JN accelerators contain standard RF ion sources, capable of producing high intensity positively charged beams of a variety of light ions. Ion beams for the FN Tandem accelerator are provided by two external ion sources. A standard sputter ion source is used to produce a wide variety of negatively charged ion beams, and a duoplasmatron ion source is used to provide negatively charged helium beams. Beams injected into the FN Tandem accelerator can be provided in either continuous or pulsed modes.

Some of the unique capabilities at Notre Dame include the Blue Giant detector array, consisting of 32 ion-implanted Si detectors capable of covering a very large angular range, and the Twinsol radioactive ion beam facility, consisting of a pair of large bore superconducting solenoid magnets. Other facilities include a moving tape system with

an additional superconducting solenoid for the study of weak interactions, an array of Ge detectors (three 55% and two Clovers) for gamma spectroscopy measurements, and a state-of-the-art RDM device for lifetime measurements.

Interdisciplinary programs that utilize high-current particle beams to study phenomena of interest in atomic and condensed-matter physics, and in the engineering of solid-state devices, are also being pursued. A brief summary of the most important research work of our faculty and staff is given below.

#### *Radioactive Nuclear Beams*

One of our major research programs is directed toward the study of reactions induced by short-lived radioactive nuclear beams. This is an area that was pioneered in the Nuclear Structure Laboratory at Notre Dame, where the world's first usable beams of radioactive nuclei at non-relativistic energies were developed in 1987. The research encompasses studies of reactions induced by short-lived nuclei that are important for the understanding of astrophysical and cosmological processes, as well as investigations of the structure of exotic nuclear species at the limits of nuclear stability. Some of the future initiatives include:

1. The development of Twinsol as a momentum separator to study explosive stellar hydrogen and helium burning.
2. The Sub-Coulomb dissociation of  ${}^8\text{B}$ , which is important both as it relates to the problem of "missing" solar neutrinos and because  ${}^8\text{B}$  is a "proton-dripline" nucleus that has been proposed to have a quite exotic "proton-halo" structure.
3. The development of a new rabbit system for the study of the  $(\beta, n)$  correlations in  ${}^8\text{B}$   $\beta$  decay in searching for G-parity violation resulting from u and d quark mass differences.

#### *Nuclear Astrophysics*

The research activities of the nuclear astrophysics group are focused on measurements of reaction and decay processes that are important for the understanding of hydrogen, helium, and carbon burning phases during stellar evolution, and in explosive stellar events such as novae, supernovae, and x-ray bursts. In addition to the experimental work, large network simulations of nucleosynthesis in these stable-burning and explosive scenarios are carried out. A few examples of the studies being presently carried out are:

1. New experimental techniques and methods have been developed to successfully measure the  ${}^{12}\text{C}(\alpha, \gamma){}^{16}\text{O}$  reaction rate that is crucial for understanding the fate of late stars and the ignition of supernovae. These techniques are now applied for determining the stellar neutron sources for the s-process in the Red Giant and Asymptotic Giant phases of stellar evolution.
2. To simulate the origin of lead in our universe, s-process measurements on Ni and Pb isotopes have been initiated at the new n-TOF facility at CERN/Geneva. The results will be implemented into nucleosynthesis simulations of stellar evolution.
3. The  ${}^{19}\text{F}(p, \gamma)$  and  ${}^{20}\text{Ne}(p, \gamma)$  reactions determine the origin and fate of fluorine and neon in hydrogen-shell burning of deeply convective massive stars. The observed elemental abundances at the surface of these stars are inconsistent with the accepted rates for these reactions. We have remeasured the rates using new detector techniques and found results that differ considerably from previous work.
4. A strong experimental program has focused on the study of the ignition and the end-point of the so-called "rp" process in x-ray bursts to determine the temperature, density, and time scale for x-ray burst modelling. Complementary to that, large-scale nucleosynthesis modelling has been performed to simulate the associated luminosity and nucleosynthesis conditions at the surface of neutron stars.

#### *Fundamental Interactions and Weak Decays*

The primary goal of this research effort is to use the atomic nucleus as a laboratory to probe for new physics beyond the "Standard Model" of elementary-particle interactions. We are also actively working on understanding nuclear structure issues that are critical for determining the efficiency of solar neutrino detectors. Some examples of the work being done are:

1. The very small electron-capture branch in the decay of  ${}^{116}\text{In}$  has recently been measured. This decay rate is a test of nuclear structure calculations that are being used to translate observed double  $\beta$  decay rates into upper limits for parameters that characterize physics beyond the Standard Model.

2. We have recently measured the electron-neutrino correlation in a Fermi nuclear  $\beta$  decay with unprecedented precision. Our measurement allows us to put the most stringent constraints possible on scalar contributions to the weak interaction.
3. We are currently working on preparing an experiment that will search for Time-Reversal-Symmetry Violation in the decay of neutrons. Our experiment has already produced the most sensitive probe of this observable and an upcoming run will further improve our precision.
4. We are working on a high-precision determination of the electron-neutrino correlation in the nuclear  $\beta$  decay of  ${}^8\text{B}$  and  ${}^8\text{Li}$ , which should allow us to make the most accurate measurements to date of G-parity breaking, and could allow determination of the up-down quark mass difference.

#### *Nuclear Structure*

The focus of this work is on studies of the fundamental modes of motion in nuclei. The dynamics of many-body quantum systems, including nuclei, rely heavily on fluctuations around an equilibrium shape. For many nuclei the equilibrium shape is nonspherical, resulting in a spectrum that is dominated by rotational structure. Of particular interest in studies of rotational dynamics are the characterizations of "super-deformed" structures and the search for "hyper-deformation," which involves highly elongated nuclear shapes.

An interesting new twist to rotational motion is the concept of "tilted axis rotation" whereby the nuclear rotation may occur about more than one axis. This results in interesting and novel phenomena such as "wobbling motion" (akin to that of a wobbling top) and breakdown of chiral symmetry (the nuclei demonstrating left- and right-handedness). Another topic of investigation is the so-called "anti-magnetic rotation" which is a novel form of nuclear motion: a symmetric rotation of nucleonic currents, leading to regular rotational bands of nuclei.

Vibrational dynamics in nuclei are not yet well understood. Schematically, vibrations can be described as multipole distortions spanning the range from monopole to high multipole oscillations around an equilibrium shape. Research is focused on isoscalar dipole oscillations (which are directly related to the nuclear incompressibility), as well as on quadrupole and octupole modes resulting in

low-lying collective excitations superimposed onto the underlying rotational structure. Nuclear incompressibility is a fundamental property of nuclear matter and is crucial to our understanding of the phenomena of stellar collapse, supernovae, and collective flow in high-energy heavy-ion collisions. The only way to experimentally determine this quantity is via the monopole and isoscalar dipole vibrations in nuclei.

The mass of a nucleus is one of its most fundamental properties. Experimental nuclear masses and various mass models typically show excellent agreement near stability. Far from stability where there is very little or no information known, mass models diverge widely. Nuclear masses play a particularly crucial role in nucleosynthesis processes that take place in stellar explosions. For example, the rp-process (rapid proton capture) is thought to occur on the accretion disks of x-ray bursting binary neutron star systems. The r-process (rapid neutron capture) is responsible for the synthesis of the heavy elements in cataclysmic stellar scenarios. Both processes involve the creation of nuclei far from stability. Our current research interests are both in theory and experiment.

In theory, we are developing a reliable structure-based mass model. In experiment, we have a research program for the measurement of nuclear masses along both processes. Some examples are given below.

1. Mass measurements of the  $N=Z$  waiting point nuclei  $^{68}\text{Se}$ ,  $^{80}\text{Zr}$ , and  $^{84}\text{Mo}$  of the rp-process.
2. Mass measurements of neutron rich nuclei Ag, Sn, and Cd.

The main expertise of the Nuclear Structure groups lie in  $\gamma$  ray spectroscopy measurements using multi detector arrays, electron spectroscopy, and in the determination of the lifetimes of nuclear states using techniques capable of covering a wide range of intervals, from a femto-second to several hundred picoseconds.

#### *Research Experiences for Teachers (RET)*

Notre Dame operates a Research Experience for Teachers (RET) program; which pairs high school teachers from the North Central Indiana/Southwest Michigan region with physics faculty in the department. Teachers in RET participate in a paid eight-week program of summer research and receive academic graduate research credit.

In principle, research is possible in any area of physics depending upon the mutual interest of the teacher and faculty mentor. Twelve high school teachers are supported in this program each summer.

#### *Graduate Facilities in Physics*

The Department of Physics, located in Nieuwland Science Hall, has excellent research facilities both on and off campus. Astronomy/astrophysics research facilities include 20 nights a year at the 1.8 meter Vatican Advanced Technology Telescope (VATT) and 10 nights a year at the soon-to-be-completed 2x 8.5 meter Large Binocular Telescope (LBT). Current research is also conducted using a variety of telescopes, including the Hubble Space Telescope (HST), the Keck Telescope, the NASA Infrared Telescope (IRTF), and the Steward and Cerro-Telolo Observatories. An air-shower array located next to the campus is used to study high- (30-300GeV) and ultrahigh-energy (greater than 100TeV) cosmic rays, utilizing position-sensitive proportional wire detectors for precision angle measurements and particle identification. Facilities for accelerator-based atomic physics research include the Atomic Physics Accelerator Lab at Notre Dame (APALand), which includes a 200 kV heavy ion accelerator and various vacuum ultraviolet and visible monochromators, high-resolution position-sensitive photon detectors, and Doppler-free laser excitations chambers, as well as other table-top laser excitation systems. Precision measurements in atomic Cs, necessary for interpretation of parity nonconservation experiments, are carried out using Ti-sapphire, dye, and diode lasers. Experiments on highly charged ions are also carried out at Argonne National Laboratory (ANL) and at GSI-Darmstadt, Germany. x-ray-atom interactions are also studied at national synchrotron radiation facilities. In biophysics, cell culture and neurobiology facilities are available. The 300-Mhz magnetic resonance imager (MRI) is a vertical super-wide bore seven-Tesla magnet with exchangeable probes (up to 64 mm in diameter) and gradient sets (up to 100 Gauss/cm) for imaging microscopy and biological applications. The facility is equipped for in vivo study of small animals. Condensed-matter physics facilities are available for molecular-beam epitaxy (MBE) of semiconductor films, super-lattices, and microstructures and for bulk crystal growth, including a traveling solvent floating zone furnace; low-temperature electron tunneling; microwave, optical, and infrared photoresponse studies of superconductors; resonance studies in ferromagnetic and paramagnetic materials; surface

physics; x-ray and fluorescence characterization of solids; low-temperature thermodynamic studies; and optical and far-infrared studies of semiconductors. XAFS and x-ray scattering experiments are also carried out at the ANL, and neutron diffraction studies are performed at the National Institute of Standards and Technology. High-energy elementary particle physics research is carried out at the Tevatron Collider at Fermi National Accelerator Laboratory (FNAL), Brookhaven National Laboratory (BNL), Stanford Linear Accelerator (SLAC), and the Large Hadron Collider at the CERN Laboratory in Geneva, Switzerland. On-campus facilities are used for the development of new particle detection systems, including scintillating fiber tracking and tile-fiber calorimeter detectors, and for detector development and instruction for the QuarkNet education and outreach project. Research facilities include 1-MV, 4-MV, and 9-MV Van de Graaff nuclear accelerators; a 1-meter magnetic spectrograph; a multidetector array for gamma-ray spectroscopy; and a dual superconducting solenoid system for radioactive beam studies. Nuclear physics programs are also under way at ANL, the National Superconducting Cyclotron Laboratory, and Thomas Jefferson National Laboratory, among others. Computing facilities include the University's SGI Origin 2000 super-computer, plus University and departmental computer clusters that include PCs and Macintoshes, and UNIX workstations that include Suns, IBMs, SGIs, and Linux PCs. High-speed Ethernet connections are available in all University offices, laboratories, and residences, with outside network access available through the NSF's vBNS project. The department also has a well-equipped research library. A well-equipped machine shop and a capable staff of technicians serve the needs of the experimental research groups.

#### *Course Descriptions*

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

#### *500. Physics Colloquium*

(1-0-0) Bunker

A discussion of current topics in physics by guest lecturers and members of the faculty. (Every year)

*503. Methods of Theoretical Physics I*

(3-0-3) Staff

A study of the methods of mathematical physics. Topics include linear vector spaces, matrices, group theory, complex variable theory, infinite series, special functions, and differential equations. (Every year)

*505. Theoretical Mechanics*

(3-0-3) Staff

Lectures and problems dealing with the mechanics of a particle, systems of particles, and rigid bodies. The Lagrangian and Hamiltonian formulations of classical mechanics; theory of small oscillations. Introduction to special relativity. Introduction to nonlinear dynamics and chaos; bifurcation theory. (Every year)

*506. Electromagnetism*

(3-0-3) Staff

Electrostatics; Laplace's and Poisson's equations; Legendre's and Bessel's equations; Green's functions; static multipole expansions; magnetostatics; magnetic vector and scalar potentials; Maxwell's equations; plane waves. (Every year)

*507, 508. Quantum Mechanics I and II*

(3-0-3) (3-0-3) Staff

General Hilbert Space formulation of Quantum Mechanics; Schrödinger vs. Heisenberg picture; symmetries and conservation laws; Feynman path integrals; harmonic oscillator; the Coulomb problem; the Bohm-Aharonov effect; the theory of angular momentum; EPR correlations and Bell's inequality; Bose-Einstein and Fermi-Dirac statistics; elementary approximation methods; scattering theory. (Every year)

*510. Methods of Experimental Physics*

(2-2-3) Staff

A lecture and laboratory course on methods of modern experimental physics. The course is designed to expose first-year graduate students to all aspects of experimental physics from instrumentation and data acquisition to statistical treatment of data. Computer-related equipment includes LABVIEW data-acquisition software, Pentium MMX personal computers, and Ultrasparc work-stations. Instrumentation includes state-of-the-art detectors from inorganic scintillators to solid state detectors, lasers, x-ray sources, and NMR and ESR magnets. The course is designed around 10 experiments in astrophysics, atomic, condensed matter, high energy, and nuclear physics. An important part of the course is equipment design, familiarity with various detection systems, electronic pulse-processing, and in-depth knowledge of computer to equipment interfaces. (Every year)

*531, 532, 533. Current Topics in Physics*

(3-0-1) (3-0-1) (3-0-1) Staff

Discussion of topics of current interest in physics. (Offered as needed)

*587. Interpretive Problems in Quantum Mechanics*

(3-0-3) Staff

This course is intended for graduate students in physics and in the history and/or philosophy of science who wish to examine in some reasonable detail the roots, both historical and philosophical, of quantum mechanics and the profound conceptual problems to which that theory has given rise. The main vehicle for this will be a study of original seminal papers in the field (e.g., those by Planck, Bohr, Heisenberg, Schrödinger, Born, Einstein, Podolsky and Rosen, von Neumann, Bell, Bohm) and of related papers in the foundations of physics literature. Some background in physics, especially in the formalism of quantum mechanics, is desirable. However, the relevant physics and philosophy will be presented in the course itself. (Offered as needed)

*598A. Directed Research in Atomic Physics*

(V-V-V) Berry

This course is for high school teachers participating in atomic physics research in the Physics Department, for example as participants in the RET (Research Experience for Teachers), or similar programs that partner high school teachers with atomic physicists. Participants will be introduced to atomic physics in informal lectures with faculty, with course notes and reference texts available. Additionally, they will participate in directed research associated with current atomic physics experiments being carried out by department faculty. Students maintain a research logbook and submit a written research summary at the conclusion of the research period.

*598B. Directed Research in Biophysics*

(V-V-V) Staff

This course is for high school teachers participating in biophysics research in the Physics Department, for example as participants in the RET (Research Experience for Teachers), or similar programs that partner high school teachers with biophysicists. Participants will be introduced to biophysics in informal lectures with faculty, with course notes and reference texts available. Additionally, they will participate in directed research associated with current biophysics experiments being carried out by department faculty. Students maintain a research logbook and submit a written research summary at the conclusion of the research period.

*598C. Directed Research in Condensed Matter Physics*

(V-V-V) Staff

This course is for high school teachers participating in condensed matter physics research in the Physics Department, for example as participants in the RET (Research Experience for Teachers), or similar programs that partner high school teachers with condensed matter physicists. Participants will be introduced to condensed matter physics in informal lectures with faculty, with course notes and reference texts available. Additionally, they will participate in directed research associated with current condensed matter physics experiments being carried out by department faculty. Students maintain a research logbook and submit a written research summary at the conclusion of the research period.

*598N. Directed Research in Nuclear Physics*

(V-V-V) Kolata

This course is for high school teachers participating in nuclear physics research in the Physics Department, for example as participants in the RET (Research Experience for Teachers), or similar programs that partner high school teachers with nuclear physicists. Participants will be introduced to nuclear physics in informal lectures with faculty, with course notes and reference texts available. Additionally, they will participate in directed research associated with current nuclear physics experiments being carried out by department faculty. Students maintain a research logbook and submit a written research summary at the conclusion of the research period.

*598R. Directed Research in Particle Physics*

(V-V-V) Ruchti

This course is for high school teachers participating in particle physics research in the Physics Department, for example as participants in the QuarkNet, or similar programs that partner high school teachers with particle physicists. Participants will be introduced to particle physics in informal lectures with faculty, with course notes and reference texts available. Additionally, they will participate in directed research associated with current particle physics experiments being carried out by department faculty. This activity can include detector design, construction and operation, as well as data recording, data reduction and physics analyses. Students maintain a research logbook and submit a written research summary at the conclusion of the research period.

*598S. Directed Research in Astrophysics*

(V-V-V) Mathews

This course is for high school teachers participating in astrophysics research in the Physics Department, for example as participants in the RET (Research Experience for Teachers), or similar programs that partner high school teachers with astrophysicists. Participants will be introduced to astrophysics in informal lectures with faculty, with course notes and reference texts available. Additionally, they will participate in directed research associated with current astrophysics experiments being carried out by department faculty. Students maintain a research logbook and submit a written research summary at the conclusion of the research period.

*601. Electrodynamics*

(3-0-3) Staff

Scattering and diffraction; special relativity; covariant formulation; radiation from charges; multipole expansions; radiation damping. (Every year)

*602. Statistical Thermodynamics*

(3-0-3) Staff

Review of basic elements of phenomenological thermodynamics; kinetic theory and transport equation; dilute gases in equilibrium; classical statistical mechanics; microcanonical, canonical and grand canonical ensembles; quantum statistical mechanics; the renormalization group, critical phenomena and phase transitions. (Every year)

*603. Quantum Mechanics III*

(3-0-3) Staff

Advanced topics in nonrelativistic quantum mechanics: advanced approximation methods, partial wave expansions, and the optical theorem, Berry's phase; relativistic quantum mechanics; the Dirac equation, the electromagnetic interactions of the Dirac particle, the fine structure of atoms, Klein's paradox; basic elements of quantum field theory: Lagrangian and Hamiltonian formulation, the existence of antiparticles, the Feynman rules with elementary applications; one-loop renormalization and the renormalization group. (Every year)

*604. Quantum Field Theory*

(3-0-3) Staff

General formulation of quantum field theories; the spin-statistics theorem; CPT invariance and its tests; local gauge theories; symmetries, conservation laws, Ward identities and anomalies; Feynman path integrals; Feynman rules for abelian and nonabelian gauge theories; ghosts; the general renormal-

ization program for gauge theories and the renormalization group; asymptotic freedom and slavery; spontaneous realization of symmetries and the Higgs mechanism; Grand Unification. (Offered as needed)

*605. Astrophysics*

(3-0-3) Staff

An introductory course in astrophysics covering such topics as spectral and color indices, photometry, variable stars, mass functions, theoretical stellar models, synthesis of elements, white dwarfs, neutron stars, supernova, cosmic rays, galaxies, and cosmology. (Every year)

*606. Many Body Theory*

(3-0-3) Staff

Second quantization; density matrix; double-time Green's functions; temperature Green's functions; static and time-dependent properties of a system of electrons in the normal state; superconductivity; Goldstone theorems; phase transitions in one and two dimensions. (Offered as needed)

*607, 608. Atomic Physics*

(3-0-3) (3-0-3) Staff

Atomic structure and properties. Spectroscopy of simple and complex atomic systems, the Schrödinger and Dirac equations, Hartree-Fock methods, allowed and forbidden radiative transitions, and hyperfine splitting. Further topics that may be covered are laser-atom interactions, laser cooling and trapping, photoionization, atomic collisions, many-body perturbation theory, quantum electrodynamics, and atomic parity non-conservation. (The first semester is offered every year; the second semester is offered as needed.)

*609, 610. Nuclear Physics*

(3-0-3) (3-0-3) Staff

The nucleus as a Fermi gas; the Von Weizsäcker mass formula; tensor algebra and the Wigner-Eckart theorem; isospin; independent-particle motion; the many-body problem in nuclear physics; the Hartree-Fock self-consistent field; the shell model; collective nuclear motion; rotations and vibrations; pairing forces; nuclear reaction theory; electromagnetic and weak interactions; fundamental symmetries and searches for "new physics" in the context of the nucleus; nuclear astrophysics; the solar neutrino problem; use of electron scattering as a tool to investigate the structure of the nucleon and the nucleus; quarks and gluons in relativistic heavy ion collisions. (The first semester is offered every year; the second semester is offered as needed.)

*613. Solid-State Physics*

(3-0-3) Staff

Free electron theories of solids; Drude and Sommerfeld theory; crystal and reciprocal lattices; diffraction; Bloch electrons; band structure and the Fermi surface; cohesive energy; classical and quantum theory of the harmonic crystal, phonons; dielectric properties of insulators; semiconductors; paramagnetism and diamagnetism, magnetic ordering; superconductivity. (Every year)

*614. Solid-State Physics*

(3-0-3) Staff

Advanced topics in condensed matter physics chosen from such areas as: critical phenomena; high-temperature superconductivity; quantum fluids; spin glasses; quantum wells and quantum dots; quantum Hall effect; "soft" condensed-matter systems. Survey of modern experimental techniques such as molecular-beam epitaxy; dilution refrigerators; XAFS, ESR, x-ray, and neutron scattering. (Offered as needed)

*617, 618. Elementary Particle Physics*

(3-0-3) (3-0-3) Staff

Relativistic transformations and kinematics; symmetries and conservation laws; selection rules; basic elements of group theory; the quark model and fundamental interactions in nature; abelian and nonabelian gauge theories; the Standard Model of High Energy Physics, its Feynman rules and renormalization; the Higgs mechanism; the CKM matrix; Supersymmetry and Supergravity; Grand Unification; empirical foundations: accelerators, detectors and experimental techniques; crucial experiments. (The first semester is offered every year; the second semester is offered as needed.)

*619. Stars and Stellar Evolution*

(3-0-3) Staff

Observables of stellar astronomy and star classification, astrophysical hydrodynamics, stellar interiors, hydrostatic equilibrium, energy transport, stellar opacities, equation of state, thermonuclear reaction rates, nucleosynthesis. The evolution of main sequence and post main sequence stars along the Hertzsprung-Russell diagram, stages of thermonuclear burning. Stellar pulsations and transients. Basic theory of star formation and gravitational collapse. Formation and evolution of planetary systems. Relativistic hydrodynamics including white dwarfs, neutron stars, black holes, accretion discs and x-ray transients. Binary star evolution. Stellar collapse and supernovae. (Offered as needed)

620. *Galactic Dynamics and Theoretical Cosmology*

(3-0-3) Staff

A course on stellar systems, galaxies, and the large-scale structure of the universe and microwave background. Observational properties of galaxies and galactic clusters. Galaxy morphology. Galaxy models including: gravitational collapse and star formation, galactic halos, galactic chemical evolution, potential theory, stellar orbits, and the theory of the equilibrium configurations of stellar systems. The theory of spiral structure, collisions and encounters between stellar systems, and two-body relaxation in the approach to equilibrium. Dark matter content of galaxies, clusters, and the intergalactic medium. Models of large-scale structure including cold, hot, and mixed-dark matter models. The formation and evolution of galactic and extragalactic cosmic radiation. The origin, radiation transport, and structure of the cosmic microwave background radiation and other diffuse backgrounds. Inflationary cosmology, cosmic phase transitions, primordial nucleosynthesis. (Offered as needed)

621. *General Relativity*

(3-0-3) Staff

Physical principles of general relativity, tensor algebra, Einstein field equations. The Schwarzschild solution and applications, including terrestrial and near-terrestrial experiments, and (non-rotating) black holes. Stellar structure, white dwarves, and neutron stars. Standard cosmology and the Friedman solutions, the early universe, relict background radiation, and the cosmological helium abundance. (Offered as needed)

623, 624. *Topics in Contemporary Physics*

(3-0-3) (3-0-3) Staff

A study in depth of selected topics of current interest. (Offered as needed)

625, 626. *Special Topics in Physics*

(3-0-3) (3-0-3) Staff

Discussions of topical concepts in physics. (Offered as needed)

651, 652. *Topics in Nuclear Physics*

(2-0-2) (2-0-2) Staff

Discussions of research and current literature in nuclear physics. (Every year)

653, 654. *Topics in Atomic Physics*

(2-0-2) (2-0-2) Staff

Discussion of research and current literature in atomic physics. (Every year)

655, 656. *Topics in Elementary Particle Physics*

(2-0-2) (2-0-2) Staff

Discussion of research and current literature in elementary particle physics. (Every year)

657, 658. *Topics in Theoretical Physics*

(2-0-2) (2-0-2) Staff

Discussion of research and current problems in theoretical physics. (Every year)

659, 660. *Topics in Solid-State Physics*

(2-0-2) (2-0-2) Staff

Discussion of research and current literature in solid-state physics. (Every year)

661. *Astrophysics Seminar*

(2-0-2)(2-0-2) Staff

Discussion of research and current literature in astrophysics. (Every year)

671. *Early Universe Seminar*

(2-0-2) Staff

Application of particle and nuclear physics to the early universe. Subjects covered will include: isotropy and homogeneity of the universe, microwave background radiation, "Big Bang" cosmology, inflation models, the "standard model" of high energy physics, baryosynthesis and "Grand Unified" theories, nucleosynthesis, cosmic strings, and "dark" matter. (Every year)

699. *Research and Dissertation*

(V-V-V) Staff

Research and dissertation for resident graduate students.

700. *Nonresident Dissertation Research*

(0-0-1) Staff

Required of nonresident graduate students who are completing their dissertations in absentia and who wish to retain their degree status.

In addition to the foregoing, certain advanced undergraduate courses may be taken for graduate credit.

**Faculty**

Ani Aprahamian, *Chair and Professor*. B.A., Clark Univ., 1980; Ph.D., *ibid.*, 1986. (1989)

Gerald B. Arnold, *Professor*. B.A., Northwestern Univ., 1969; M.S., Univ. of California, Los Angeles, 1972; Ph.D., *ibid.*, 1977. (1978)

Dinshaw Balsara, *Assistant Professor*. M.S. (Physics), Indian Inst. of Tech., Kanpur, 1982; M.S. (Astronomy), Univ. of Chicago, 1989; Ph.D., Univ. of Illinois at Urbana-Champaign, 1990. (2001)

Albert-László Barabási, *the Emil T. Hofman Professor of Physics*. B.A., Univ. of Bucharest, 1989; M.A., Univ. of Budapest, 1991; Ph.D., Boston Univ., 1994. (1995)

David P. Bennett, *Research Associate Professor*. B.S., Case Western Reserve Univ., 1981; Ph.D., Stanford Univ., 1986. (1996)

H. Gordon Berry, *Professor*. B.A., Oxford Univ., 1962; M.S., Univ. of Wisconsin, 1963; Ph.D., *ibid.*, 1967. (1994)

Ikaros I. Bigi, *Professor*. M.Sc., Univ. München, 1973; Ph.D., *ibid.*, 1976. (1988)

Howard A. Blackstead, *Professor*. B.S., North Dakota State, 1962; M.A., Dartmouth College, 1964; Ph.D., Rice Univ., 1967. (1969)

Bruce A. Bunker, *Professor*. B.Sc., Univ. of Washington, 1974; Ph.D., *ibid.*, 1980. (1983)

Neal M. Cason, *Professor*. A.B., Ripon College, 1959; M.S., Univ. of Wisconsin, 1961; Ph.D., *ibid.*, 1964. (1965)

Philippe A. Collon, *Assistant Professor*. Licence, Univ. Catholique De Louvain, 1993; Ph.D., Univ. of Wien, 1999. (2003)

Malgorzata Dobrowolska-Furdyna, *Professor*. M.S., Warsaw Univ., 1972; Ph.D., Polish Academy of Sciences, 1980. (1988)

Morten R. Eskildsen, *Assistant Professor*. B.Sc., Univ. of Copenhagen, 1993; M.Sc., *ibid.*, 1994; Ph.D., *ibid.*, 1998. (2003)

Stefan G. Frauendorf, *Professor*. M.S., Technical Univ. of Dresden, 1968; Ph.D., *ibid.*, 1971. (1998)

Jacek K. Furdyna, *the Aurora and Tom Marquez Professor of Physics and Fellow of the Nanovic Institute for European Studies*. B.S., Loyola Univ., Chicago, 1955; Ph.D., Northwestern Univ., 1960. (1986)

Umesh Garg, *Professor*. B.S., Birla Institute of Technology, Pilani, India, 1972; M.S., *ibid.*, 1974; M.A., State Univ. of New York, Stony Brook, 1975; Ph.D., *ibid.*, 1978. (1982)

Peter M. Garnavich, *Assistant Professor*. B.S., Univ. of Maryland, 1980; M.S., Massachusetts Inst. of Technology, 1983; Ph.D., Univ. of Washington, 1991. (1999)

Joachim Görres, *Research Professor*. B.S., Univ. of Munster, 1974; Diplom., *ibid.*, 1979; Ph.D., *ibid.*, 1983. (1989)

Anna Goussiou, *Assistant Professor*. B.S., Aristotle Univ. of Thessalonika, Greece, 1989; M.S., Univ. of Wisconsin-Madison, 1995; Ph.D., *ibid.*, 1995. (2003)

- Dale R. Harshman, *Visiting Professor*. B.S., Pacific Lutheran, 1978; M.Sc., Western Washington Univ., 1980; Ph.D., Univ. of British Columbia, 1986. (1999)
- Michael D. Hildreth, *Assistant Professor*. A.B., Princeton Univ., 1988; Ph.D., Stanford Univ., 1995. (2000)
- Anthony K. Hyder, *Associate Vice President for Graduate Studies and Research and Professor*. B.S., Univ. of Notre Dame, 1962; Ph.D., Air Force Institute of Technology, 1971. (1991)
- Boldizsár Jankó, *Assistant Professor*. Univ. Dipl., Eötvös Univ., Budapest, Hungary, 1991; Ph.D., Cornell Univ., 1996. (2000)
- Colin Philip Jessop, *Associate Professor*. B.A., Univ. of Cambridge (Trinity College); M.A., *ibid.*; Ph.D., Harvard Univ., 1994. (2003)
- Walter R. Johnson, *the Frank M. Freimann Professor of Physics*. B.S.E., Univ. of Michigan, 1952; M.S., *ibid.*, 1953; Ph.D., *ibid.*, 1957. (1958)
- Gerald L. Jones, *Professor*. B.S., Univ. of Kansas, 1956; Ph.D., *ibid.*, 1960. (1963)
- James J. Kolata, *Professor*. B.S., Marquette Univ., 1964; M.S., Michigan State Univ., 1966; Ph.D., *ibid.*, 1969. (1977)
- Christopher F. Kolda, *Assistant Professor*. B.A., Johns Hopkins Univ., 1990; M.S., Univ. of Michigan, 1992; Ph.D., *ibid.*, 1995. (2000)
- Larry O. Lamm, *Research Associate Professor*. B.S., East Carolina Univ., 1978; M.S., *ibid.*, 1983; Ph.D., Univ. of Notre Dame, 1989. (1994)
- A. Eugene Livingston, *Professor*. B.Sc., Univ. of Alberta, 1969; M.Sc., *ibid.*, 1970; Ph.D., *ibid.*, 1974. (1978)
- John M. LoSecco, *Professor*. B.S., Cooper Union, 1972; A.M., Harvard Univ., 1973; Ph.D., *ibid.*, 1976. (1985)
- Monica Lynker, *Guest Assistant Professor*. Vordiplom, G.H. Siegen, 1984; Ph.D., UT Austin, 1990. (2000)
- Grant J. Mathews, *Professor and Director of the Center for Astrophysics*. B.S., Michigan State Univ., 1972; Ph.D., Univ. of Maryland, 1977. (1994)
- Patrick J. Mooney, *Visiting Research Assistant Professor*. B.S., Univ. of Notre Dame, 1978; Ph.D., *ibid.*, 1986. (1998)
- Kathie E. Newman, *Director of Graduate Studies and Professor*. B.Sc., Michigan State Univ., 1974; Ph.D., Univ. of Washington, 1981. (1983)
- Terrence W. Rettig, *Professor*. B.A., Defiance College, 1968; M.S., Ball State Univ., 1970; M.A., Indiana Univ., 1972; Ph.D., *ibid.*, 1976. (1983)
- Randal C. Ruchti, *Professor*. B.S., Univ. of Wisconsin, 1968; M.S., Univ. of Illinois, 1970; Ph.D., Michigan State Univ., 1973. (1977)
- Steven T. Ruggiero, *Associate Professor*. B.S., Rensselaer Polytechnic Institute, 1975; M.S., Stanford Univ., 1977; Ph.D., *ibid.*, 1981. (1983)
- Shafa D. J. Al Saddawi, *Adjunct Assistant Professor*. B.Sc., Baghdad Univ., 1969; M.Sc., Warsaw Univ., 1985; Ph.D., *ibid.*, 1989. (1999)
- Ulyana I. Safronova, *Visiting Professor*. M.S., Moscow Physical-Technical Inst., 1958; Ph.D., Vilnius Univ., 1964. (1998)
- Jonathan R. Sapirstein, *Professor*. B.S., Stanford Univ., 1973; Ph.D., *ibid.*, 1979. (1984)
- Paul E. Shanley, *Associate Professor*. B.S., Northeastern Univ., 1960; M.S., *ibid.*, 1962; Ph.D., *ibid.*, 1966. (1968)
- William D. Shephard, *Professor*. B.A., Wesleyan Univ., 1954; M.S., Univ. of Wisconsin, 1955; Ph.D., *ibid.*, 1962. (1963)
- Steven N. Shore, *Adjunct Professor*. M.Sc., SUNY-Stony Brook, 1974; Ph.D., Univ. of Toronto, 1978. (1995)
- Carol E. Tanner, *Associate Professor*. B.S., Univ. of Illinois, Urbana-Champaign, 1980; M.S., Univ. of California, Berkeley, 1982; Ph.D., *ibid.*, 1985. (1990)
- Erdinch R. Tatar, *Adjunct Assistant Professor*. Ph.D., Univ. of Notre Dame, 2000. (2000)
- Jeffrey H. Terry, *Adjunct Assistant Professor*. B.Sc., Univ. of Chicago, 1990; Ph.D., Stanford Univ., 1997. (2002)
- Nikolai G. Uraltsev, *Adjunct Associate Professor*. Ph.D., LNPI, Gatchina, 1983.
- Vance D. Vanderburg, *Adjunct Professor*. B.S., Syracuse Univ., 1960; Ph.D., Purdue Univ., 1965. (2000)
- Jadwiga Warchol, *Research Professor*. B.Sc., Univ. of Warsaw, 1962; M.Sc., *ibid.*, 1963; Ph.D., *ibid.*, 1969. (1984)
- Mitchell R. Wayne, *Associate Dean of the College of Science and Professor*. B.S., Univ. of California, Los Angeles, 1977; M.S., *ibid.*, 1980; Ph.D., *ibid.*, 1985. (1991)
- Fridolin Weber, *Visiting Professor of Physics*. M.S., Univ. of Munich, 1982; Ph.D., *ibid.*, 1985; Ph.D., *ibid.*, 1992. (2000)
- Michael C. F. Wiescher, *the Frank M. Freimann Professor of Physics*. Vordiplom, Univ. Munster, 1972; Diplom, *ibid.*, 1975; Ph.D., *ibid.*, 1980. (1986)
- James R. Wilson, *Adjunct Professor*. B.S., Univ. of California, Berkeley, 1943; Ph.D., *ibid.*, 1952. (1996)
- Tomasz Wojtowicz, *Visiting Research Associate Professor*. M. Sc., 1980, Warsaw Univ.; Ph.D., 1988, Institute of Physics, PAS; Ph.D., habilitation, 2000, Institute of Physics, PAS. (2001)

## Interdisciplinary Program

### The Molecular Biosciences Program

#### Codirectors:

- David R. Hyde, *Professor of Biological Sciences*  
Paul W. Huber, *Professor of Chemistry and Biochemistry*

#### Telephone:

- (574) 631-8054 (Hyde),  
(574) 631-6042 (Huber)

#### Location:

- 264 Galvin Life Sciences (Hyde),  
437 Stepan Chemistry (Huber)

#### E-mail:

- dhyde@nd.edu,  
phuber@nd.edu

Web: <http://www.science.nd.edu/MBP/MBP.html>

Current research probing the molecular details of the biological sciences requires simultaneous application of genetic, biochemical, and molecular biological principles and expertise. The Molecular Biosciences Program (M.B.P.) provides a broad range of training opportunities for students seeking careers within this active research field. Faculty participants of the Department of Biological Sciences and the Department of Chemistry and Biochemistry administer the M.B.P. within the College of Science. Students interested in the M.B. program should apply for admission to the Department of Biological Sciences or Chemistry and Biochemistry depending on their research interests.

#### Research Facilities

The Department of Biological Sciences, housed in the modern Galvin Life Sciences complex, has excellent facilities for all laboratory research in molecular biology. Facilities

and training opportunities are available in genetics, molecular and cell biology, and developmental biology. The Department of Chemistry and Biochemistry has training opportunities in the fields of gene expression, protein structure and enzyme kinetics. Many M.B.P. faculty have research activities within the newly established Walther Cancer Center and Keck Transgene Center.

The University maintains modern research facilities in support of the Molecular Biosciences Program. The Biosciences Core Facility maintains instrumentation for DNA, RNA, and peptide synthesis, amino acid and carbohydrate analysis, and protein and peptide sequencing. The Department of Biological Sciences houses an optics facility for confocal microscopy and scanning and transmission electron microscopy and a new flow cytometry facility equipped with a Coulter Epics XL flow cytometer and a Coulter ALTRA flow sorter. The College of Science NMR Facility contains state-of-the-art high field spectrometers that support both chemical and biological nuclear magnetic resonance research. The Mass Spectrometry Facility is equipped to analyze high mass biomolecules and determine exact masses of low and medium size molecules. The Freimann Life Science Center provides a modern animal care facility. The staff of certified veterinary technicians ensures proper care and use of laboratory research animals. Several science libraries are found on campus in Nieuwland Science Hall, the Radiation Laboratory, and the Galvin Life Sciences Building. Additional resources are available in the main campus Hesburgh Library.

#### *Degree Requirements*

Students participating in the Molecular Biosciences Program must complete the degree requirements of either the Department of Biological Sciences or the Department of Chemistry and Biochemistry. Several courses are designed for all M.B.P. students, and are usually taken during the first year of graduate school. There are additional elective courses in each department to allow for specialization within the M.B.P. Students in the Biological Sciences are required to take Molecular Biology I and II, Fundamentals of Biochemistry, and five elective courses. These are minimum requirements. The student's research adviser and committee may require additional courses based on the background and research interests of the student. In the Department of Chemistry and Biochemistry there are specific requirements depending on the focus of the study. A student in Biochemistry is required to take Fundamentals of Biochemistry,

Intermediary Metabolism, Molecular Biology I, and Advanced Biochemical Techniques. In Organic Chemistry, a student is required to take Advanced Organic Chemistry I, Advanced Organic Chemistry II, and Synthetic Organic Chemistry, with an additional nine credit hours of courses.

All M.B.P. students must pass both oral and written comprehensive examinations. Students will conduct original research and write an approved dissertation on this work. The work is conducted under the direction of an adviser participating in the M.B.P. Students in the program also must complete a one-year teaching requirement that usually involves assisting in the instruction of laboratory courses within their discipline. All students participate in the seminar activities of the program.

#### *Course Descriptions*

Both required and elective courses of the Molecular Biosciences Program are categorized according to the department offering the course. Please refer to the section on degree requirements for more information.

#### *Biological Sciences*

##### *Developmental Genetics*

Analysis of the cellular and molecular genetic mechanisms underlying animal development, with emphasis on major vertebrate and invertebrate model systems.

##### *Immunology*

An introductory course emphasizing the cells and tissues of the immune system and the nature and function of antigens and antibodies.

##### *Molecular Biology I*

Physical chemistry of nucleic acids, bacterial genetics, principles of cloning, DNA replication and recombination, prokaryotic and eukaryotic transcription, RNA processing and translation. Listed also as CHEM 531.

##### *Molecular Biology II*

Yeast genetics and molecular biology; retroviruses and transposable elements; recombinant DNA: tools and applications in *Drosophila*, yeast, and mice. Listed also as CHEM 532.

##### *Advanced Cell Biology I*

The basic biochemical, structural, and biophysical properties of key systems involved in membrane transport, protein trafficking, bioenergetics, cell signaling, vesicular transport, organelle biogenesis, and cytoskeletal functions.

##### *Advanced Cell Biology II*

The biochemical, structural, and biophysical properties of key systems involved in cellular adhesion, cell cycle regulation, programmed cell death (apoptosis), and the relationship to mechanisms of disease leading to carcinogenesis, aging.

##### *Immunobiology of Infectious Diseases*

Course focuses on the cellular and molecular mechanisms behind human diseases. Specifically, the design and effects of drug treatments on microbial and cellular processes and the development and implementation of vaccines.

##### *Topics in Tumor Biology*

Course examines the cell and molecular basis of tumor genesis and development in specific cancer cell types.

#### *Chemistry and Biochemistry*

##### *Fundamentals of Biochemistry*

Chemistry of carbohydrates, amino acids, proteins, nucleotides, nucleic acids, lipids, and enzymes.

##### *Intermediary Metabolism*

A study of the chemical reactions characteristic of living systems.

##### *Molecular Biology I*

Physical chemistry of nucleic acids, bacterial genetics, principles of cloning, DNA replication and recombination, prokaryotic and eukaryotic transcription, RNA processing and translation. Listed also as BIOS 531.

##### *Molecular Biology II*

Yeast genetics and molecular biology; retroviruses and transposable elements; recombinant DNA: tools and applications in *Drosophila*, yeast, and mice. Listed also as BIOS 532.

##### *Enzyme Chemistry*

Physical and chemical properties and mechanism of action of enzymes and their role in metabolic processes.

##### *NMR Spectroscopy in Chemistry and Biochemistry*

A survey of modern NMR methods used to determine molecular structure and conformation, study chemical and biochemical reactivity, and probe metabolic processes in biological systems.

##### *Chemical Basis of Gene Expression*

Emphasis is placed on eukaryotic gene structure, replication, transcription, and translation.



*Advanced Organic Chemistry I and II*

The theoretical basis of organic chemistry and a detailed study of the preparation and reactions of organic compounds.

*Synthetic Organic Chemistry*

A systematic and critical study of the synthetic methods of modern organic chemistry, including the development of multistage syntheses.

*Teaching, Research Fellowships*

Financial support is available to all students. The Molecular Biosciences Program nominates outstanding applicants for University-wide fellowships, some of which are specific for female and minority candidates. The M.B.P. also administers program-specific fellowships that support incoming and matriculating students. Research assistantships are available in many of the research laboratories, and teaching assistantships are available to all students. Teaching assistantships typically involve 10 to 12 hours of work per week teaching within an undergraduate laboratory course. All M.B.P. students are awarded full-tuition scholarships.

*Application and Admission*

Students interested in the Molecular Biosciences Program must apply for admission to one of the departments involved in the program, Biological Sciences or Chemistry and Biochemistry. Applicants should choose the department that best serves their training goals. Each department has different degree requirements, as described above. Usually the research adviser will be in the same department as the student, although this is not a necessity.

To apply to this program, please submit a completed Graduate School application form. On this application, you must specify to which of the host departments (Biological Sciences or Chemistry and Biochemistry) you are applying, and specify that your area of interest or specialization will be the Molecular Biosciences Program. Transcripts of all previous academic credits, three recommendation forms from undergraduate instructors aware of your qualifications, and a statement of purpose are also required.

Graduate Record Exam (GRE) General Test scores must also be submitted and your choice of one Advanced Study Examination. The GRE advanced test is required for consideration within the Department of Biological Sciences and is highly recommended for the Department of Chemistry and Biochem-

istry. Information about these tests can be obtained from:

GRE ETS  
P.O. Box 600  
Princeton, NJ 08541-6000

*Faculty and Research**Biological Sciences*

John H. Adams, molecular interactions of malaria merozoites with host erythrocytes and genetic/antigenic variation of *Plasmodium*.

Crislyn D'Souza-Schorey, Small GTPases in cell signaling and membrane trafficking.

John G. Duman, Physiological and biochemical adaptations to subzero temperatures, especially (1) structure and function of antifreeze proteins and ice nucleating proteins, and (2) studies of transgenic plants expressing insect antifreeze proteins.

Malcolm J. Fraser Jr., baculovirus molecular genetics, transposons, transgenic engineering of insects.

David R. Hyde, molecular genetics of *Drosophila* vision, molecular genetics of eye development and retinal degeneration in zebrafish, mechanisms of neuronal regeneration in zebrafish.

Alan L. Johnson, ovarian follicular growth, differentiation, and atresia; apoptosis.

Lei Li, molecular genetic basis of visual disorders, circadian clock and olfactory centrifugal inputs on visual sensitivity.

Joseph E. O'Tousa, maturation, structure, and function of rhodopsin, molecular genetics of retinal degeneration, control of cell death processes.

Jeffrey S. Schorey, molecular and cellular processes of mycobacterium-host cell interactions.

Neil F. Shay, molecular, cellular, and physiological aspects of nutrition and nutrient deficiencies.

Martin P. R. Tenniswood, tumor biology, apoptosis in hormone-dependent cancers.

Kevin T. Vaughan, dynactin complex, dynein-mediated organelle transport.

JoEllen J. Welsh, breast cancer, apoptotic mechanisms.

*Chemistry and Biochemistry*

Brian M. Baker, biophysical chemistry of macromolecular interactions, receptor-ligand interactions in immunity.

Subhash C. Basu, regulation of glycosyltransferases during development, DNA polymerase-associated lectin in eukaryotic DNA replication.

Francis J. Castellino, in vivo and in vitro structure-function relationships of blood coagulation and fibrinolysis proteins.

Patricia L. Clark, protein folding in cellular environments, ribosomal interactions with polypeptide chain conformations.

Holly V. Goodson, dynamics of microtubule assembly, regulation of cytoskeletal structure.

Paul Helquist, design, synthesis, and mechanism of antibiotics and anticancer agents.

Paul W. Huber, RNA-protein interactions, RNA localization, regulation of transcription.

Marvin J. Miller, synthetic and bioorganic chemistry, microbial iron transport agents, amino acids, peptides and  $\beta$ -lactam antibiotics.

Thomas L. Nowak, mechanisms of enzyme activation and catalysis, carbohydrate metabolism, biochemical applications of NMR spectroscopy.

Anthony S. Serianni, biomolecular structure determination via isotope-edited NMR methods.

Bradley D. Smith, biomimetic chemistry, biomembrane fusion, phospholipid flip-flop, antimicrobial agents.

Olaf G. Wiest, physical and computational organic chemistry protein-ligand interactions, rational drug design.

*Further Information*

For additional information about the Molecular Biosciences Program, write one of the codirectors, Dr. David R. Hyde or Dr. Paul W. Huber, at the addresses given above.

For information specific to the departments involved in the Molecular Biosciences Program, please write the corresponding graduate director:

*Biological Sciences:*

Dr. Gary Lamberti  
Director, Graduate Studies  
Dept. of Biological Sciences  
University of Notre Dame  
Notre Dame, IN 46556  
Telephone: (574) 631-6552  
E-mail: biosadm@nd.edu

**Chemistry and Biochemistry:**

Dr. Richard Taylor  
 Director, Graduate Studies  
 Dept. of Chemistry and Biochemistry  
 University of Notre Dame  
 Notre Dame, IN 46556  
 Telephone: (574) 631-5759/6705  
 E-mail: taylor.61@nd.edu

**M.D./Ph.D. Joint Degree Program***Acting Director:*

John F. O'Malley

Telephone: (574) 631-5574  
 Fax: (574) 631-7821  
 Location: B-22 Haggard Hall  
 E-mail: scbme.1@nd.edu  
 Web: <http://galen.sbcme.nd.edu>

**The Program of Studies**

The University of Notre Dame and Indiana University School of Medicine offer a joint M.D./Ph.D. degree for exceptional students interested in academic medicine. This unusual partnership between a private Catholic university and a state-supported medical school was formed in 1995. The program draws on the strengths of the medical faculty and the research excellence of the graduate program faculty to train scientists who can bridge the gap between clinical medicine and basic life sciences.

The South Bend Center for Medical Education (Indiana University School of Medicine) has announced plans to build a new medical education facility that will also house the Notre Dame Transgene Center.

**General Requirements**

To earn the joint degree, students will complete the first two years of medical school at the South Bend Center for Medical Education (SBCME), located on the Notre Dame campus, and continue at Notre Dame for three more years to pursue the University's doctoral degree through the Graduate School. The last two years of medical school then will be completed at the Indiana University School of Medicine's main campus in Indianapolis.

Program descriptions and requirements, as well as course and faculty listings for all of Notre Dame's doctoral programs, may be found elsewhere in this *Bulletin*. Students in the M.D./Ph.D. program may pursue the

doctoral degree in any of these disciplines. Course and faculty listings specific to the medical training may be found below.

**Admission**

Admission to the program requires separate applications to the Notre Dame Graduate School and the Indiana University School of Medicine. The Graduate School will accept MCAT scores in place of the GRE scores required of all applicants. The parallel applications will be coordinated and tracked by the South Bend Center for Medical Education, which serves as the central office for the combined degree program. Representatives from Notre Dame and the I.U. School of Medicine monitor and oversee the program.

Application to the joint degree program will not jeopardize a student's application to either the Graduate School or the School of Medicine. The student may be admitted to either school independently. Students admitted into the joint degree program will receive both tuition and stipend assistance.

For information and application materials, interested students should contact the South Bend Center for Medical Education.

**Course Descriptions**

The following courses are central to center programs. Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

**SBCM 501. Gross Anatomy**  
(3-9-8) O'Malley

An intensive study of the gross structure of the human body, accomplished through maximum student participation in the dissection of the human cadaver together with formal lectures and assigned readings.

**SBCM 503. Neuroscience**  
(3.5-3.5-5) Kingsley

An integrated course that canvasses the biophysics, biochemistry, anatomy, physiology, and pathology of the human nervous system and its vasculature.

**SBCM 504. Human Physiology**  
(3-3.5-8) Olson

The study of the physiology of the cardiovascular, respiratory, renal, endocrine, and gastrointestinal systems. Emphasis is placed on medical aspects of human physiology. Student participation laboratories are used to demonstrate classic physiologic principles and current bioanalytic techniques.

**SBCM 505. Histology/Embryology**  
(2.5-3.5-5) Hamlett

The study of microscopic anatomy of normal human tissues. Light microscopy receives the major emphasis, but electron microscopic structure is included in areas of special interest. Two lecture hours per week are devoted to the fundamentals of embryology.

**SBCM 512. Introduction to Clinical Medicine I: Behavioral Science**  
(2-0-2) Macri

This course focuses on the emotional, intellectual, and social development of the human being. Every attempt is made to help medical students understand their own personalities and to begin the process of using themselves as therapeutic agents.

**SBCM 556. Medical Microbiology**  
(3.5-5-7) Staff

A diversity of microbiology and related subtopics are studied within this course, including immunology, virology, bacteriology, parasitology, mycology, and aspects of infectious disease. While primary emphasis is on the biology and pathogenic mechanisms of individual organisms, microbe relationships are discussed extensively throughout the course.

**SBCM 600. Introduction to Clinical Medicine I: The Patient-Doctor Relationship**  
(2-0-2) Magneson, staff

A multidepartmental interdisciplinary course designed to introduce students to medical ethics, history taking, and the patient-doctor relationship through interactions with faculty and patients in a variety of settings. In small groups facilitated by primary care and behavioral science faculty, students direct their learning toward the complexity of the context from which a patient seeks medical care. In order to achieve this, students examine normal human behavior and development throughout the life cycle. Issues addressed include preventive health care, sexuality, cultural diversity, minority health issues, religion and spirituality, family dynamics, the economics of health care, and death and dying.

*SBCM 605. Medical Genetics*

(2-0-2) McKee

A survey course of lectures and discussions dealing with the mechanisms and patterns of inheritance. Emphasis on human genetic disorders. Students may also participate in the Memorial Hospital Regional Genetic Counseling Clinic, where they will be introduced to genetic diagnosis, management, and counseling of patients with genetic diseases.

*SBCM 651. Introduction to Medicine—II*

(19-0-19) Magnuson, team

A multidepartmental multidisciplinary course designed to introduce clinical medicine. Includes medical history taking and physical examination skills learned at the bedside with direct patient contact. Clinical medicine is surveyed concurrently with emphasis on pathophysiology and diagnosis. Problem-solving skills are stressed, including synthesis and interpretation of medical data.

*SBCM 652. Biostatistics*

(1-0-1) Christ

Biostatistics for medical students.

*SBCM 653. General Pathology*

(3-1-4) Prahlow

The study of diseases that affect human tissues. Emphasis is placed on the principles of inflammation, necrosis, repair, growth disturbances, and hemodynamic and metabolic disorders. Students participate in laboratory exercises, which are constructed for problem case analysis.

*SBCM 654. Pharmacology*

(5-2-7) Christ

A systematic study of the mechanism of action, disposition, and fate of drugs in living systems with emphasis on drugs of medical importance.

*SBCM 654. Systemic Pathology*

(8-0-8) Prahlow

The study of disease and its relationship to structural and functional abnormalities of specific organ systems. Emphasis is placed on both pathologic anatomy and clinical manifestations of disease.

*CHEM 667M. Biological Chemistry*

(5-0-5) McKee

The lecture sequence provides an analysis of current biochemical topics and an introduction to those areas of biochemistry that are especially relevant in medicine. Emphasis is placed on metabolic pathways, endocrine control, and related clinical problems.

Additional programs in biomedically related sciences appear elsewhere in the *Bulletin* in the Department of Biological Sciences (parasitology, vector biology, virology, bacteriology, and chemistry and biochemistry).

*Faculty*

Daryl D. Christ, *Associate Professor of Pharmacology and Adjunct Associate Professor (biological sciences)*. B.S., Univ. of Iowa, 1964; Ph.D., Loyola Univ. of Chicago, 1969. (1987)

William C. Hamlett, *Adjunct Professor (biological sciences)*. B.S., Univ. of South Carolina, 1970; M.S., *ibid.*, 1973; Ph.D. Clemson Univ., 1983. (1991)

Robert E. Kingsley, *Adjunct Associate Professor (biological sciences)*. B.A., Univ. of Michigan, 1965; Ph.D., Indiana Univ., 1971. (1974)

Edward E. McKee, *Adjunct Associate Professor (chemistry and biochemistry)*. B.S., Pennsylvania State Univ., 1972; Ph.D., *ibid.*, 1977. (1991)

Kenneth R. Olson, *Adjunct Professor (biological sciences) and Concurrent Professor of Chemical and Biomolecular Engineering*. B.S., Univ. of Wisconsin, LaCrosse, 1969; M.S., Michigan State Univ., 1970; Ph.D., *ibid.*, 1972. (1975)

John F. O'Malley, *Adjunct Associate Professor (biological sciences)*. B.S., Holy Cross College, 1952; M.S., Worcester State, 1957; Ph.D., Creighton Univ., 1971. (1971)

Joseph A. Prahlow, *Adjunct Associate Professor (clinical) (biological sciences)*. B.S., Valparaiso Univ., 1986; M.D., Indiana Univ. School of Medicine 1990. (2000)

# The Division of Social Sciences

The Division of Social Sciences offers programs of graduate study leading to the Ph.D. in economics, political science, psychology, and sociology. Programs leading to the master of arts degree are also available, including an interdisciplinary master's degree in peace studies, as well as a master of education degree.

The division seeks to professionally develop graduate students by providing them with a thorough analysis of current theoretical developments in the various disciplines, training in modern research techniques, personal contact with faculty and their research efforts, and a program tailored to the students' individual professional needs and interests.

Centers and institutes provide a framework for multidisciplinary approaches to issues in the social sciences. The Helen Kellogg Institute for International Studies promotes comparative international research on themes relevant to contemporary society. Building on a core interest in Latin America, the Kellogg Institute fosters research on many regions of the world, attempting to expand understanding of democracy, development, social justice, and other important international goals challenging humankind. The Joan B. Kroc Institute for International Peace Studies is a leader in addressing political, cultural, religious, social, and economic factors that lay the foundation for peace. Descriptions of these and other research centers may be found elsewhere in this bulletin.

The Laboratory for Social Research facilitates the use of social science research methodology and trains faculty, graduate students, and others within the University in the proper use of social science research techniques. It also facilitates the task of social science research for those involved in it, while educating users and enabling them to be self-reliant and independent in social science techniques and technology.

## Economics

### *Chair:*

Richard A. Jensen

### *Director of Graduate Studies:*

Kali P. Rath

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The University of Notre Dame has recently approved a restructuring of its Economics Department. As a result, changes are being introduced in both the organization of the faculty and the structure and content of its master's and doctoral programs. The restructured graduate program will be located in the newly created Department of Economics and Econometrics. During the transition period, no new students will be admitted; for the fall of 2004 there will be no new entering class. As the transition is completed, information will be made available on the departmental website.

### *The Program of Studies*

The goal of the Department of Economics is to graduate students who have the expertise to assist in the solution of the economic problems facing humanity. Graduates in

economics from the University of Notre Dame will be distinctive for their combination of technical competence, familiarity with alternative approaches, and concern for values in economics.

The program in economics, designed to fulfill the above goals, rests on the following principal elements:

1. A solid foundation in micro- and macroeconomic theory, statistics and econometrics, political economy, history of economic thought, and methodology.
2. Training in the analysis of the creation and distribution of wealth, the causes of poverty and inequality, and the formulation of policies to alleviate poverty and promote the development of urban centers, backward regions, and underdeveloped countries.
3. Full use of the variety of methodologies, including neoclassical, post-Keynesian, neo-Marxian, and institutionalist, available for the study of economic relations and events.

The graduate doctoral program consists of four major elements: (1) graduate core courses required of all Ph.D. students, (2) field and other elective courses, (3) work-

shops, and (4) dissertation work. In addition to the core courses, doctoral students take a minimum of nine other courses, including three courses in a field of specialization. The graduate economics program offers three fields of specialization: development and international economics; economic theory, history of economic thought, and methodology; and institutions (such as labor, financial, industrial, and public institutions). Students are alternatively allowed to tailor their own field clusters. Each of the field clusters offers a unique approach to the field that distinguishes the Notre Dame program from others. It is expected that after completing the course work, students will do their advanced study and research in one of the fields where Notre Dame and the faculty excel.

### *Doctor of Philosophy*

The requirements for the Ph.D. are a minimum of 16 graduate courses, including seven core courses and a three-course field cluster requirement; successful completion of comprehensive examinations in macroeconomic theory, microeconomic theory, and political economy; a written dissertation; and fulfillment of University requirements with respect to grade point average and residency. The typical doctoral program takes four years, although it can be accomplished in less time, especially if the student has had some

previous graduate work. Normally, students complete their course work within two years, write their comprehensive examinations at the end of the first year, participate in workshops, and in the third year develop and present a dissertation proposal. After a director and three readers have agreed to serve on the student's dissertation committee, the student carries out the proposed research with their advice and guidance.

#### *Master of Arts*

Both a research and a nonresearch M.A. degree are available. The basic requirements for each are Economics 500, 501, 502, 508, and 591, a total of 30 credit hours, and successful completion of the M.A. comprehensive examinations covering macroeconomic theory, microeconomic theory, and political economy. For the research M.A., a thesis (which counts six credits toward a 30-credit-hour total) is required. The non-research M.A. entails 30 credit hours of regular course work, but no thesis requirement.

#### *Special Features*

The economics program is flexible enough to accommodate the needs and background of the individual student so that courses in a number of other areas can be added easily and logically.

In addition to regular seminars and workshops, the economics department sponsors lectures, seminars, round table discussions, and conferences with guest economists from around the world.

Other features of the program include a high faculty-student ratio, Macintosh computers, IBM PCs, and computer terminals throughout the campus area, and opportunities to utilize the services of the Laboratory for Social Research.

#### *Course Descriptions*

Each course listing includes:

- Course Number
- Title
- (Lecture hours per week–laboratory or tutorial hours per week–credits per semester)
- Instructor
- Course Description

#### *I. Required Graduate Courses*

##### *500. Mathematics for Economists*

(3-0-3) Jensen, Lee, Mukhopadhyay

*Prerequisite:* ECON 301, ECON 302, or equivalents, or permission of instructor. Mathematical methods used in economic

theory and analysis. Major topics include differential and integral calculus and matrix algebra.

##### *501. Macroeconomic Theory I*

(3-0-3) Dutt, Mark, Ros

*Prerequisite:* ECON 302 or equivalent.

An overview of alternative static macro models (such as Keynesian, monetarist, new classical, new Keynesian, and post-Keynesian models); microeconomic foundations of macroeconomics; an introduction to business cycles, growth, and open economy issues.

##### *502. Microeconomic Theory I*

(3-0-3) Jensen, Rakowski

*Prerequisite:* ECON 301 or equivalent.

Mathematical presentation of neoclassical models of consumer behavior, behavior of the firm, and analysis of markets under perfect and imperfect competition. Analysis of market failures, choice under uncertainty, and the economics of information.

##### *506. History of Economic Thought and Methodology*

(3-0-3) Mirowski, Sent

Introduction to the history of economic thought and methodological issues in economics. Survey of preclassical, classical, Marxian, marginalist, and other approaches. Issues in the philosophy of science concerning explanation, verification, and prediction.

##### *508. Political Economy*

(3-0-3) Ruccio, Wolfson

Alternative approaches to political economy, including classical, Marxian (both classical and contemporary), post-Keynesian, institutional, feminist, and neoclassical approaches. Methods of analysis in these approaches are illustrated by examining the basic concepts of political economy such as class, state, gender, race, power, institutions, crisis, and development as well as concrete historical and contemporary issues.

##### *591. Statistics*

(3-0-3) Lee, Marsh

Exposition of statistical techniques with applications in development, labor theory, and public policy economics. Testing hypotheses in economic theory and estimating behavioral relationships in economics.

##### *592. Econometrics I*

(3-0-3) Lee, Marsh

*Prerequisite:* ECON 591, ECON 303, or equivalent statistics course.

Properties of estimators, methods of estimation, general linear regression model,

maximum likelihood estimation, nonlinear regression models, Karnaugh maps, hypotheses testing with likelihood ratio, Wald, Rao tests, ANOVA, and spline regression methods.

##### *603. Macroeconomic Theory II*

(3-0-3) Dutt, Mark, Ros

*Prerequisite:* ECON 501 or equivalent.

Analysis of recent contributions and controversies in macroeconomic theory emphasizing alternative approaches such as new classical, new Keynesian, and post-Keynesian approaches. Macroeconomic dynamics involving the analysis of growth distribution and cycles.

##### *604. Microeconomic Theory II*

(3-0-3) Jensen, Rath

*Prerequisite:* ECON 502 or equivalent.

General equilibrium analysis, welfare economics, and game theory. Issues in applied microeconomics. Discussion of alternative approaches to microeconomics.

#### *II. Elective Graduate Courses*

##### *513. The Computer as Social Phenomenon*

(3-0-3) Mirowski

This course takes the perspective of "science studies" and applies it to issues that do not fit easily into either computer science or economics. These include: Does the computer have a well-defined existence? How has the computer influenced our theories of human nature? Is the "new information economy" a real phenomenon? It also deals with some emerging issues in Internet commerce.

##### *515. Economic Methodology*

(3-0-3) Mirowski, Ruccio, Sent

Philosophy of science issues of explanation, verification, and prediction are used to critique neoclassical, Keynesian, Marxian, and other heterodox economic theories.

##### *516. Problems in Political Economy*

(3-0-3) Dutt, Ruccio, Wolfson

Alternative theories (institutionalist, Marxist, and post-Keynesian) and their application to researchable problems. Major emphasis on preparation for writing a dissertation using an alternative methodology.

##### *517. Growth and Distribution Theory*

(3-0-3) Dutt, Mark

Alternative theories of growth, income distribution, and prices from a theoretical point of view. It first considers simple macroeconomic theories of growth and income distribution. It then systematically examines money and inflation, technological change, sector issues,

government activity, and open economy issues in terms of the alternative theoretical approaches. Students will be required to write a paper.

*521. Monetary Economics*

(3-0-3) Bonello, Wolfson

Major theoretical and empirical studies on the demand for and the supply of money, the impact of money in alternative macroeconomic models, and major topics in monetary policy.

*522. Financial Institutions, Markets, and Instability*

(3-0-3) Wolfson

An examination of the workings of the financial system. Topics include financial crises and the business cycle, institutional and structural change affecting financial markets and institutions, the global financial system, financial fragility, regulatory policy and financial restructuring, the political economy of central banking, and money and credit in the economy.

*531. Theory of Public Finance*

(3-0-3) Betson, Sullivan

The effects of public expenditure and taxation policies on resource allocation and income distribution.

*541. Labor Institutions*

(3-0-3) Ghilarducci

Wage and benefit determination under collective bargaining and the decline of union bargaining power, and labor market segmentation including dual labor market analysis and the labor process debate.

*542. Labor Economic Theory*

(3-0-3) Ghilarducci, Sullivan

Three paradigms in labor economic theory: neoclassical, radical, and institutional. Theories of time use, household formation, women's employment, wage determination, efficiency wages, labor market dynamics, and unemployment are among the areas covered.

*561. Development Economics*

(3-0-3) Dutt, Ros, Ruccio

A general introduction to the field of development economics, with concentration initially on questions of a macrostrategic nature. The final topic is macroanalysis of country development programs, examining country studies, and macro models.

*562. Research Methods and Policies of Development*

(3-0-3) Kim

Research and planning methods applicable to development problems including project appraisal and computable development modeling. Case studies in Third World development.

*564. International Finance*

(3-0-3) Kim, Lee, Mark

Empirically based examination of exchange-rate and balance-of-payments issues and the debt problem.

*565. International Political Economy*

(3-0-3) Mosley

This seminar explores the interaction between politics and economics in the international system, with an emphasis on the theoretical development of the subfield of international political economy. We will investigate the balance between cooperation and conflict, the effect of international institutions on economic relations, and the mutual impact of domestic and international politics. Throughout the course, we will consider how well models developed in other fields of political science or economics can be applied to international political economy. We will also attempt to identify the "state of the art" in the study of international political economy.

*571. International Trade*

(3-0-3) Dutt, Kim, Mark

Theoretical models and empirical analysis of international trade and factor movements. Alternative approaches to trade theory, including Heckscher-Ohlin, models of imperfect competition, and nonorthodox approaches. Discussion of welfare issues, commercial policy, and regional integration.

*572. Open Economy Macroeconomics*

(3-0-3) Mark, Ros

Macroeconomic theory and policy in open economies. Balance of payments accounting, basic theory of fiscal and monetary policy under alternative exchange rate regimes, and recent developments in the area of exchange rate economics. Implications of the social issues for current policy issues in the areas of stabilization policies and international borrowing.

*578. Political Economy Postindustrial Societies*

(3-0-3) Messina

This course investigates the nexus between politics and economics in the postindustrial societies. After a brief discussion of the

theoretical principles of economic liberalism, the course focuses on the impact of economic factors and conditions on politics and the political and economic consequences of the organization of the world economy along free market principles. It concludes by scrutinizing the relationship between domestic politics and the project for deeper economic integration in the case of the European Union.

*581. Industrial Organization*

(3-0-3) Jensen

Introduction to the study of industrial structures and their relationship to economic performance. Competing theories of the determinants of structure at the level of individual industries and sectors and the role of structure in the competitiveness of firms in the regional, national, and global economy. Role of competitive forces in relatively unregulated environments and role of regulation and industrial policy in creating successful industries.

*593. Econometrics II*

(3-0-3) Lee, Marsh, Mukhopadhyay

*Prerequisite:* ECON 592.

A survey course in practical, applied econometric techniques. Students learn how to make effective use of such techniques as spline regression, switching regressions, disequilibrium models, robust regression, nonlinear estimation, logit, probit, tobit, censoring, truncation, and event history analysis. Extensive computer applications.

*594. Mathematical Economics*

(3-0-3) Jensen, Marsh, Rath

Linear algebra and the theory of linear programming; applications to the theory of the firm, production, and demand theory. Queuing theory; game theory, dynamic programming; and decision making under uncertainty.

*595. Topics in Applied Econometrics*

(3-0-3) Mukhopadhyay

Applications of econometric techniques to economic problems in the fields of micro, macro, and international economics.

*596. Computing for Social Sciences*

(0-1-1) Mukhopadhyay

A once-a-week lab course familiarizing students with statistical programs useful for social scientists.

*596A. Computing for Social Science Research*  
(0-1-1) Staff

A lab course designed to introduce basic statistical techniques.

*598. Special Studies*

(V-V-V) Staff

*Prerequisites:* written consent of instructor. Independent study under the direction of a faculty member. Course requirements may include substantial writing as determined by the director. They will disenroll a student early for failure to meet course requirements. Students who have been disenrolled or who have failed at the end of the first semester are disqualified for Special Studies in the following term.

**III. Graduate Seminars**

*612. Seminar in Methodology and the History of Economic Thought*

(3-0-3) Mirowski, Ruccio, Sent

Special topics in economic methodology and history of economic thought. Subject matter to vary from year to year.

*614. Game Theory and Applications*

(3-0-3) Jensen, Rath

The objective is to develop the basic concepts of game theory and to apply them to understand strategic interactions in both market and nonmarket environments. Specific topics include subgame perfect equilibrium in repeated games, folk theorems, stick and carrot strategies, bargaining, incentive and mechanism design, signaling games, and strategic voting.

*619. Seminar in Economic Theory*

(3-0-3) Dutt, Jensen, Rath

Special topics in economic theory. Subject matter to vary from year to year.

*633. Seminar in Public Sector Economics*

(3-0-3) Betson, Sullivan, Warlick

Special topics in public sector economics. Subject matter to vary from year to year.

*643. Seminar in Labor Economics*

(3-0-3) Ghilarducci, Sullivan

Special topics in labor economics. Subject matter to vary from year to year.

*663. Seminar in Development Economics*

(3-0-3) Dutt, Kim, Ros, Ruccio

Special topics in development economics. Subject matter to vary from year to year.

*673. Seminar in International Economics*

(3-0-3) Dutt, Kim, Mark, Ros

Special topics in international trade and open economy macroeconomics. Subject matter to vary from year to year.

**IV. Workshops**

*615, 616. Workshops in Economic Theory, History of Economic Thought and Methodology*

(1-0-1) (1-0-1) Staff

A forum for students to present their current research in economic theory, history of economic thought, and methodology, and to discuss various papers and research of interest to the participants.

*645, 646. Workshops in Institutions*

(1-0-1) (1-0-1) Staff

A forum for students to present their current research in institutional economics (concerning labor, financial, industrial, and public institutions) and to discuss various papers and research of interest to the participants.

*665, 666. Workshops in Development and International Economics*

(1-0-1) (1-0-1) Staff

A forum for students to present their current research in development and international economics and to discuss various papers and research of interest to the participants.

*675. Dissertation Workshop*

(V-V-V) Staff

This workshop involves one or more faculty discussing with students at the early stages of their research how to select a dissertation topic and to begin their research. The discussion is supplemented by students at an advanced stage of research, who highlight the main points in their project and share their experience in researching and writing dissertations.

**V. Other Graduate Courses**

*599. Thesis Direction*

(V-V-V) Staff

This course is taken by a student wishing to earn a research master's degree. The student works under the guidance of one or more faculty member to produce a master's thesis.

*695. Special Topics*

(3-0-3) Staff

By arrangement with individual instructors. Regular letter grading with fixed 3.0 credit hours only.

*697. Directed Readings*

(V-V-V) Staff

By arrangement with individual instructors. Satisfactory/unsatisfactory grading with variable number of credit hours.

*699. Research and Dissertation*

(V-V-V) Staff

Research and dissertation for resident doctoral students.

*700. Nonresident Dissertation Research*

(0-0-1) Staff

Required of nonresident graduate students who are completing their dissertations in absentia and who wish to retain their degree status.

*701. Graduate Seminar*

(V-V-V) Staff

The objectives of the seminar are to acquaint future economics teachers with the growing literature in economics education; with the essential elements of educational theory that are applicable to economic instruction; and with the opportunity to improve their teaching technique.

*702. Graduate Practicum*

(V-V-V) Staff

This course is designed to provide practical teaching advice and experiences for those graduate students who plan to teach at the university level, either after they complete their degree or as a teaching assistant here at the University. The issues covered in this course include: establishing explicit teaching objectives, preparing a course syllabus, teaching in various classroom settings—small lecture courses to large or even jumbo-sized lecture courses, seminars, reading courses, and independent research/study—adjusting to special student needs, assessing student learning, gender/ethnic concerns, using educational technologies, out-of-classroom student contact, and balancing research and teaching demands.

Each class participant will be expected to develop a course syllabus, prepare some student assessment instruments, draft lecture material, and conduct a minimum of three live lecture/discussions that will be videotaped and evaluated. The video taped sessions will be the centerpiece of this seminar. There will be no text, but each participant will be expected to purchase at least three high-quality videotapes. (Educational Media of the Office of Information Technology will determine the tape specifications.) These tapes will remain the property of the seminar participant.

All graduate students who currently serve as teaching assistants, or plan to serve as teaching assistants in the near future, are expected to enroll in this seminar one time.

### VI. Upper-Level Undergraduate Courses and Graduate Courses in Other Departments

In addition to the regular graduate courses listed above, certain undergraduate economics courses are available to graduate students. Up to 10 such credit hours may be counted for the M.A. or for the Ph.D. These are courses at the 400 level and require the permission of the student's adviser and the director of graduate studies to qualify for graduate credit. Similar approval is needed for graduate-level courses offered by other departments.

### Faculty

Rev. Ernest J. Bartell, C.S.C., *Professor Emeritus*. Ph.B., Univ. of Notre Dame, 1953; A.M., Univ. of Chicago, 1954; M.A., Holy Cross College, 1961; Ph.D., Princeton Univ., 1966. (1961, 1966, 1980)

David M. Betson, *Associate Professor*. B.A., Kalamazoo College, 1972; M.A., Univ. of Wisconsin, 1975; Ph.D., *ibid.*, 1980. (1982)

Frank J. Bonello, *Associate Professor*. B.S., Univ. of Detroit, 1961; M.A., *ibid.*, 1963; Ph.D., Michigan State Univ., 1968. (1968)

Charles Craypo, *Professor Emeritus*. B.A., Michigan State Univ., 1959; M.A., *ibid.*, 1961; Ph.D., *ibid.*, 1966. (1978)

John T. Croteau, *Professor Emeritus*. A.B., Holy Cross College, 1931; M.A., Clark Univ., 1932; Ph.D., *ibid.*, 1935; LL.D., St. Joseph's Univ., Canada, 1956; Honorary LL.D., Univ. of Prince Edward Island, 1976. (1953)

Amitava K. Dutt, *Professor*. B.A., Univ. of Calcutta, 1975; M.A., *ibid.*, 1977; Ph.D., Massachusetts Institute of Technology, 1983. (1988)

Teresa Ghilarducci, *Director of the Higgins Labor Research Center, Associate Professor, Fellow in the Nanovic Institute for European Studies, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. A.B., Univ. of California, Berkeley, 1978; Ph.D., *ibid.*, 1984. (1983)

Denis A. Goulet, *the William and Dorothy O'Neill Professor in Education for Justice, Professor Emeritus of Economics, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., St. Paul's College, 1954; M.A., *ibid.*, 1956; Ph.D., Univ. of São Paulo, 1963. (1979)

Richard A. Jensen, *Chair and Professor, and Fellow in the Helen Kellogg Institute for International Studies*. B.A., Univ. of Kansas, 1971; Ph.D., Northwestern Univ., 1980. (2000)

Kwan Suk Kim, *Professor*. B.A., Seoul National Univ., 1959; M.A., Univ. of Minnesota, 1961; Ph.D., *ibid.*, 1967. (1967)

William H. Leahy, *Professor*. B.A., Univ. of Notre Dame, 1959; M.A., *ibid.*, 1960; Ph.D., *ibid.*, 1966. (1963)

Byung-Joo Lee, *Associate Professor*. B.S., Seoul National Univ., 1982; M.A., Pennsylvania State Univ., 1984; M.S., Univ. of Wisconsin, 1986; Ph.D., *ibid.*, 1988. (1996)

Nelson C. Mark, *the DeCrane Professor of International Studies and Fellow in the Helen Kellogg Institute for International Studies*. B.A., Univ. of California at Santa Barbara, 1978; Ph.D., Univ. of Chicago, 1983. (2002)

Lawrence C. Marsh, *Associate Professor*. B.A., College of Wooster, 1967; M.A., Michigan State Univ., 1969; Ph.D., *ibid.*, 1976. (1975)

Philip E. Mirowski, *the Carl E. Koch Professor of Economics*. B.A., Michigan State, 1973; M.A., Univ. of Michigan, 1976; Ph.D., *ibid.*, 1979. (1990)

Kajal Mukhopadhyay, *Research Assistant Professor and Associate Director in the Laboratory for Social Research and Concurrent Research Assistant Professor of Economics*. B.A., Indian Statistical Institute, 1987; Ph.D., Indiana Univ., Bloomington, 1996. (1996)

James J. Rakowski, *Associate Professor*. B.A., Creighton Univ., 1963; Ph.D., Univ. of Minnesota, 1968. (1967)

Kali P. Rath, *Director of Graduate Studies and Associate Professor*. B.A., Utkal Univ., 1977; M.A., *ibid.*, 1980; M.A., Johns Hopkins Univ., 1988; Ph.D., *ibid.*, 1992. (1990)

Jaime Ros, *Professor*. B.A., Univ. of Paris XII, 1971; M.A., National Univ. of Mexico (UNAM), 1974; Diploma in Econ., Cambridge Univ., 1978. (1990)

David F. Ruccio, *Associate Professor*. B.A., Bowdoin College, 1976; Ph.D., Univ. of Massachusetts at Amherst, 1984. (1982)

Esther-Mirjam Sent, *Associate Professor*. Doctorandus, Univ. of Amsterdam, 1989; Ph.D., Stanford Univ., 1994. (1994)

Roger B. Skurski, *Professor*. B.S., Cornell Univ., 1964; M.S., Univ. of Wisconsin, 1967; Ph.D., *ibid.*, 1970. (1968)

James X. Sullivan, *Assistant Professor*. B.A., Univ. of Notre Dame, 1993; Ph.D., Northwestern Univ., 2002. (2002)

Thomas R. Swartz, *Professor*. B.A., LaSalle College, 1960; M.A., Ohio Univ., 1962; Ph.D., Indiana Univ., 1965. (1965)

Jennifer L. Warlick, *Associate Professor*. B.A., Duke Univ., 1972; M.A., Univ. of Wisconsin, 1975; Ph.D., *ibid.*, 1979. (1982)

Charles K. Wilber, *Professor Emeritus*. B.A., Univ. of Portland, 1957; M.S., *ibid.*, 1960; Ph.D., Univ. of Maryland, 1966. (1975)

Martin H. Wolfson, *Associate Professor*. B.A., Swarthmore, 1966; M.A., American Univ., 1975; Ph. D., *ibid.*, 1984. (1989)

### Education

#### Director:

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#### The Program of Studies

The master of education (M.Ed.) program is housed in the Institute for Educational Initiatives, which provides research leadership in education and fosters efforts in education that are informed by social science research. The only clients for this master's program are students enrolled in the Alliance for Catholic Education. (The ACE program is described in the "Centers, Institutes, and Laboratories" section of this *Bulletin*.)

Students in this program work toward licensure, consistent with the standards in the state of Indiana, in each of the following areas: middle childhood (i.e., elementary education), early adolescence (middle school), adolescence and young adulthood (high school), English language arts, social studies, science, mathematics, and foreign languages. Like most teacher accreditation programs at the master's level, content-area courses must be completed before entering the master's program, which provides education course work only.

A total of 37 (39 for elementary) credit hours of course work and teaching experience are required, with an overall grade point of at least 3.0. Half of the course work will occur



in two summer sessions, with 10 to 12 credits earned in each. The faculty who teach in the M.Ed. program are drawn from a variety of disciplines and colleges within and, in some cases, from outside the University.

The first summer includes practice teaching in South Bend-area elementary and secondary schools as well as nine or 10 credit hours of course work. During each semester of the first school year, students take three credits of supervised teaching experience at an assigned Catholic school in the southern United States and during the second semester, students take two credits of a distance learning seminar. In the second summer, students again take 10 or 11 credit hours of course work. During the second school year, students each semester once again participate in a three-credit supervised teaching experience in their assigned school and in a one-credit distance learning seminar that focuses on state standards and assessment methods. Throughout the two years, supervision is accomplished by measuring students against professional performance indicators while students build a teaching portfolio documenting their progress in developing as a teacher.

In addition to the credit-hour and GPA requirements, students must complete two years of service in teaching with supervised teaching grades of not less than 3.0. The teaching portfolio is evaluated by both University faculty and master teachers, who provide recommendations for continued development.

During the summer sessions, students live in community in Notre Dame residence halls, participating in presentations and programs aimed at stimulating their academic understanding of education, especially as it relates to community and spiritual development.

#### **Admission Requirements**

The M.Ed. program seeks to admit individuals who have the competence and commitment to be outstanding teachers and who are willing to serve for two years as teachers in cooperating Catholic schools. Competence for admission is assessed through evaluation of written essays, interviews, grade point average (at least a 3.0 in the major), standardized test scores, and letters of recommendation. Commitment to the community and spiritual ideals of the program is necessary.

Admission is a two-stage process. A selection committee composed of Notre Dame faculty, administrators, and staff assesses the candidates, identifying approximately 80 who will be asked to join the program. These 80 students will then be invited to apply to the Graduate School for admission. From this point on, the admissions process is identical to that of every other master's program at the University.

#### **Course Sequence**

All ACE students are placed in one of three developmental level curricular tracks: elementary, middle school, or high school, depending on their ACE placement. Those in the middle school and high school tracks are then placed in a content area: mathematics, science, social studies, English/language arts, or foreign language. The particular methods and content courses will depend on the developmental level track.

##### 1. First Summer (11/12 credits)

###### **All tracks:**

502. *Introduction to Teaching*

503. *Practicum*

504. *Introduction to Computers in Education*

506. *Teaching in Catholic Schools*

550. *Integrative Seminar*

**Elementary:** 519. *Teaching of Reading/*

*Instructional Planning*; 513. *Language Arts I*;

515. *Mathematics in Elementary Education I*

**Middle school:** 522. *Introduction to Middle School Teaching/Instruction Planning; Seminar in Content Area I: 560, 562, 564, 566, or 568*

**High school:** 521. *Introduction to High School Teaching; Seminar in Content Area I: 560, 562, 564, 566, or 568*

**Elective:** 582. *Liturgical Music*

##### 2. First School Year: all tracks (8 credits)

595. *Supervised Teaching* (two semesters)

597. *Clinical Seminar* (one semester)

543. *Topics in Educational Psychology* (second semester)

**Elective:** 582. *Liturgical Music*

##### 3. Second Summer (10/11 credits)

**Elementary:** 540. *Exceptionality in Childhood*;

544. *Child Development and Moral Education*;

514. *Language Arts II*; 516. *Content Methods*;

550. *Integrative Methods*

**Middle school:** 541. *Exceptionality in Early*

*Adolescence*; 545. *Development and Moral*

*Education in Early Adolescence; Seminar in*

*Content Area II: 570, 572, 574, 576, 578*;

550. *Integrative Methods*

**High school:** 542. *Exceptionality in Adolescence*;

546. *Development and Moral Education in*

*Adolescence; Seminar in Content Area II: 570,*

*572, 574, 576, 578; 550. Integrative Methods*  
**Elective:** 580. *Children's Literature*, 584. *Art across the Curriculum*, 586. *Contemporary Educational Technology*, or 588. *Coaching and Youth*

##### 4. Second School Year: all tracks (8 credits)

595. *Supervised Teaching* (two semesters)

597. *Clinical Seminar* (two semesters)

*Assessment in Content Area II* or 517. *Assessment in Elementary Education*

#### **Course Descriptions**

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

##### 502. *Introduction to Teaching*

(25-0-1) Staff

An introduction to the meaning and practice of contemporary teaching, including classroom organization and management, and to historical highlights in public and Catholic education. Class meets for one week. (First summer)

##### 503. *Practicum*

(1-15-2) Staff

An intense practicum in the South Bend area schools during the summer. The experience will include approximately 5-6 weeks of closely supervised teaching experience as well as weekly reflections on that experience. Extensive planning of instruction is required. Meets for six weeks. (First summer)

##### 504. *Introduction to Computers in Education*

(10-0-1) Staff

Introduction to instructional computing via hands-on experience with productivity/instructional software. Introduction to social, moral and technological issues of educational computing through literature, lecture, and discussions. Class meets for two weeks. (First summer)

##### 506. *Teaching in Catholic Schools*

(2-0-1) Staff

An overview of six core topics of Catholic teaching along with a discussion of their influence and impact on Catholic school culture and teaching. Class meets for seven weeks. (First summer)

*507. Teaching Religion in Catholic Schools*  
(2-0-1) Staff

An overview of six core topics of Catholic teaching along with initial planning with grade level master teachers to teach these topics in Catholic schools. Class meets for seven weeks. (First summer)

*513. Language Arts in Elementary Education I*  
(10-0-1) Staff

The effective use of teaching materials and strategies in the elementary classroom (K-6) for the teaching of writing, speaking, listening, and spelling, their scope and sequence in relation to grade level standards, and the integration of these language arts skills with other subjects in the elementary curriculum. Readings will be selected from the International Reading Association and the National Council of Teachers of English. Class meets for three weeks. (First summer)

*514. Language Arts in Elementary Education II*  
(12.5-0-2) Staff

The development of a literature-based, thematic unit which will integrate the language arts skills and the curriculum content areas for their particular grade level along with the theories for and practice in constructing traditional and performance assessments. Readings will be selected from the International Reading Association and the National Council of Teachers of English. Class meets for three weeks. (Second summer)

*515. Mathematics in Elementary Education I*  
(10-0-2) Staff

The effective use of teaching materials and strategies in the elementary classroom (K-6) for the teaching of mathematics. Readings will be selected from the National Council of Teachers of Mathematics. Class meets for three and a half weeks. (First summer)

*516. Content Methods for Elementary Education*

(10-0-2) Staff

A program of reading which will enable participants to develop effective units of study which integrate reading, writing, mathematics, social studies and science. Readings will be selected from the publications of the major professional associations in elementary curriculum. Class meets for three and a half weeks. (Second summer)

*517. Assessment in Elementary Education*  
(V-V-2) Staff

Readings on the theories for and practice in the strategies to construct traditional and performance assessments in Elementary

Education. The ability to analyze the results in terms of stated unit goals, to reflect on the effectiveness of the unit planning, and to adjust future units to reteach core knowledge and skills will be emphasized. (Second year Internet course)

*519. Teaching of Reading/Instructional Planning*

(10-0-3) Staff

An exploration of the research and instructional strategies of reading instruction including emergent literacy, reading readiness, phonemic awareness, phonics, word recognition, vocabulary development, fluency, cultural literacy, and reading comprehension, as well as particular strategies for reading remediation. The second part of the course will enable students to conceptualize and construct effective unit and lesson plans. Class meets for seven weeks. (First summer)

*521. Introduction to High School Teaching*  
(10-0-3) Staff

An introduction to the culture and dynamics of the high school classroom. Central to the course is instructional planning which emphasizes unit planning based on goals derived from state standards and assessments which measure student progress in meeting these goals. Lesson planning based on unit goals focus on an integrative survey of strategies and methods which lead to effective daily instruction. Class meets for seven weeks. (First summer)

*522. Introduction to Middle School Teaching*  
(13-0-3) Staff

An introduction to the culture and dynamics of the middle school classroom. Central to the course is instructional planning which emphasizes unit planning based on goals derived from state standards and assessments which measure student progress in meeting these goals. Lesson planning based on unit goals focus on an integrative survey of strategies and methods which lead to effective daily instruction. Class meets for four weeks. (First summer)

*540. Exceptionality in Childhood*  
(8-15-3) Staff

A survey in exceptionality with emphasis on the elementary-aged child is followed by in-depth study of the common learning problems in the elementary grades, especially reading, writing and mathematics disability. Both teaching strategies and assessment are considered. Class meets for six weeks, with one week of lab. (Second summer)

*541. Exceptionality in Early Adolescence*  
(8-15-3) Staff

A survey in exceptionality with emphasis on the middle grades child is followed by in-depth study of the common learning problems in the middle school, especially reading, writing and mathematics disability. Both teaching strategies and assessment are considered. Class meets for six weeks, with one week of lab. (Second summer)

*542. Exceptionality in Adolescence*  
(8-15-3) Staff

A survey in exceptionality with emphasis on the high school student is followed by in-depth study of the common learning problems in the high school, especially reading, writing and mathematics disability. Both teaching strategies and assessment are considered. Class meets for six weeks, with one week of lab. (Second summer)

*543. Topics in Educational Psychology*  
(V-V-2) Staff

Readings on topics in Educational Psychology relevant to the experiences of first year teacher. Analytic reflection on the readings and their applications within the local classroom and school setting. (First year, second semester Internet course)

*544. Child Development and Moral Education*  
(10-2-3) Staff

A systematic treatment of the cognitive, social, biological, and personality development relating to education and an examination of the theoretical and research bases of moral development and their implications for the classroom, with an emphasis on childhood. Class meets for five weeks, with one week of lab. (Second summer)

*545. Development and Moral Education in Early Adolescence*

(10-2-3) Staff

A systematic treatment of the cognitive, social, biological, and personality development relating to education and an examination of the theoretical and research bases of moral development and their implications for the classroom, with an emphasis on early adolescence. Class meets for five weeks, with one week of lab. (Second summer)

*546A. Development and Moral Education in Adolescence*

(10-2-3) Staff

A systematic treatment of the cognitive, social, biological, and personality development relating to education and an examination of the theoretical and research bases of moral

development and their implications for the classroom, with an emphasis on adolescence. Class meets for five weeks, with one week of lab. (Second summer)

*546B. Development and Moral Education in Early and Late Adolescence*

(10-2-3) Staff

For those desiring certification at both levels, a systematic treatment of the cognitive, social, biological, and personality development relating to education and an examination of the theoretical and research bases of moral development and their implications for the classroom, with an emphasis on early and late adolescence. Class meets for five weeks, with one week of lab. (Second summer)

*550. Integrative Seminar*

(V-0-1) Staff

An integration of the professional, communal, and spiritual dimensions of the ACE program. Participants engage in active listening as well as interactive and collaborative learning exercises to integrate these pillars of ACE in their professional service to Catholic Schools. Class meets ten hours the first week; two hours for seven weeks thereafter. (First summer)

*550A. Integrative Seminar*

(2-0-1) Staff

An integration of the professional, communal, and spiritual dimensions of the ACE program. Participants engage in active listening as well as interactive and collaborative learning exercises to integrate these pillars of ACE in their professional service to Catholic Schools. Class meets for seven weeks. (Second summer)

*560. English/Language Arts Education I*

(8-0-2) Staff

The development of class experiences, activities and content specific methods for middle and high school classes, based on readings selected from the publications of the National Council of Teachers of English and current research and theory. Class meets for seven weeks. (First summer)

*562. Social Studies Education I*

(8-0-2) Staff

The development of class experiences, activities and content-specific methods for middle and high school classes, based on readings selected from the publications of the National Council for the Social Studies and current research and theory. Class meets for seven weeks. (First summer)

*564. Foreign Language Education I*

(8-0-2) Staff

The development of class experiences, activities and content-specific methods for middle and high school classes, based on readings selected from the publications of the American Council for the Study of Foreign Language and current research and theory. Class meets for seven weeks. (First summer)

*566. Mathematics Education I*

(8-0-2) Staff

The development of class experiences, activities and content-specific methods for middle and high school classes, based on readings selected from the publications of the National Council of Teachers of Mathematics and current research and theory. Class meets for seven weeks. (First summer)

*568. Science Education I*

(8-0-2) Staff

The development of class experiences, activities and content-specific methods for middle and high school classes, based on readings selected from the publications of the National Science Teachers Association and current research and theory. Class meets for seven weeks. (First summer)

*570. English/Language Arts Education II*

(10-0-3) Staff

A review of class experiences, activities and content-specific methods within the context of unit goals and assessments for middle and high school classes, based on readings selected from the publications of the National Council of Teachers of English and current research and theory. Class meets for seven weeks. (Second summer)

*571. English/Language Arts Assessment*

(V-V-2) Staff

Readings on the theories for and practice in the strategies to construct traditional and performance assessments in English/Language Arts. The ability to analyze the results in terms of stated unit goals, to reflect on the effectiveness of the unit planning, and to adjust future units to reteach core knowledge and skills will be emphasized. (Second year Internet course)

*572. Social Studies Education II*

(10-0-3) Staff

A review of class experiences, activities and content specific methods within the context of unit goals and assessments for middle and high school classes, based on readings selected from the publications of the National Council for the Social Studies and current research

and theory. Class meets for seven weeks. (Second summer)

*573. Social Studies Assessment*

(V-V-2) Staff

Readings on the theories for and practice in the strategies to construct traditional and performance assessments in Social Studies. The ability to analyze the results in terms of stated unit goals, to reflect on the effectiveness of the unit planning, and to adjust future units to reteach core knowledge and skills will be emphasized. (Second year Internet course)

*574. Foreign Language Education II*

(10-0-3) Staff

A review of class experiences, activities and content specific methods within the context of unit goals and assessments for middle and high school classes, based on readings selected from the publications of the National Council for the Study of Foreign Language and current research and theory. Class meets for seven weeks. (Second summer)

*575. Foreign Language Assessment*

(V-V-2) Staff

Readings on the theories for and practice in the strategies to construct traditional and performance assessments in Foreign Language. The ability to analyze the results in terms of stated unit goals, to reflect on the effectiveness of the unit planning, and to adjust future units to reteach core knowledge and skills will be emphasized. (Second year Internet course)

*576. Mathematics Education II*

(10-0-3) Staff

A review of class experiences, activities and content specific methods within the context of unit goals and assessments for middle and high school classes, based on readings selected from the publications of the National Council of Teachers of Mathematics and current research and theory. Class meets for seven weeks. (Second summer)

*577. Mathematics Assessment*

(V-V-2) Staff

Readings on the theories for and practice in the strategies to construct traditional and performance assessments in Mathematics. The ability to analyze the results in terms of stated unit goals, to reflect on the effectiveness of the unit planning, and to adjust future units to reteach core knowledge and skills will be emphasized. (Second year Internet course)

*578. Science Education II*

(10-0-3) Staff

A review of class experiences, activities and content specific methods within the context of unit goals and assessments for middle and high school classes, based on readings selected from the publications of the National Science Teachers Association and current research and theory. Class meets for seven weeks. (Second summer)

*579. Science Assessment*

(V-V-2) Staff

Readings on the theories for and practice in the strategies to construct traditional and performance assessments in science. The ability to analyze the results in terms of stated unit goals, to reflect on the effectiveness of the unit planning, and to adjust future units to reteach core knowledge and skills will be emphasized. (Second year Internet course)

*580. Educating in Faith: Catechesis in Catholic Schools*

(15-0-3) Staff

Theoretical and practical dimensions of catechesis within class sessions designed to be highly dialogical and interactive. This course is designed to assist current or prospective teachers of theology at the secondary level in the catechesis of young adults in Catholic schools. Class meets for three weeks. (Second summer elective)

*581. Introduction to Children's Literature*

(8-0-1) Staff

Introduction to the use of children's literature in elementary and middle school classrooms. Class meets for two weeks. (Second summer elective)

*582. Liturgical Music in Catholic Schools*

(2-1-2) Staff

Introduction to folk liturgical music and its appropriate use in K-12 Catholic education. Students' work in the liturgical folk choir during the summer can be used appropriately with respect to sacraments and occasions for celebration in Catholic schools. Credit awarded during the spring semester, with registration required in the previous summer and fall semesters. Summer class meets for seven weeks; Internet-only class during academic year. (First summer, first year Internet elective)

*583. Folk Choir*

(2-1-1) Staff

Work with the folk choir, which continues to build the repertoire for Catholic school use. Class meets for seven weeks. (Second summer elective)

*584. Teaching Art Across the Curriculum*

(8-0-1) Staff

A selection of practical methods and discussion topics to enable teachers to integrate art while teaching such subjects as English, writing, reading, drama, social studies, language arts, math and chemistry at the elementary and high school level. Class meets for two weeks. (Second summer elective)

*586. Contemporary Educational Technology*

(8-0-1) Staff

Integration of computing skills and critical thinking strategies required to use modern technology for enhanced teaching and learning. Class meets for two weeks. (Second summer elective)

*588. Coaching and Youth*

(8-0-1) Staff

Readings and discussion on the social scientific research on coaching strategies that promote the social development of youth through sport; applications of research findings are emphasized. Class meets for two weeks. (Second summer elective)

*593. Clinical Seminar*

(V-V-1) Staff

The course focuses on the development of the teacher as a professional and reflective practitioner. Evidence is accumulated in a portfolio of accomplishments which demonstrates growth vis-a-vis general and content-specific standards. Reflective analysis relative to best practices and current research is documented. (Four semesters Internet)

*595. Supervised Teaching*

(0-30-2) Staff

The course focuses on classroom teaching. It includes the observation of classroom teaching, examination of instructional and planning materials, meetings with the ACE teacher, mentor teacher and building principal, and the collection of field notes and evaluations for formative and summative assessment. (Four semesters)

*596. Capstone Essay*

(V-V-1) Staff

During the two year program, ACE teachers accumulate a portfolio of accomplishments which demonstrates their growth vis-a-vis general and content-specific professional standards. The portfolio provides a basis for reflective analysis of their performance in the classroom relative to the best practices of and latest research in the profession. In a final essay, ACE teachers will summarize and reflect upon their growth in the three pillars of the ACE program. (Final semester)

*598. Special Topics*

(V-V-V) Staff

Topics vary by semester.

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**Peace Studies**
*Director:*

R. Scott Appleby

*Director of Graduate Studies:*

Cynthia K. Mahmood

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The Joan B. Kroc Institute for International Peace Studies offers an interdisciplinary master's degree in peace studies and a field of concentration within doctoral programs in traditional disciplines. Graduate work in peace studies at the institute is highly international in character and designed to equip students with both theoretical understanding and practical skills. The master's program attracts highly qualified students from all continents and major cultural regions of the world, with three-fourths of the students coming from outside the United States. In a highly selective process, the institute accepts 20 students annually in its 11-month master of arts program. The institute particularly seeks students from war-torn areas or regions where violence could erupt, and actively seeks to ensure cultural, religious, and socioeconomic diversity among participants. Peace studies students engage in building community as they share their diverse perspectives on the problems of peace and justice facing the world. The program prepares peace studies students for careers in scholarly research, teaching, public service, religious leadership, political organizing, or social action. Four

major themes characterize the graduate curriculum:

- The role of international norms and institutions in peacemaking: Institute faculty and students search for ways (a) to make intergovernmental organizations and other international institutions more effective and representative and (b) to increase compliance with fundamental norms of peace and human rights.
- The impact of religious, philosophical, and cultural influences on peace: Through teaching and research, the institute explores the ethics of the use of force, the ways in which the world's religious traditions foment violence or encourage peace, the practice of nonviolence, the importance of philosophies of global justice, and the ingredients of cultures of peace.
- The dynamics of intergroup conflict and conflict transformation: Students and faculty enhance multidisciplinary understanding of the conditions that give rise to violent conflicts in order to identify local and international responses able to transform conflicts and encourage peacebuilding. All of the institute's conflict studies incorporate cross-cultural examination of key issues.
- The promotion of social, economic, and environmental justice: Students and faculty interested in social change examine the role of nongovernmental organizations and commercial enterprises, and states, in sustainable economic development, respect for human rights, and conflict transformation.

To earn the M.A. degree, students must demonstrate proficiency in one foreign language, participate in an academic or community-based internship, and successfully complete 30 hours of credit and a comprehensive exam.

Requirements of the program include the following core seminars and courses:

- IIPS 502. Origins of Violence and Cultures of Peace*  
*IIPS 521. War, Human Rights, and Peacebuilding*  
*IIPS 522. International Political Economy and Sustainable Development*  
*IIPS 556. Conflict Transformation and Strategic Peacebuilding*  
*IIPS 557. Effective Peacebuilding*

The group of 50 fellows supporting the institute is drawn from 15 departments in the social sciences and humanities and the schools of law and business at the University of Notre Dame.

#### *Course Descriptions*

The following list includes courses offered on a regular basis. Many, although not all, are offered on an annual basis.

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

#### *502. Origins of Violence and Cultures of Peace* (3-0-3) Mahmood

In this core graduate course we look at peace and violence in the broadest geographic and chronological contexts. We begin with a review of the anthropology literature on human aggression, from evolutionary origins through ethnographic variation. From biology we move on to consider the social and political functions of violence and its ritual and spiritual interpretations across the world's cultures. We look at nonviolent societies and investigate their distinguishing features. Finally, we explore how the cultural contexts of violence and nonviolence intersect with today's global political order and contemporary theories of war and peace. Ethical and methodological questions play a central role in our deliberations throughout the course, with the ultimate aim of bringing our information and understandings to bear on practical action toward peacemaking today. (Every fall)

#### *515E. Images of War and Peace in Literature* (3-0-3) Ruthann Johansen

Using English language novels and poetry of the 20th century, this course will (1) examine the metaphors and themes that unmask the realities of war and disclose the aspirations and struggles for peace, and (2) explore the ways literary works themselves through language, rhythms, and images become battlegrounds on which the human imagination creates an individual's sense of self and constructs and deconstructs cultural ideologies. Literature translated into English from other languages may be the focus of independent research projects within the course. (Every spring)

#### *517. International Migration and Human Rights: Research and Policy* (3-0-3) Bustamante

This seminar focuses on research reports on U.S. immigration from Mexico for a critique of research methods and basic differences in the interpretation of data. A review of the literature is discussed with an emphasis on policymaking on immigration in the United States and Mexico. A comparison is made between the debate on migrants' human rights in various parts of the world. A critique on scientific theories focusing on the relationship between international migrations and human rights is also included. Suggested for first-year graduate students of sociology, political science, and peace studies. (Every spring)

#### *521A. War, Human Rights, and Peacebuilding* (3-0-3) Johansen

This required course examines major global issues and multilateral responses to them in the areas of human rights and war prevention. The course, which emphasizes peace research methods and findings, includes study of the theory and practice of peacebuilding in its broadest sense of nurturing social integration and promoting justice as the work of peace. Discussion of human rights issues will include the Universal Declaration and Covenants; the rights of women and children; efforts to hold individuals accountable to prohibitions of war crimes and crimes against humanity; and questions of identity as they affect sovereignty and compliance with human rights norms. Discussion of war/peace issues will include debates among peace researchers, feminists, and political realists on causes of violence and conditions of peace; arms control and disarmament; intergroup tension reduction; and efforts by international commissions, the United Nations, and nongovernmental organizations to implement humanitarian norms of peace and human rights and gradually replace the rule of force with the rule of law in international relations. (Every fall)

#### *522A. International Political Economy and Sustainable Development* (3-0-3) Staff

This required course focuses on the global economic and environmental problems and the multilateral responses to cope with them. Its vantage point is that economic globalization is a complex phenomenon; it has both positive and negative consequences that vary from one society and social group to another. The course deals, in particular, with the impact of globalization on sustainable development, social equity, labor, health, and environment. It also discusses the political

aspects of globalization that are, among other things, related to the democratic and governance deficits in international relations. Democratic governance of global economic and environmental relations requires the reform of the existing international institutions and the development of new ones. Particularly important are the contributions of non-state actors, especially NGOs, in initiating, implementing, monitoring, and enforcing international rules. This aspect of globalization harks back to the emergence of new, autonomous transnational spaces and networks that become arenas of global civil politics and culture promoting new ethical standards, participation, transparency, and accountability. (Every spring)

*525A. Ethics and International Relations*

(3-0-3) Philpott

The class explores diverse international issues through normative political philosophy and case studies. It is suitable for students of political theory and international relations alike. Topics include the justice of war, the problem of killing innocents, terrorism, nuclear weapons, intervention, human rights and pluralism, distributive justice, the status of borders, globalization and development, and women's rights. These will be explored through competing moral frameworks, including duty based and consequentialist frameworks. (Every spring)

*550. International NGO Management*

(3-0-3) Culbertson

This course will provide an introduction to concepts and skills needed for effective management in nongovernmental organizations working in the international context. In addition to an overview of NGOs and their diverse roles in society, students will critically explore several current issues and trends having an impact on NGOs. These include the changing relationships between public, for-profit, and nonprofit entities; the development of partnerships between local and international NGOs; and emerging patterns of NGO financing. With these issues in the background, discussion will then turn to the challenges facing program managers in NGOs. Class sessions will examine specific strategies and methods for program planning, monitoring and evaluation; fund-raising and grant writing; budgeting and financial management; decision making; and handling personnel issues. The course will give particular attention to the unique role of values (personal and organizational) in the NGO context and their impact on management, as well as issues of management style and organizational culture. (Every spring)

*556A, B. Conflict Transformation and Strategic Peacebuilding*

(2-0-2) Lederach, Mahmood, Hayner

This required course will introduce students to the key concepts related to conflict transformation and peacebuilding theory and practice as an integrated framework. The primary purposes are to familiarize students with approaches to promote constructive and strategic change processes in settings of deep-rooted conflict and provide them with opportunity to integrate the theory with practical aspects of designing and implementing those strategies on the ground. During class time, students will be exposed to case studies, simulations, inductive theory development, and elicitive approaches to conflict intervention. Workshops on professional development will complement academic activities and presentations. (Fall, spring)

*557. Effective Peacebuilding*

(3-0-3) Lopez

This required course is designed to permit critical examination of some of the macro and micro conditions that are needed in order for a political and social system to live in peace. As it is more difficult to establish peace out of a war or warlike set of circumstances, we focus especially on this situation—bringing societies from war and collective violence to peace, especially a sustainable peace. Within these concerns we pay particular attention to the role that local and international nongovernmental organizations play (or might play) in the peacebuilding enterprise. We also examine the problems and tensions that arise as one group committed to sustainable peace wants to advance human rights issues, especially accountability concerns, as a precondition for settling the violent conflict. (Every summer)

*565. International Political Economy*

(3-0-3) Mosley

This seminar explores the interaction between politics and economics in the international system, with an emphasis on the theoretical development of the subfield of international political economy. We will investigate the balance between cooperation and conflict, the effect of international institutions on economic relations, and the mutual impact of domestic and international politics. Throughout the course, we will consider how well models developed in other fields of political science or economics can be applied to international political economy. We also will attempt to identify the "state of the art" in the study of international political economy. (Every fall)

*566. Nonviolent Social Change*

(3-0-3) Cortright

This course will examine strategies of nonviolent social change as reflected in the writings of Dr. Martin Luther King Jr., Mohandas K. Gandhi, Gene Sharp, and Latin American advocates of liberation theology. These will be contrasted and compared with very different traditions of social change advocacy in the work of Saul Alinsky and Malcolm X. The course will also look at historical examples of nonviolent social change and explore the factors accounting for the success or failure of various social change movements, including: the U.S. civil rights movement, the 1989 democratic revolutions in Central and Eastern Europe, and the U.S. peace movement. The main part of the course will be an examination of the practical methods of nonviolent social change. The techniques of nonviolent action will be thoroughly assessed. Specific methods to be studied include: power analysis, coalition building, media communications, fund-raising, grassroots organizing, and lobbying. (Every spring)

*575. Democratic Theory and Multiculturalism*

(3-0-3) Dallmayr

We live increasingly in a multicultural world. But is this trend compatible with democracy? In recent decades, democratic theory has been a battlefield between "liberals" and "communitarians." In both camps, multiculturalism is problematic. Liberals give primacy to autonomous individuals, outside cultural contexts. Communitarians stress community values, neglecting the multiplicity of cultural and religious values. The seminar explores the possibility of a multicultural democracy, beyond liberal detachment and communitarian parochialism. Starting from the liberal-communitarian debate, the seminar proceeds to a discussion of multicultural democracy both on the domestic level and on that of "cosmopolitan democracy." (Every fall)

*579A. Terrorism and Political Philosophy*

(3-0-3) Sterba

Following 9/11, the United States government has made war on terrorism its number one priority. But how should we understand the terrorism that the U.S. opposes? Is it something only our enemies have engaged in or have we ourselves and our allies also engaged in terrorist acts? More importantly, is terrorism always wrong, or are there morally justified acts of terrorism? When we actually confront wrongful acts of terrorism, what are the morally defensible responses? Is war a morally defensible response to the terrorism of 9/11? If war is a morally defensible

response to terrorism, how is terrorism related to issues of international justice? Do failures of international justice motivate acts of terrorism? Did they do so in the case of 9/11? Are morally defensible responses to terrorism required to correct for related failures of international justice? If so, what implications, if any, does this have for the U.S. achieving a morally defensible response to 9/11? This course will focus on evaluating competing answers to these and other central questions relating to 9/11. We shall approach these questions through an evaluation of competing conceptions of justice because that is the only way we can ultimately hope to have defensible answers to them. (Every spring)

*580. Ethnic Conflict and Peace Processes*

(3-0-3) Darby

This team-taught course focuses on the ethnic conflicts that are found across the world today, and considers the special issues of peacebuilding where ethnicity is implicated. A review of theories of ethnicity is followed by in-depth consideration of the following cases: Kashmir, Punjab, Cyprus, Northern Ireland, Israel/Palestine, South Africa, Sri Lanka, and Spain (Basques). Students work in teams to develop plans toward peacebuilding in these and other areas of their choosing. What works and what doesn't work where racial, religious, linguistic, and other "primordial" affiliations entangle with political conflict? We review successes and failures and propose possible new approaches. (Every fall)

*589. Arab-Israeli Conflict*

(3-0-3) Dowty

This course will focus on the historical development of the Arab-Israel conflict and current issues of that conflict on both the Israeli-Palestinian and interstate (Israeli-Arab) dimensions. Class participation will be emphasized; course requirements include a take-home exam over background material and a substantial research paper.

*611. Globalization and Multinational Corporate Responsibility*

(1.5-0-1.5) Tavis

Globalization is galloping across our world at a dramatic pace—enhancing global productivity but leaving many people behind in the process. As the key integrating institutions, multinational enterprises deserve much of the credit for the productivity, but are also inextricably involved in the associated social destruction. The objective of this course is to enhance the awareness and understanding of future business executives, governmental officials, or managers of nongovernmental

organizations about the evolving role of the multinational enterprise, and how that role should be managed.

*633. International Law*

(3-0-3) Carozza, Shelton

This course uses a problem-oriented approach to introduce students to international law, not as a body of static rules, but rather as a decision-making process that includes a structure of decision makers as well as a body of highly flexible prescriptions. International law is seen as a process of continuous interaction, of continuous demand and response. The Nuremberg Trials are used as a means of developing an understanding of the international legal process. Using problems pertaining to environmental protection, economic well-being, human rights, and war prevention, students engage in analysis of international institutions, procedures, and prescriptions. Finally, an examination is made of the potential contribution of international law to a sustainable future. (Every fall)

*660. Theories of International Relations*

(3-0-3) Lieber

This course provides first- and second-year graduate students with an in-depth investigation of the major theories that have guided Western scholarship and policymaking in international relations in the post-1945 world. In this course we are not as much concerned with learning about the world as much as we are concerned about learning how scholars and policy makers learn about the world. In particular, we will be examining those frameworks and methods that modern social science employs in describing, explaining, and predicting international events. The rationale underlying this approach is that these frameworks are the "real world" upon which policymakers base much of their judgment. (Every fall)

*671. International Human Rights Law*

(3-0-3) Méndez

This course examines human rights as legally protected rights in international law, with reference to the practice of states in general, including the United States; reviews the wider recognition of substantive human rights in a growing number of international instruments; appraises future prospects of further progress as well as inherent obstacles and possibility of overcoming prejudices and discrimination; examines the extent to which human rights have become part of positive international law; evaluates the effectiveness and weaknesses of existing legal institutions; and assesses endeavors to realize human rights

in an international community of sovereign states, whose policies reflect differing social backgrounds and varying national interests. (Every spring)

*679A. Dispute Resolution*

(3-0-3) Fick

This course considers the theory and procedure of different legal methods for resolving disputes with an emphasis on negotiation, mediation, and arbitration. It consists of readings, analysis of disputes (both real and hypothetical) and methods for resolving them, and simulation problems. Students who have taken the Legal Negotiation course may only receive two credit hours for this course. (Every spring)

*694A. Universal Protection of Human Rights*

(3-0-3) Carozza

*Prerequisite:* International Law or equivalent. A foundational course in international human rights law. Focuses primarily on examples from United Nations-related human rights regimes and examines the historical and jurisprudential bases of international human rights law; the normative frameworks of the principal universal human rights treaties and of customary international law; and the institutional mechanisms for interpreting, monitoring compliance with, and enforcing those norms.

*694B. International Humanitarian Law*

(3-0-3) Méndez

This course discusses international humanitarian law (IHL). It attempts to study international law that limits the use of violence in international and non-international armed conflicts. The course will be practice-oriented, designed to elicit a critical assessment of IHL. Students are required to come prepared to discuss the week's readings and encouraged to offer comments and opinions from their own experiences or knowledge.

*Other Graduate Courses*

*597. Directed Readings*

(V-V-V) Staff

Directed readings on an approved subject under the direction of a faculty member.

*599. Thesis Direction*

(V-V-V) Staff

Research and writing on an approved subject under the direction of a faculty member.

*600. Nonresident Thesis Research*

(0-0-1) Staff

Required of nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.

697. *Directed Readings*  
(V-V-V) Staff

Directed readings on an approved subject under the direction of a faculty member.

**Upper-level Undergraduate Courses**

In addition to the courses listed above, the following 400-level courses may be taken for graduate credit in accordance with the restrictions established by the Graduate School and with the consent of the director of graduate studies.

- 419. *Topics In Social/Cultural Anthropology*
- 419. *Self, Society, and Environment*
- 424. *The Holocaust*
- 427. *Advanced Moral Problems*
- 431. *Race, Ethnicity and Power*
- 432. *Anthropology of War and Peace*
- 441. *Latin American Politics*
- 451. *Politics of Tropical Africa*
- 456. *Tradition and Modernization in China and Japan*
- 479. *International Migration and Human Rights*
- 484. *Economic Development Latin America*

**Core Faculty**

R. Scott Appleby, *the John M. Regan Jr. Director, and Professor of History*

David Cortright, *Visiting Research Fellow, and President of Fourth Freedom Forum, Goshen, Indiana*

John Darby, *Professor of Comparative Ethnic Studies and Fellow*

Robert C. Johansen, *Senior Fellow, and Professor of Political Science*

John Paul Lederach, *Professor of International Peacebuilding and Fellow*

George A. Lopez, *Director of Policy Studies and Senior Fellow, and Professor of Political Science*

Cynthia K. Mahmood, *Director of Graduate Studies and Fellow, and Associate Professor of Anthropology*

J. Daniel Philpott, *Fellow, and Assistant Professor of Political Science*

Raimo Väyrynen, *Senior Fellow, and Professor of Political Science*

Charles K. Wilber, *Counselor to the Director, and Professor Emeritus of Economics*

**Fellows**

Asma Afsaruddin, *Associate Professor of Classics*

Rev. Michael J. Baxter, C.S.C., *Assistant Professor of Theology*

Doris L. Bergen, *Associate Professor of History and Fellow in the Nanovic Institute for European Studies*

Jeffrey H. Bergstrand, *Associate Professor of Finance and Business Economics*

Rev. David B. Burrell, C.S.C., *the Rev. Theodore M. Hesburgh, C.S.C., Professor of Arts and Letters (Philosophy and Theology)*

Paolo G. Carozza, *Associate Professor of Law and Fellow in the Nanovic Institute for European Studies*

Paul M. Cobb, *Assistant Professor of History*

Kathleen Collins, *Assistant Professor of Political Science*

Barbara Connolly, *Assistant Professor of Political Science*

E. Mark Cummings, *the Notre Dame Professor of Psychology*

Fred R. Dallmayr, *the Packey J. Dee Professor of Political Science, Professor of Philosophy, Fellow in the Kellogg Institute for International Studies, and Fellow in the Nanovic Institute for European Studies*

Alan K. Dowty, *Professor of Political Science*

Barbara J. Fick, *Associate Professor of Law*

Michael J. Francis, *Professor of Political Science*

Rev. Patrick D. Gaffney, C.S.C., *Associate Professor of Anthropology*

Teresa Ghilarducci, *Director of the Higgins Labor Research Center, Associate Professor of Economics, and Fellow in the Nanovic Institute for European Studies*

Denis A. Goulet, *the William and Dorothy O'Neill Professor Emeritus in Education for Justice and Professor Emeritus of Economics*

Frances Hagopian, *the Michael Grace III Associate Professor of Latin American Studies*

George S. Howard, *the Morahan Director of the Arts and Letters Core Course Program and Professor of Psychology*

Lionel M. Jensen, *Department Chair and Associate Professor of East Asian Languages and Literatures and Concurrent Associate Professor of History*

Ruthann K. Johansen, *Concurrent Associate Professor in the College of Arts and Letters and Associate Professional Specialist and Assistant Director in the College of Arts and Letters Core Course*

Paul V. Kollman, C.S.C., *Assistant Professor of Theology*

Keir A. Lieber, *Assistant Professor of Political Science*

Daniel A. Lindley III, *Assistant Professor of Political Science*

David M. Lodge, *Professor of Biological Sciences*

Scott P. Mainwaring, *the Eugene and Helen Conley Professor of Political Science*

A. James Mcadams, *Director of the Nanovic Institute for European Studies and the William M. Scholl Professor of International Affairs*

Juan Méndez, *Professor of Law and Director of the Center for Civil and Human Rights*

Layna Mosley, *Assistant Professor of Political Science and Fellow in the Nanovic Institute for European Studies*

Daniel J. Myers, *Chair and Associate Professor of Sociology*

Carolyn R. Nordstrom, *Associate Professor of Anthropology*

Emily L. Osborn, *Assistant Professor of History*

Richard B. Pierce, *Assistant Professor of History*

Donald B. Pope-Davis, *Associate Vice President and Associate Dean of Graduate Studies, Director of the McNair Scholars Program, and Professor of Psychology*

Victoria D. L. Sanford, *Assistant Professor of Anthropology*

Dinah L. Shelton, *Professor of Law*

Kristin Shrader-Frechette, *the O'Neill Professor of Philosophy and Concurrent Professor of Biological Sciences*

James P. Sterba, *Professor of Philosophy*

Lee A. Tavis, *the C. R. Smith Professor of Business Administration (Finance) and Director of the Program on Multinational Managers and Developing Country Concerns*

A. Peter Walshe, *Director of the African Studies Program and Professor of Political Science*

Andrew J. Weigert, *Professor of Sociology*

Todd D. Whitmore, *Associate Professor of Theology*

Rev. Oliver F. Williams, C.S.C., *Academic Director of the Center for Ethics and Religious Values in Business and Associate Professor of Management*



## Political Science

### Chair:

Rodney Hero

### Director of Graduate Studies:

Andrew C. Gould

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### The Program of Studies

The primary aim of the graduate program in political science is to train qualified candidates for research and teaching. The department offers M.A. and Ph.D. degrees. It has four major subfields:

1. political theory;
2. comparative politics;
3. international relations;
4. American politics.

The department has faculty with a wide range of interests. Its particular strengths include political theory; democratic institutions; ethnicity, religion, and nationalism; political economy; international humanitarian issues and peace studies; Latin American politics; regime change; political participation; politics and literature; and constitutional studies. The highly selective student body is drawn from a large pool of applicants from many countries: in 2003 we had 259 applicants for 13 openings. The department's community of graduate students is marked by a diversity of interests, backgrounds, and nationalities. The small size of the graduate program facilitates close interaction between faculty and students and allows us to offer financial assistance to virtually all students we admit.

In recent years, 80 percent of Notre Dame Ph.D. recipients in political science have been appointed to full-time teaching and research positions. Recent appointments of Notre Dame Ph.D.s in political science include tenure-track positions at leading universities (e.g., the University of Pennsylvania, University of Pittsburgh, Florida State, Purdue, Florida International University, Oklahoma, Louisiana State University, Pepperdine, SUNY-Stony Brook, California State University-Sacramento) and at renowned liberal arts colleges (e.g., Bowdoin, Connecticut College, Bates, Whittier). Students in the department have fared well in winning prestigious fellowships and prizes, including the Edwin Corwin Award of the American Political

Science Association for the best dissertation in public law and the Leo Strauss Award for the best dissertation in political theory.

The faculty is strong, and it is growing and changing. The department currently has 42 faculty members, including scholars of national and international recognition.

M.A. students must complete a minimum of 30 hours in course credits and must pass a comprehensive written examination in their major field. A minimum of 12 hours of course work is required in the major field, and a minimum of nine in a second field. However, M.A. students are not eligible for funding, and we rarely offer admission to those seeking only the M.A.

### Doctoral Program

Ph.D. students must complete the following requirements:

1. A total of 60 credit hours of courses, including at least 48 credit hours of substantive courses;
2. At least 12 hours of courses and comprehensive written exams in two of the department's four subfields (American politics, comparative politics, international relations, and political theory);
3. At least nine hours of course credits in a student-defined area of specialization;
4. A proseminar and a quantitative methods course;
5. A reading exam in one foreign language;
6. A master's paper;
7. An oral examination, based on the student's dissertation proposal;
8. A Ph.D. dissertation and its successful oral defense.

Students in the department are advised to consult the listing of courses in other departments, particularly in sociology, economics, history, philosophy, and theology. Courses in other departments selected in consultation with the student's adviser are counted toward a degree.

### Research Institutes

Department faculty and graduate students also work in several major research institutions at Notre Dame. The Kellogg Institute for International Studies promotes advanced study, teaching, and research on international problems, especially of developing countries. Kellogg scholars focus on democratization and development in Latin America and on related research on all world regions. The Kroc Institute for International Peace Studies

conducts research, teaching, and public education on war prevention and global security, the promotion of human rights and justice, and international dimensions of social, economic, and environmental justice. (Applicants interested in an M.A.-only program in peace studies should apply directly to the Kroc Institute.) The Nanovic Institute for European Studies facilitates lectures, conferences, and research opportunities on a variety of issues relating to contemporary European politics and society. Its programs are designed to appeal to graduate students working in any area of the social sciences or humanities, including comparative European politics, the relations among European states and developments in the EU, and European political theory and history. The Program in American Democracy supports and facilitates research, teaching, and other activities that explore and assess the quality of democracy in the United States. The program currently sponsors a working paper series, a speaker series, occasional conferences, and other activities.

These and other research initiatives of the department faculty aid graduate students through lively scholarly communities and numerous opportunities for research support, dissertation-year fellowships, and other resources.

The department also makes substantial use of the Laboratory for Social Research. The lab provides consulting in statistical analysis and computer applications and serves as the repository for data from the Inter-University Consortium for Political and Social Research and other archives.

### Course Descriptions

The following list includes courses offered during the last three academic years by current faculty members. Some courses are offered on an annual basis, and many others are offered less frequently. Because this list is restricted to the past three academic years, it is not exhaustive. Students should also consult the list of courses in other departments.

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

*501. Introduction to Quantitative Methods*  
(3-0-3) Wolbrecht, Sanders

This course is an introduction to the use of statistical methodology in the social sciences; it is not a course on statistics. The class emphasizes the role of statistics as a tool, rather than an end in itself. While we learn a variety of statistical techniques, the focus is upon the logic of these techniques rather than their mathematical intricacies. There will be a series of exercises and exams, coupled with a major project in which students will be required to gather and analyze data on an empirical problem of their choice.

*502. Proseminar*

(3-0-3) Coppedge, Gould

This is a required course for all first-year graduate students in the Department of Political Science. It is what is commonly called a “scope and methods” course; that is, a course designed to survey the great variety of themes and approaches in political science and to guide you through the fundamental debates about what political science is or should be. This course is also about democracy because the best way to teach about methods is to apply them to an interesting topic, and democracy is a topic of central interest to almost all of us these days. There is abundant literature that demonstrates the relevance of our course themes to democracy. Therefore, in the process of learning about the scope and methods of political science, this course will also familiarize you with some key ideas about what democracy is, what it could be, how it is changing, what causes it, and how we measure it.

*601. Advanced Quantitative Methods*

(3-0-3) Sanders

Quantitative methods are often used to understand the behavior and interactions of individuals, governments, and nations. This course is designed to provide students with an understanding of the quantitative tools that are useful for doing quantitative political research. We will begin by reviewing the basics of statistical inference and the linear regression model, with a thorough discussion of the problems that arise in regression analysis and the solutions to those problems. The bulk of the course will be devoted to the following topics:

- extensions to the basic regression model: simultaneous equations and time-series/cross-sectional models,
- maximum-likelihood techniques for modeling categorical dependent variables: logit/probit, ordered logit/probit, multinomial logit/probit, and count models,

- models for dealing with sample selection bias: tobit and Heckman models,
- techniques for modeling time-series data.

Throughout, we will focus on understanding the theoretical underpinnings of the model and developing and evaluating applications of the models to substantive problems in political science. Students will be asked to do data-analysis exercises, to evaluate published research relying on quantitative techniques, and to do a research project on a topic of their own choosing.

*American*

*504. Seminar on the Supreme Court*

(3-0-3) Kommers

This seminar examines the politics and process of decision making in the United States Supreme Court. It covers the Court's organization, jurisdiction, and procedures; the nomination and confirmation of justices; the role of law clerks and advocates; and outside influences on the Court's personnel. The seminar also includes major units on the Court's exercise of its discretionary jurisdiction, the setting of the Court's agenda, oral argument and the opinion-writing process, the impact of Supreme Court decisions, and judicial-legislative relationships. Last, and importantly, the seminar explores various methods and approaches to the study of judicial decision making. Grades will be based on a term paper, class participation, and oral reports.

*506. Field Seminar in American Politics*

(3-0-3) Wolbrecht

This is the “core” seminar in American politics, designed to provide a survey of the most important literature in the field. The seminar is intended to present the student with a broad, eclectic view of the current state of the literature in American politics. The readings attempt to provide a sampling of classic and recent theory and substance in the hope of suggesting where scholars stand, and where they seem to be headed, with respect to some major topics in the American subfield.

*507. American Subnational Politics and Government*

(3-0-3) Hero

The purpose of this seminar is to provide a careful and extensive overview of the scholarly issues and literature concerning American “subnational,” especially state, politics. The assumption and approach taken is that state and local governments in the United States are important in and of themselves, but they are also critical in how they shape national

politics and governance through their own political and policy patterns and in their implementation of “national” domestic policies. Three bodies of literature will be the focus of analysis: U.S. federalism and intergovernmental relations; state governance, politics and public policy; and urban/local politics (with the most extensive attention given to the second of the three).

In general, the approach will be comparative while at the same time giving close attention to historical and contemporary theoretical and analytical debates in the field. Moreover, there will be considerable attention to the significance of subnational politics for understanding the U.S. political system in general, as well as the approaches to studying that system.

*510. Political Participation*

(3-0-3) Campbell

Many observers wonder why more Americans don't vote. Others wonder why anybody votes at all. This course cuts a swath through a large and methodologically diverse literature that examines these and other questions relating to political engagement. Readings include both some golden oldies and hits right off the political science charts. Some will be normative, others empirical. Students will grapple with questions like how a nation's political institutions facilitate political participation (or not), and whether it matters that some kinds of people are more likely to participate in politics than others. The focus will be on the United States, but perspectives from other nations will be offered as well. Given the topic of the course, it should come as no surprise that the instructor asks for full participation in class discussions as well as a paper. Like the assigned readings, this can be empirical or normative—or even a little of both.

*511. The American Founding*

(3-0-3) M. Zuckert

This seminar centers on James Madison's *Notes* of the proceedings in the constitutional convention, but attempts to view the thoughts and deeds of the delegates in the broader context of the American Revolution and the American experience in the decade between the start of the revolution and the drafting of the Constitution on the one hand, and of broader developments in political philosophy (e.g., the all-important thought of Montesquieu) on the other. Each student will prepare a research paper explaining a theme related to the course materials.

*512. Completing the Constitution: The Post-Civil War Amendments*

(3-0-3) M. Zuckert

This seminar will explore the thesis that the post-Civil War amendments to the Constitution (the 13th, 14th, and 15th) are best understood as efforts to “complete the Constitution,” that is, to carry through the logic of the original founders where they stopped short for various reasons. At the center of the seminar are the Congressional debates on the various amendments and related civil rights legislation. Each student will prepare a research paper exploring a theme related to the course materials.

*514. Political Parties and Interest Groups*

(3-0-3) Wolbrecht

In the United States, as in most democracies, political parties and interest groups are central mediating institutions linking citizens and the political decision makers who govern them. In an effort to understand the role of political parties and interest organizations in the American political system, we will examine issues of historical development, membership, organization, tactics, competition, and representation, among others. While the primary focus is the American case, the questions and concepts addressed in this course are applicable to other democratic systems.

*515. Religion and the Constitution*

(3-0-3) Barber

Does constitutionalism in America presuppose a supreme being? Does the maintenance of constitutional institutions depend on the prevalence of religious or specifically Christian faith and morals? To what extent can or should constitutional government accommodate religious beliefs, institutions, and practices? Is constitutionalism in America on a collision course with the religious commitments of a substantial portion of the American people? This seminar will explore these and related issues. Readings include classical writers such as Locke and Jefferson, contemporary scholars and social critics such as Stanley Fish and Richard John Neuhaus, and leading decisions of the U.S. Supreme Court. The course is open to graduate students and law students. Space may be available to a few seniors who have instructor's permission. Course grade will be based on a term paper, class participation, and assigned oral reports.

*517. The Presidency: Institution and Performance*

(3-0-3) Arnold

This course develops a two-part perspective on the U.S. presidency, examining its

institutional development while assessing the leadership behavior of incumbents within it. Readings will survey conceptual strategies for understanding institutional development and leadership performance. Students will write brief, critical essays on readings that will focus class discussion. Additionally, students will prepare research papers using a case or database to assess the utility of one conceptual approach for understanding presidential leadership.

*518. Legislative Studies*

(3-0-3) Griffin

This course will examine both the organizational choices within legislatures and the outside influence on legislator behavior. Topics to be covered include problems of collective choice, the party versus preferences debate, legislative elections, roll call behavior, legislator home style, and the historical development of legislative institutions. Although particular attention will be paid to the U.S. Congress, comparative legislatures will also be considered.

*520. Elections and Public Policy*

(3-0-3) Radcliff

This course examines the relationship between the electoral choices of voters and the public policy regimes that the governments so chosen pursue. The central focus is thus on whether and how different types of electoral outcomes (which parties win elections and in what institutional contexts) actually determine the policies that governments pursue.

*521. Federalism and the Constitution*

(3-0-3) Barber

Beginning in 1995, the Rehnquist Court has sought to restore some of the immunities from federal power that the states enjoyed prior to the late 1930s. Cases decided under the Commerce Clause and the 10th and 11th Amendments reflect the view that “federalism” is a fundamental feature of the American constitutional order, dear to the framers and integral to the values of “limited government” and “liberty.” Critics of this “states’ rights revolution” contend that the framers’ first priority was a strong national government and that advances in personal and civil liberties have historically come at the expense of states’ rights. This course asks what American “federalism,” as a normative concept, is, whether it is a genuine constitutional principle, and if so for what textual, historical, or moral reasons. The first part of the course will review Supreme Court cases. The second part will review what statesmen and political philosophers have said about the subject. In addition

to around 30 cases, readings will include selections from *The Federalist Papers* and writings by Tocqueville, Calhoun, Lincoln, Martin Diamond, Herbert Storing, Charles Taylor, and others. Grades will be based on an objective exam covering the cases, oral reports in class, and a term paper. This is a graduate course, but senior undergraduates may register with the instructor's consent.

*Comparative*

*505. Comparative Constitutional Law*

(3-0-3) Kommers

This seminar introduces graduate students and law students to the developing field of comparative constitutional law and constitutionalism. Leading American constitutional cases in topical areas such as church-state relations, freedom of speech, right to life issues (abortion, death penalty, and assisted suicide), political representation, gender and racial discrimination, and social and economic rights will be compared with similar cases handed down by Canada's Supreme Court, Germany's Federal Constitutional Court, and the European Court of Human Rights. Selected cases are also drawn from the Hungarian, Indian, and South African Constitutional Courts. The seminar's task is threefold: to identify the similarities and differences in the reasoning and outcomes of the cases, to explain these differences and similarities, and then to discuss aspects of American constitutional law in the light of the foreign materials. In addition, the seminar will consider and identify the uses that particular courts have made of comparative analysis in deciding questions arising under their respective constitutions. Graduate students with a background in political theory, comparative government, or constitutional law should find the seminar informative and intellectually challenging. Grades are based on oral reports, general participation, and a term paper that assesses some aspect of American constitutional law in the light of foreign constitutional developments.

*541. Theoretical Approaches in Comparative Politics*

(3-0-3) (3-0-3) Hagopian, Mainwaring

This course has two objectives. First and foremost, it provides an overview of major theoretical approaches to comparative politics. We will examine structural approaches, contingent action arguments, institutionalism, rational choice, political culture, and eclectic approaches. We will also spend one week discussing international influences on domestic politics.

An important secondary objective is to provide some awareness of comparative methods in political science. Toward this objective, we will begin the semester with some readings on methods in comparative politics, and we will discuss methods of inquiry throughout the semester.

*542. Comparative Parties and Party Systems*  
(3-0-3) Mainwaring

This course will focus on comparative parties and party systems. The major purpose is to acquaint students with some of the most important theoretical and comparative literature on one of the major themes in political science.

The course has three main units. We will begin with some general reflections on why parties matter. In Part I, we will also examine the literature on the decline of parties and the rise of other vehicles of representation.

In Part II, we will discuss three leading theoretical approaches to the analysis of why different party systems emerge in different nations. In particular, we will discuss authors who emphasize social cleavages, voters' preferences (the spatial model), and electoral systems as factors shaping party systems.

Part III of the course focuses on parties rather than party systems as the unit of analysis. A fundamental question is the way parties function internally. To what extent can parties be seen as rational actors as opposed to organizations with logics that may not follow the normal dictates of rationality? More broadly, what shapes how parties compete and function?

*543. Democracy and Markets in Latin America*  
(3-0-3) Hagopian

This course examines the two most significant changes in Latin American politics in the latter part of the 20th century: the consolidation of democratic political regimes and the transition to an economic order in which market forces play a predominant role in the allocation of resources. It begins by introducing contending theoretical perspectives on the ways in which these political and economic transitions take place and the extent to which they are mutually reinforcing or constraining. It then analyzes the roles of various political and social actors and institutions in the processes of democratization and economic liberalization. Specifically, the focus is on the changing foundations of citizen association and participation, channels of political representation, and political institutions that shape

and constrain the trajectories of democratic consolidation and state- and market-oriented reform.

*544. State Building and Regime Change*  
(3-0-3) Gould

In this seminar we will discuss classic and contemporary works on questions of state-building and regime change in the modern world. State-building and regime change constitute two distinct yet interrelated outcomes that are perennially at the top of research agendas in political science and sociology. Why and how do bureaucracies develop? What are the differences in the organizational infrastructure of various states and why do these differences emerge? Why do different political regimes emerge? What accounts for transitions from one type of regime to another? While there are many possible ways of structuring a look at the broad body of research seeking to answer these questions, this course adopts a threefold division in its presentation: we will examine, in turn, explanations that focus on rationality, culture, and structure. We will also examine renewed attention to modernization theories and to political-economy.

*545. The Political Economy of Postindustrial Societies*  
(3-0-3) Messina

This course investigates the nexus between politics and economics in the postindustrial societies. After a brief discussion of the theoretical principles of economic liberalism, the course focuses on the impact of economic factors and conditions on politics and the political and economic consequences of the organization of the world economy along free market principles. It concludes by scrutinizing the relationship between domestic politics and the project for deeper economic integration in the case of the European Union.

*546. Politics of Nation and Community*  
(3-0-3)

This course combines readings in comparative politics and political theory in order to consider political community, nationalism, and alternatives to the nation-state. Possible meanings and applications of "internationalism" receive critical examination. Readings range from Charles Taylor to Eric Hobsbawm to Michel Foucault, all the while probing approaches to national identity and modern dilemmas of governance. Students keep a journal, write one short paper, and work for the latter half of the semester on a major research paper, the latter combining a case study with the theoretical literature discussed in class.

*550. Theories of Identity and Conflict*  
(3-0-3) Collins

This course covers theories of ethnicity, nationality, and religious identity, and their relation to social movements, violence, and civil conflict. The course includes a range of approaches and debates on the sources of identity, causes of identity mobilization, changing identity, the causes of conflict, and strategies for resolving identity-based conflict. We will read rational choice approaches, including Laitin, Fearon, Weingast, Bates, etc., as well as institutionalist theories, such as Horowitz, and culturalist and social theories.

*586. Game Theory, Politics and Institutional Analysis*  
(3-0-3) Gould, Rath

This course will focus on game theory as employed in empirical analyses of politics and institutions. It will cover some fundamental concepts of game theory: basic elements of games; several equilibrium concepts and different types of game. Selected applications include: explanations of political party competition, legislative decision making, the maintenance of democracy and constitutionalism, interethnic cooperation and conflict, differences in social norms, transitions from socialist to market economies, the political economy of reforms and the economics of sovereign debt.

*644. Comparing Democracies*  
(3-0-3) Coppedge

This is a seminar on the nature and consequences of democracy. It is a companion course to POLS 575, Comparative Research on Democratization, which examines causes of democracy. However, neither seminar is a prerequisite for the other. Comparing Democracies is a semester-long workshop devoted to establishing rigorous criteria for evaluating how democratic "democracies" are and what difference it makes. We will read and discuss selected theoretical works that propose definitions of and justifications for democracy. We will break down the concepts into measurable components and function as a research team to produce qualitative and quantitative indicators of the quality of democracy. Students will also present and critique their own research on the consequences of these qualities of democracy for regime stability, social equity, or other outcomes. The seminar includes practical instruction on concept formation, measurement theory, dimensional analysis, and other methodological tools that would be useful for analyzing many complex political phenomena besides democracy.

*645. Comparative Research on Democratization*  
(3-0-3) Coppedge

This course is both a survey of major works seeking to explain the birth and survival of democracy and a research seminar that allows students to explore these topics on their own and as members of a research team. Discussions will examine how leading political scientists have studied democratization from a great variety of approaches, including case studies and comparative history, rational choice, political culture, institutionalism, modernization, and large-sample comparisons. The substantive readings provide fodder for discussing major issues of research design. Lectures will provide user-friendly introductions to a variety of analytic techniques. Research assignments will encourage hands-on experience with data collection and statistical analysis. There is virtually no overlap between this course and POLS 579, *Comparing Democracies*, which examines the nature and consequences of democracy.

*654. The Politics of Tropical and Southern Africa*

(3-0-3) Walshe

At first the course will concentrate on tropical Africa: traditional political systems, the impact of colonialism, the rise of African nationalism, political independence and its aftermath—the phenomenon of military/bureaucratic states and the search for legitimate forms of government. The focus shifts for the second half of the semester: the rise of Afrikaner nationalism, the consolidation of the apartheid state, black protests and the liberation movement, the Frontline States, and the U.S. policy towards the region. There will be two examinations. Students who wish to write a research paper should think in terms of signing up for “Special Studies” in a subsequent semester.

*681. Democracy and Democratic Theory*

(3-0-3) O'Donnell

This seminar will explore and discuss what to my mind are the main meanings, conundrums, and predicaments of democratic theory and practice since its origins until today. Active participation in class, two written reports on selected readings per each student, and an option between a research paper or a take-home exam will be expected.

*International Relations*

*524. American Foreign Policy*

(3-0-3) Lindley

This course examines in detail theories about American foreign policy ranging from structural, state-level policy process, to decision

making theories. We will also review the history of American foreign policy and assess several prominent policy problems currently facing decision makers. We will work extensively on formulating, critiquing, and testing theories, with a focus on case-study methodology. Book/article reviews and a major research paper are required. Students will lead class at times, will present their own work, and will participate in debates. Qualified undergraduates may take the course with permission.

*525. Ethics and International Relations*

(3-0-3) Philpott

Ethics and International Relations explores diverse international issues through normative political philosophy and case studies. It is suitable for students of political theory and international relations alike. Topics include the justice of war, the problem of killing innocents, terrorism, nuclear weapons, intervention, human rights and pluralism, distributive justice, the status of borders, globalization and development, and women's rights. These will be explored through competing moral frameworks, including duty-based and consequentialist frameworks.

*526. International Political Economy*

(3-0-3) Mosley

This seminar explores the interaction between politics and economics in the international system, with an emphasis on the theoretical development of the subfield of international political economy. We will investigate the balance between cooperation and conflict, the effect of international institutions on economic relations, and the mutual impact of domestic and international politics. Substantive topics include the international trade system, the international monetary and financial systems, the role of the global economy in economic development, and the impact of economic globalization on domestic societies.

Throughout the course, we will consider how well models developed in other fields of political science or economics can be applied to international political economy. We also will attempt to identify the “state of the art” in the study of international political economy. This course serves as a basis for future research in the fields of international political economy, international relations, and comparative political economy. It also prepares students for the international political economy component of the international relations comprehensive exam. Students are expected to participate in all class sessions, to write several short papers, and to write and present a research design at the end of the course.

*527. War, Human Rights, and Peacebuilding*  
(3-0-3) Johansen

The course considers: (a) global peace issues: the workings of the balance of power system and nationalism; arms trade and arms control; economic sanctions; approaches to international tension reduction; implementing fundamental norms of peace; (b) global human rights issues: the Universal Declaration and Covenants; rights of women and children; collective rights; gross violations of human rights as correlates of violence and war; efforts to hold individuals accountable to prohibitions of crimes against humanity and war crimes; fundamental norms of human rights; issues of identity as they affect exercise of state sovereignty; and compliance with human rights norms; (c) multilateral responses: the work of the UN and its agencies in peacebuilding as well as in reducing violence and helping those victimized by it; attention to regional international organizations; examination of the recommendations of high-profile international commissions on issues of security and human rights; the politics of implementing their recommendations, including the role of nongovernmental organizations; and (d) peace research findings and research methods in the areas of peace and human rights; similarities and differences between world order/peace studies scholarship and political realism.

*528. Issues in Arab/Israeli Conflict*

(3-0-3) Dowty

This course will focus on the historical development of the Arab-Israeli conflict and current issues of that conflict on both the Israeli-Palestinian and interstate (Israeli-Arab) dimensions. Class participation will be emphasized; course requirements include a take-home exam over background material and a substantial research paper.

*529. Theories of International Relations*

(3-0-3) Lieber

This course provides a survey of major theoretical traditions and their applications in the study of international relations. The course explores recent changes in and debates on the key theoretical approaches; especially neorealism, liberal institutionalism, and structural theories. A main objective of the course is to clarify and assess various methodological commitments, ranging from empiricism to constructivism, that are built in these theoretical ideas and their consequences for the design and conduct of research. The course does not dwell upon the practice of

international relations, but it makes an effort to link up theories and methods surveyed with the real world. This happens by tracing the long-term developments in security (war, peace, and deterrence) and economic (protectionism, free trade, and globalization) strategies by state and non-state actors. In this context, there will be a special focus on the international political and economic orders and their historical transitions. The students are expected to read carefully the assigned material, participate actively in the class discussions, write a publishable book review, develop a research design, and complete a final examination.

*532. International Organization*  
(3-0-3) Staff

International organizations (IOs) and institutions are pervasive in international relations. IOs can facilitate cooperation as well as institutionalize competition and conflict, including warfare. This course will examine the origins, roles, and prospects for IOs, with an emphasis on understanding change in intergovernmental organizations such as the UN system and regional organizations. Each student will present a briefing on a selected IO and write a research paper on some aspect of IO politics.

*533. Peace and World Order I*  
(3-0-3) Johansen

This course examines various ways of understanding the causes and dynamics of inequality and collective violence in contemporary international relations. For this purpose special attention is paid to the following explanations: power rivalries and international anarchy, the acquisition and proliferation of military capabilities, global socioeconomic inequities, and ideological and cultural differences as well as the deterioration of the environmental security. In addition to providing a critical description and explanation of the causes of violence, the course also considers key methodological issues and examines the efforts of peace and conflict studies to better understand and mitigate the problems of violence.

*534. Peace and World Order II*  
(3-0-3) Johansen, Väyrynen

This course examines alternative approaches to achieving a peaceful, just, and environmentally healthy world order. Students will explore efforts by governments and citizens' groups to improve international institutions and to implement world order reforms such as suggested in the reports of the Palme, Brandt, Brundtland, and South

Commissions; the Commission on Global Governance; and subsequent international efforts. Students explore opportunities for and impediments to implementing their own preferred visions of future world order.

*535. Sustainable Development*  
(3-0-3) Staff

This course investigates the politically popular concept of sustainable development both to explore competing values embedded in the term, and to think pragmatically about how sustainable development could be implemented around the world. We look at the constraints on sustainable development imposed by the global systems of trade, aid and finance, and the opportunities for local decision makers to make more sustainable choices. We explore these challenges in depth through case studies in various regions of the world, such as tropical deforestation in Southeast Asia, nuclear safety in the former Soviet Union, biotechnology in Kenya, Brazil, India, and China, corporate environmentalism in Mexico and Brazil, and toxic waste trade between developing and developed countries.

*588. The United Nations and the Maintenance of International Peace and Security*  
(3-0-3) Johansen

Students will examine (1) the theory and practice of United Nations peacemaking, peacekeeping, and enforcement; (2) proposals for strengthening UN capabilities in these areas; and (3) the prospects for employing the UN more effectively to reduce the role of military power in the world system.

*625. International Political Economy*  
(3-0-3) Mosley, Väyrynen

This seminar explores the interaction between politics and economics in the international system, with an emphasis on the theoretical development of the subfield of international political economy. We will investigate the balance between cooperation and conflict, the effect of international institutions on economic relations, and the mutual impact of domestic and international politics. Throughout the course, we will consider how well models developed in other fields of political science or economics can be applied to international political economy. We also will attempt to identify the "state of the art" in the study of international political economy.

This course is intended to prepare students for the IPE component of the preliminary exams in international relations, and to lay the groundwork for future research in the fields of international political economy, in-

ternational relations, and comparative political economy. The course also is open (with the instructor's permission) to undergraduate students who would like a more theoretically oriented exploration of international political economy.

*626. The Political Economy of International Institutions*  
(3-0-3) Mosley

This seminar addresses the formation and functioning of international institutions from a rational-choice perspective. We consider the ways in which theories developed in other branches of political economy—including collective action and path dependence—can be employed to understand international institutions. Under what conditions do international institutions influence state behavior? What are the conditions that facilitate change in international institutions? What is the relationship between ideas and interests in international relations theory?

*Theory*

*571. Plato's Trilogy*  
(3-0-3) C. Zuckert

In this seminar we will explore the significance of the differences in the philosophical positions, political teachings, and pedagogical styles Plato presents in Socrates (especially the *Theaetetus*) and the Eleatic Stranger (in the *Sophist* and *Statesman*). Students will be asked to write a major interpretive study as well as a critique of a recent critical work.

*572. Cicero and the Romans*  
(3-0-3) Nicgorski

This course offers the opportunity to study major issues in political theory, moral philosophy, and jurisprudence as they appear in the writings of Cicero and in the teachings of the philosophical schools of ancient Rome. Lucretius is also read. Topics considered include the relation of practice and theory, the virtues and expediency, the basis of right and law, and the natures of republican and mixed constitutions. Above all the course provides an opportunity for reading and discussing some of Cicero's most significant writings. Cicero's skepticism and his metaphysical and theological views come to attention in certain of the readings. Cicero, a leading statesman of the late Roman Republic, endeavored to mediate between the work of Greek theorists and Roman practice; in time, his writings became among the most important sources on ancient moral and political thought for the Christian tradition. His acknowledged influence on key American founders was much greater than that of Plato or Aristotle.

573. *Aristotle*

(3-0-3) Goerner

A basic introduction to Aristotle's "human philosophy" (*ta anthropina philosophia*) by reading the *Nicomachean Ethics* and the *Politics*. The aim of the course: obtain a critical understanding of the main substantive structure of Aristotle's theory of excellence in personal and political practice as well as of the method used in presenting the theory. The course will be conducted in seminar style: participants will be expected to take turns presenting short, tightly argued introductions to key passages with a view to focusing discussion on the principal interpretive and theoretical questions posed by the particular text under discussion. Each seminar participant is also expected to write a critical research paper adjudicating a disagreement in the relevant, current, scholarly literature (usually two articles) on some issue in Aristotle's ethico-political theory.

574. *Rousseau*

(3-0-3) Botting

In this graduate political theory seminar, we will read three of Jean-Jacques Rousseau's works that he composed and published almost simultaneously—*Julie* (1761), *Emile* (1762) and *On the Social Contract* (1762)—and ask whether or not they can be understood as substantively interrelated works of political theory. Students will write a 25-page research paper on Rousseau, a five-page book review of a major work of Rousseau scholarship, and give an in-class presentation based on the book review.

575. *Medieval Political Theory: Thomas**Aquinas*

(3-0-3) Keys

This seminar in medieval thought will focus on the politically relevant writings of Thomas Aquinas. Special attention will be given to the interplay between faith and reason, and between ethics and politics, in his work. Our aim will not be solely to gain a historical grasp of one of the great thinkers of the past, but also and especially to examine what relevance the problems he tackled and the approaches he proposed might have for us today. We will read selections from Aquinas's commentaries on Aristotle's *Nicomachean Ethics* and *Politics*; the *Summa Theologiae* on political authority and government, justice, prudence, and law; and the *De Regno (On Kingship)*. Students will also gain familiarity with contemporary secondary literature and debate regarding aspects of Aquinas's ethical and political thought.

575. *Medieval Political Theory*

(3-0-3) Roos

This course is aimed at introducing students to some of the main elements of political theory in the Middle Ages. It will use one survey book, but its main concentration will be a more intensive investigation of the thoughts of Thomas Aquinas and Augustine. The course will pay special attention to the conception of nature in Aquinas, and the relationship between nature and grace, politics and salvation, contemplation and action, and virtue and law.

576. *Hume's Practical Philosophy*

(3-0-3) Hösle

Hume is not only one of the most revolutionary theoretical philosophers; in his essays he deals with many moral, economical and political questions and defends a peculiar form of liberalism. In the course, we will read the "Treatise of Human Nature" the "Inquiry concerning the Principles of Morals" and his various essays on political issues. A particular accent of the course is to probe into the connections between Hume's epistemology and anthropology and his concrete political views.

577. *Social Contract*

(3-0-3) Goerner

The seminar reads one or more works by a major social contract theorist. (In recent years the seminar has treated one of the following: Hobbes, Locke, Rousseau, and Rawls). The aim is to achieve a critical understanding of the theorist's teaching on the relationships of individual, social, and political life. Participants are expected to take turns presenting short, tightly argued introductions to key passages with a view to focusing discussion on the principle interpretive and theoretical questions posed by the particular text under discussion. Each seminar participant is also expected to write a critical research paper adjudicating a disagreement in the relevant scholarly literature (usually two articles) on some issue.

578. *Nature and Modern Democracy*

(3-0-3) Nicgorski

From 1951 to 1953, the University of Chicago Press published three sets of the *Walgreen Lectures* dealing with the intellectual basis of various 20th-century challenges to democracy. These three books—Yves Simon's *Philosophy of Democratic Government*, Leo Strauss's *Natural Right and History*, and Eric Voegelin's *The New Science of Politics*—have functioned to outline three highly influential and overlapping approaches to defining the crises of modern democracy and to restoring viable

democratic foundations. This seminar-style course focuses on the reading and discussion of these books. Special attention is given to the concepts of history, science, nature, modernity, and democracy itself as they appear in the three works and in related writings.

579. *Democratic Theory and Multiculturalism*

(3-0-3) Dallmayr

We live increasingly in a multicultural world. But is this trend compatible with democracy? In recent decades, democratic theory has been a battle field between "liberals" and "communitarians." In both camps, multiculturalism is problematic. Liberals give primacy to autonomous individuals, outside cultural contexts. Communitarians stress community values, neglecting the multiplicity of cultural and religious values. The seminar explores the possibility of a multicultural democracy, beyond liberal detachment and communitarian parochialism. Starting from the liberal-communitarian debate, the seminar proceeds to a discussion of multicultural democracy both on the domestic level and on that of "cosmopolitan democracy." Some of the texts used are Charles Taylor's *Multiculturalism*, Bhikhu Parekh's *Rethinking Multiculturalism*, Iris M. Young's *Inclusion and Democracy*, Seyla Benhabib's *Democracy and Difference*, and David Held and Archibugi's *Cosmopolitan Democracy*.

580. *Theories of Modernity*

(3-0-3) Dallmayr

"Modernity" today is a contested concept, embroiled in multiple and often conflicting interpretations. For some, modernity is the highway to social progress, the advancement of knowledge, and human liberation. For others, modernity is an aberration, a deviation from the path charted in ancient and medieval times—an aberration manifest in the "crisis of modernity." Still others view modernity as deficient but salvageable, or else as exhausted and obsolete (to be replaced by postmodernity). In our age of globalization, modernity also plays a crucial role in debates about Western colonialism and hegemony. The seminar seeks to chart a course through these debates. Beginning with a survey of some social science literature on modernity and modernization, the seminar turns to Jürgen Habermas's defense of modernity (as an "unfinished project") and to Charles Taylor's qualified defense. Discussion then shifts to critics of modernity, from Strauss, Voegelin, and MacIntyre to Adorno and Derrida. Some attention will also be given to non-Western critics of "Western" modernity. Some texts for

the seminar are: Jurgen Habermas, *The Philosophical Discourse of Modernity*; M. Passerin d'Entreves and Seyla Benhabib, *Habermas and the Unfinished Project of Modernity*; Charles Taylor, *A Catholic Modernity?*; Anthony Giddens, *The Consequences of Modernity*; and Gary Gutting, *Pragmatic Liberalism and The Critique of Modernity*. Selective reference will also be made to Agnes Heller, *A Theory of Modernity*; Eric Voegelin, *Modernity Without Restraint*; Alasdair MacIntyre, *After Virtue*; Hans Blumenberg, *The Legitimacy of the Modern Age*; and Scott Lasch, *Another Modernity*.

### 587. *Global Human Rights*

(3-0-3) Dallmayr

We live in an age of rapid globalization. Part of this globalizing process is the extension of the idea of "human rights" to societies around the globe. Rooted in modern Protestant and Enlightenment principles, the idea of human rights forms part not only of globalization, but also of the worldwide drive toward democratization and human emancipation. Although enjoying widespread and deserved popularity, human rights discourse is also enmeshed in difficult theoretical or philosophical quandaries. The seminar will review three main question areas. (1) Question of grounding: What is the source of human rights? To what extent can rights be justified, or what is the "rightness" of human rights? (2) Question of universality: Is the idea of human rights peculiarly Western (tied to Western modernity)? How can the idea be defended against charges of ethnocentrism and such counter-ideas as "Asian" or "Islamic" values? (3) Question of application: If one admits the universality of human rights, can such rights only be exercised by subjects against their own government, or can they also be pressed against hegemonic superpowers oppressively intervening in other societies? Can they be marshalled against multinational conglomerates and the effects of global capital speculation? And what about the destruction of natural resources (such as rainforests) and the survival rights of native communities? Students are expected to participate actively in class discussions, to present a number of oral reports, and to write a research paper related to the topic of the seminar.

### 591. *Rawls*

(3-0-3) M. Zuckert

John Rawls has undoubtedly been the most significant theorist of the liberal tradition in the late 20th century, and this seminar will explore the body of his work, including his early doctoral dissertation, through his *A*

*Theory of Justice* and his late *Political Liberalism*. The guiding questions will be: (1) that of Rawls's development—how are we to understand the various phases of his thought; (2) that of Rawls as a philosopher of liberalism—does Rawls present a plausible and attractive version of liberalism; and (3) that of the inherent truth and value of Rawls's theory.

### 594. *Nature, Grace, History*

(3-0-3) Roos

This seminar will explore several interrelated themes concerning the relationship between religious belief and politics. It will critically compare several authors on a variety of questions including the status of politics, its natural versus conventional status, whether religion is understood as natural theology or divine particular providence, whether reason and revelation can conflict, toleration of other religions, and what claims are made about the role of revealed religion in establishing political obligation. Readings will include parts of Plato's *Laws*, Augustine's *City of God*, Aquinas's *Summa Theologica*, Maimonides' *Guide of the Perplexed*, Alfarabi's *Plato's Laws*, John Calvin's *Institutes of the Christian Religion*, and selections from Martin Luther. Requirements will include two five-page seminar papers, four one-page commentaries, and a 20-page term paper due at the end of the semester.

### 596. *Machiavelli and Shakespeare*

(3-0-3) M. Zuckert

This seminar will explore the relations between these two great writers; the central hypothesis is that Shakespeare was a deeply political artist, akin to, if not quite a political philosopher, whose works reveal an almost obsessive concern with the texts and themes of Machiavelli. We will proceed by reading texts that seem to be in dialogue with each other; examples include *The Prince* on founders along with *A Midsummer Night's Dream*; Machiavelli's comedy *Mandragola* along with Shakespeare's *The Rape of Lucrece*, both versions of the story of the Roman matron Lucretia; Machiavelli's *Discourses on Livy* and Shakespeare's *Coriolanus* and *Julius Caesar* on the early and late days of the Roman republic; Machiavelli on the conquest of *Fortuna*, along with *Macbeth*.

### 599. *Thesis Direction*

(0-0-1) Staff

Research and writing on an approved subject under the direction of a faculty member.

### 600. *Nonresident Thesis Research*

(V-V-V) Staff

Required of nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.

### 671. *Socrates*

(3-0-3) C. Zuckert

Who was Socrates, and what effect did he have on later history and thought? According to Cicero, Socrates was the first political philosopher; according to Nietzsche, he was a logical monster, a pessimist disguised as an optimist; according to Kierkegaard, he was a moral teacher, second only to Jesus. We will examine several of the Platonic dialogues leading up to Socrates' trial and death in an attempt to discover which of these or other later interpretations is correct.

### 672. *Plato's Laws*

(3-0-3) C. Zuckert

In his last and longest dialogue, Plato explored the nature and limitations of the rule of law. What are its sources—intellectual and emotional? Must the laws have or at least be believed to have a divine foundation? How can people be persuaded freely to obey? What set of laws and institutions would be best and why? Plato's *Laws* contains the first explication and analysis of the "mixed regime" that is transformed by later, modern theorists into the "separation of powers" and "checks and balances" of the American Constitution. Plato himself seems to think that a regime that attempts to form the character of its citizens would be preferable. We will investigate the reasons why. Students will be required to lead a discussion of part of the text and to write a long seminar paper.

### 674. *Hegel*

(3-0-3) Staff

The seminar examines the political philosophy of Hegel. As a critic of both the modern liberal state and the 18th- and 19th-century romantic reactions to it, Hegel attempted to construct a political philosophy which could make sense of these competing models of the state and ultimately posit the beginnings of their overcoming and synthesis. We will study Hegel's theories of the state, politics, society, and history with attention to their development from his early writings to his mature work. Students will be expected to write one substantial paper on some aspect of Hegel's thought and will be responsible for critical presentations of the readings.



675. *Kant*

(3-0-3) Hösle

The purpose of the seminar is to become familiar with Kant's practical philosophy and particularly with its implications for political philosophy and the philosophy of history. We will start with Kant's *Groundwork* and the *Critique of Practical Reason*, which lay the foundation of his enterprise, continue with Kant's materially most important works *Metaphysics* of ethics and *Anthropology* and then deal with the smaller works on the philosophy of history and the relation between theory and practice.

680. *Heidegger and Praxis*

(3-0-3) Dallmayr

In recent years there has been much debate concerning Heidegger's politics. Although important, the controversy has often had the effect of impeding access to Heidegger's philosophy and its implications. One of the larger issues often obscured is this: What is the relation between philosophy and politics, between theory and praxis? How can philosophy and praxis enter into a relationship which is mutually enriching while preserving their respective integrity? The seminar explores Heidegger's philosophy with an accent on his contributions to "practical philosophy" (including ethics and politics). Following a close reading of some of Heidegger's key texts — from (parts of) *Being and Time* to the *Letter of Humanism* and *On the Way to Language* — the seminar turns to some assessments of the "practical" implications of his thought in our time of globalization, technological dominance, and civilizational conflict.

697. *Directed Readings*

(V-V-V) Staff

Reading and research on specialized topics that are immediately relevant to the student's interests and not routinely covered in the regular curriculum.

699. *Research and Dissertation*

(V-V-V) Director of Graduate Studies

Independent research and writing on an approved subject under the direction of the director of graduate studies.

700. *Nonresident Dissertation Research*

(0-0-1) Director of Graduate Studies

Required of nonresident graduate students who are completing their theses in absentia and who wish to retain their degree status.

*Faculty*

Peri E. Arnold, *Professor and Director of the Hesburgh Program in Public Service*. B.A., Roosevelt Univ., 1964; M.A., Univ. of Chicago, 1967; Ph.D., *ibid.*, 1972. (1971)

Louis J. Ayala, *Assistant Professor*. B.A., Princeton Univ., 1995; Ph.D., Stanford Univ., 2001. (2001)

Sotirios A. Barber, *Professor*. B.A., Univ. of Illinois, 1964; M.A., Univ. of Chicago, 1966; Ph.D., *ibid.*, 1973. (1986)

Eileen Botting, *Assistant Professor*. B.A., Bowdoin College, 1993; B.A., Cambridge Univ., 1995; M.A., Yale Univ., 1997; M. Phil., *ibid.*, 1998; M.A., Cambridge Univ., 1999; Ph.D., Yale Univ., 2001. (2001)

David Campbell, *Assistant Professor*. B.A., Brigham Young Univ., 1996; M.A., Harvard Univ., 2001. (2002)

Kathleen A. Collins, *Assistant Professor, Fellow in the Joan B. Kroc Institute for International Peace Studies, and Fellow in the Helen Kellogg Institute for International Peace Studies*. B.A., Univ. of Notre Dame, 1993; M.A., Stanford Univ., 1995; Ph.D., *ibid.*, 2000. (2001)

Barbara Connolly, *Assistant Professor and Fellow in the Nanovic Institute for European Studies*. B.A., Brown Univ., 1988; M.A., Univ. of California, Berkeley, 1990; Ph.D., *ibid.*, 1997. (2001)

Michael Coppedge, *Associate Professor, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Nanovic Institute for European Studies*. B.S., Randolph-Macon College, 1979; M.A., Yale Univ., 1982; Ph.D., *ibid.*, 1988. (1995)

Fred R. Dallmayr, *the Packey J. Dee Professor of Political Science, Professor of Philosophy, Fellow in the Helen Kellogg Institute for International Studies, Fellow in the Joan B. Kroc Institute for International Peace Studies, and Fellow in the Nanovic Institute for European Studies*. LL.B., Univ. of Munich, 1955; M.A., Southern Illinois Univ., 1956; Ph.D., Duke Univ., 1960. (1978)

Alan K. Dowty, *Professor and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Shimer College, 1959; M.A., Univ. of Chicago, 1960; Ph.D., *ibid.*, 1963. (1975)

Michael J. Francis, *Director of the Latin America Area Studies Program, Professor, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Joan B. Kroc Institute*

*for International Peace Studies*. B.A., Fort Hays State Univ., 1960; Ph.D., Univ. of Virginia, 1963. (1966)

Edward A. Goerner, *Professor Emeritus*. A.B., Univ. of Notre Dame, 1952; M.A., Univ. of Chicago, 1957; Ph.D., *ibid.*, 1959. (1960)

Andrew C. Gould, *Director of Graduate Studies, Associate Professor, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Nanovic Institute for European Studies*. A.B., Harvard Univ., 1985; M.A., Univ. of California, Berkeley, 1986; Ph.D., *ibid.*, 1992. (1993)

John Griffin, *Instructor*. B.A., Boston College, 1990; J.D., Univ. of Colorado School of Law, 1995; M.A., Duke Univ., 2000. (2002)

Frances Hagopian, *the Michael Grace III Associate Professor of Latin American Studies*. B.A., Brandeis Univ., 1975; Ph.D., Massachusetts Institute of Technology, 1986. (1999)

Rodney E. Hero, *Chair of Political Science and the Packey J. Dee Professor of American Democracy*. B.S., Florida State Univ., 1975; M.A., Purdue Univ., 1976; Ph.D., *ibid.*, 1980. (2000)

Robert C. Johansen, *Professor, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Manchester College, 1962; M.A., Columbia Univ., 1963; Ph.D., *ibid.*, 1968. (1986)

Mary M. Keys, *Assistant Professor*. B.A., Boston College, 1988; M.A., Univ. of Toronto, 1989; Ph.D., *ibid.*, 1998. (1996)

Donald P. Kommers, *the Joseph and Elizabeth Robbie Professor of Political Science, Concurrent Professor of Law, and Fellow in the Nanovic Institute for European Studies*. B.A., Catholic Univ. of America, 1954; M.A., Univ. of Wisconsin, 1957; Ph.D., *ibid.*, 1962. (1963)

David C. Leege, *Professor Emeritus*. B.A., Valparaiso Univ., 1959; Ph.D., Indiana Univ., 1965. (1976)

Keir Lieber, *Assistant Professor and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Univ. of Wisconsin-Madison, 1992; M.A., Univ. of Chicago, 1996; Ph.D., *ibid.*, 2000. (2001)

Daniel A. Lindley III, *Assistant Professor and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Tufts Univ., 1983; Ph.D., Massachusetts Institute of Technology, 1998. (1999)

George Lopez, *Professor of Political Science, Director of Policy Studies and Senior Fellow in the Joan B. Kroc Institute for International Peace Studies, and Fellow in the Helen Kellogg Institute for International Studies*. B.A., Saint John Fisher College, 1972; Ph.D., Syracuse Univ., 1975. (1986)

Scott P. Mainwaring, *the Eugene and Helen Conley Professor of Political Science, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Yale Univ., 1976; M.A., *ibid.*, 1976; Ph.D., Stanford Univ., 1983. (1983)

A. James McAdams, *Director of the Nanovic Institute for European Studies, the William M. Scholl Professor of International Affairs, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Earlham College, 1976; M.A., Univ. of California, Berkeley, 1977; Ph.D., *ibid.*, 1983. (1992)

Anthony M. Messina, *Associate Professor, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Nanovic Institute for European Studies*. B.A., Assumption College, 1975; M.A., Drew Univ., 1977; Ph.D., Massachusetts Institute of Technology, 1984. (1999)

Peter R. Moody Jr., *Professor*. A.B., Vanderbilt Univ., 1965; M.A., Yale Univ., 1967; Ph.D., *ibid.*, 1971. (1971)

Layna Mosley, *the Thomas J. and Robert T. Rolfs Professor of Political Science, Fellow in the Helen Kellogg Institute for International Studies, Fellow in the Nanovic Institute for European Studies, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Rollins College, 1993; M.A., Duke Univ., 1996; Ph.D., *ibid.*, 1999. (1999)

Walter J. Nicgorski, *Professor in the Program of Liberal Studies and Concurrent Professor of Political Science*. A.B., Georgetown Univ., 1960; M.A., Univ. of Chicago, 1962; Ph.D., *ibid.*, 1966. (1964)

Guillermo O'Donnell, *the Helen Kellogg Professor of Political Science and Fellow in the Helen Kellogg Institute for International Studies*. LL.B., National Univ. of Buenos Aires, 1957; M.Phil., Yale Univ., 1971; Ph.D., *ibid.*, 1986. (1982)

Daniel Philpott, *Assistant Professor, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Univ. of Virginia, 1989; Ph.D., Harvard Univ., 1996. (2001)

Benjamin F. Radcliff, *Associate Professor*. B.A., Univ. of Illinois, 1984; M.A., *ibid.*, 1986; Ph.D., *ibid.*, 1991 (1991)

L. John Roos, *Professor*. B.A., Univ. of Notre Dame, 1965; M.A., Univ. of Chicago, 1968; Ph.D., *ibid.*, 1971. (1969)

Mitchell Sanders, *Assistant Professor*. B.A., Duke Univ., 1991; Ph.D., Univ. of Rochester, 1997. (2001)

Rev. Timothy R. Scully, C.S.C., *Professor, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Nanovic Institute for European Studies*. B.A., Univ. of Notre Dame, 1976; M.Div., *ibid.*, 1979; M.A., Univ. of California, Berkeley, 1985; Ph.D., *ibid.*, 1989. (1990)

Alvin R. Tillery Jr., *Assistant Professor*. B.A., Morehouse College, 1993; Ph.D., Harvard Univ., 2000. (2000)

Raimo Väyrynen, *Professor, Fellow in the Nanovic Institute, and Senior Fellow in the Joan B. Kroc Institute for International Peace Studies*. Cand.Soc.Sci., Univ. of Tampere, 1968; Lic.Soc.Sci., *ibid.*, 1970, Dr.Soc.Sci., *ibid.*, 1973. (1993)

A. Peter Walshe, *Director of the African Studies Program, Professor, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Wadham College, Oxford Univ., 1956; M.A., Oxford Univ., 1959; D.Phil., *ibid.*, 1968. (1966)

Christopher J. Welna, *Director of Latin American Studies, Acting Director of the Kellogg Institute for International Studies, and Concurrent Assistant Professor*. B.A., Carleton College, 1978; M.A., Princeton Univ., 1982; Ph.D., Duke Univ., 1997. (1998)

Christina Wolbrecht, *the Packey J. Dee Associate Professor of Political Science*. B.A., Pacific Lutheran Univ., 1992; M.A., Washington Univ., 1994; Ph.D., *ibid.*, 1997 (1997).

Catherine Zuckert, *the Nancy Reeves Dreux Professor of Political Science*. B.A., Cornell Univ., 1964; M.A., Univ. of Chicago, 1967; Ph.D., *ibid.*, 1970. (1998)

Michael Zuckert, *the Nancy Reeves Dreux Professor of Political Science*. B.A., Cornell Univ., 1964; M.A., Univ. of Chicago, 1967; Ph.D., *ibid.*, 1974. (1998)

## Psychology

### Chair:

Cindy S. Bergeman

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### The Program of Studies

The graduate program seeks an individualized balance between training in basic research and the learning of skills in applied behavioral science. The basic training program rests on the assumption that there is a common core of knowledge required for effective action in either sphere. It consists of mastery of the general areas in psychology (such as cognition, perception, and social) and of basic methods (such as inferential statistics, research design, and the skills of scientific writing). Solid training in this core prepares the student to make an active contribution to scholarly research as academics or to solve problems in various community, clinical, or other nonacademic settings. The student becomes an active pursuer of knowledge and is trained to put knowledge already acquired to use in practical settings.

Graduate programs exist at the doctoral level in cognitive, counseling, developmental, and quantitative psychology.

### I. Cognitive

Doctoral candidates in cognitive psychology can acquire knowledge in several areas of cognition, including human memory, attention, psycholinguistics, perception, sensation, cognitive neuroscience, and higher order processes, as well as expertise in experimental methods and quantitative analysis. Research in these substantive areas stresses issues in memory retrieval, spatial cognition, language production and comprehension, music cognition, visual and auditory processing, attention, and aging. A sophisticated array of methodologies are used, including eye tracking, event related potentials, and psychophysical scaling. This combination of experiences prepares students for postdoctoral careers in university, industry, and government settings.

## II. Counseling

The counseling psychology program, which is accredited by the American Psychological Association, is dedicated to preparing research scholars, who are grounded in traditional and innovative methodologies, culturally astute, informed, and aspire to making a significant contribution to scholarship in the discipline. Faculty members are conducting research in following areas of psychology: multicultural, health, marital, social-counseling interface, and research methods. Research training starts early in the program as all students participate in research with their advisor and in an ongoing research seminar with the full program faculty. In addition to the core counseling courses, all students take a sequence of statistics and methodology courses that provides a foundation for their research activities. Students are expected to be engaged in productive research activities throughout their graduate studies.

The counseling program faculty represent a variety of research interests. Several faculty members are interested in social, social-cognitive, and cultural issues in mental and physical health. One area of research focuses on social-cognitive factors influencing perceptions of discrimination and stigmatized status, and the relationship of perceived social inequity to psychological health, social action engagement, and perceived social networks. Another area of research concerns the effects of concealment of stigma and the general processes and results of secret keeping. The effects of concealment are studied with regard to its effects on mental and physical health. Also, there is a program of research on multicultural psychology, counseling, and education. This research includes cultural and racial identity development, cultural competency training, multicultural supervision, acculturation, and issues of mental health for persons of color.

Program faculty also conduct research in the areas of marital discord, coping with chronic and terminal illness, and the adequacy of traditional research methods. In the marital area research activity focuses on marital discord and depression. Research on chronic illness has focused on coping with cancer from the perspective of self-regulation and self-efficacy theories and on the coping efficacy of caregivers. Finally, research is being conducted into the adequacy of traditional research practices in psychology, with a focus on the development and testing of alternative research procedures.

## III. Developmental

Doctoral candidates in the developmental program study development of individuals, families, and how the two interrelate. A life-span perspective is emphasized for both the individual (infancy to old age) and the family (formation to dissolution). Typical as well as atypical development, normative transitions, and the impact of nonnormative events are examined. The methodology of developmental research is stressed, and effort is made to generate knowledge and theory that have potential for application to social issues related to the development of individuals across the life span. Areas of specialization emphasize theoretical frameworks that view the individual from a systems perspective, methodology to assess family interaction and patterns of change, and intervention techniques to facilitate human development. The emphasis is on developing substantive knowledge bases necessary for careers in research and scholarship, in teaching, and in intervention. Concentrations in developmental psychology vary according to the specific interests of students and fit into three categories: cognitive development, socioemotional development, and developmental psychopathology.

### *Cognitive Development*

This area stresses research in various specialty areas in cognition, including memory and cognitive changes during childhood, cognitive styles, and metacognition. Also included in this area is an opportunity to interface with our developing emphasis in educational psychology and our cognitive program. Developmental research emanating from the cognitive program focuses on the effects of age on the neural architecture supporting executive control and prospective memory, as well as the representation and processing of information in situational models.

### *Socioemotional Development*

Research in this area of developmental psychology focuses on social and emotional development in infancy, early childhood, adolescence, and later life. Particular areas of emphasis are attachment, parenting behaviors, friendships, and social support. The interface between personal characteristics (such as personality, gender, or temperament) and contextual factors (such as family environment, marital conflict, or parental adjustment to the teen's transition into adolescence) is highlighted. Faculty research, using behavioral genetic methodologies, also assesses genetic and environmental influences on individual differences in many of these attributes.

### *Developmental Psychopathology*

Researchers in this area focus on dysfunctional development in families and individuals across the life span, including evaluating children for behavioral and emotional disorders, mental retardation, and learning disabilities. Research on topics such as the impact of marital conflict on children's emotions; child neglect; important transitions during the teen years; and the causes of developmental delays in the children of adolescent mothers is underway. Results are sometimes used to formulate and evaluate intervention programs for remediating dysfunctional behavior. Of related interest is the identification of not only the risks and vulnerabilities associated with development, but the protective mechanisms that promote more optimal outcomes as well.

## IV. Quantitative

Doctoral candidates in the quantitative program receive advanced training in statistical methods and quantitative models applicable to psychology. The quantitative area emphasizes a wide range of topics, including traditional analysis of variance and regression, categorical data analysis, structural equation modeling, dynamical systems modeling, resampling methods, and item response theory. Quantitative students will typically apply these methods to a topic in a substantive area of psychology, such as cognitive, counseling, or developmental. The extent of the substantive training above and beyond the quantitative training will depend on the interests of the individual student.

The quantitative program faculty train students to have expertise in a variety of analytical tools and to advance methodology through novel research on statistical applications and creative use of existing techniques. Areas of expertise within the program include math modeling and statistics. As in all of our programs, there is great flexibility of curriculum, and students may work with a variety of faculty, both within and between programs.

### *Curriculum*

The graduate program in psychology is primarily oriented toward the doctoral degree and consists of two stages. The first requires a minimum of 24 hours of course work and completing and defending a research thesis. During their first year, students are expected to take PSY 507 and 508. Upon completion of first-stage requirements, a student is eligible to receive a master's degree by completing the additional requirements of the Graduate School and their particular program.

The second stage of the program ordinarily involves two more years of course work, research activity, practicum (where appropriate), and preparation for the doctoral preliminary examinations, followed by an additional year of work on the dissertation and internship (in the counseling program). To fulfill the doctoral degree requirements, students must take Advanced Research Methods (PSY 610) or Psychological Measurement (PSY 609), one additional statistics course, and at least four graduate-level seminars and achieve a total of 72 or more credit hours. In the second stage, the written preliminary examinations and the oral dissertation proposal defense are ordinarily completed during the third year. The awarding of the doctor of philosophy degree requires: (1) satisfactory performance on the departmental preliminary examinations; (2) completion of course requirements with a B average; and (3) submission of an approved dissertation to the Graduate School.

#### *Special Facilities*

Haggar Hall contains faculty offices, a variety of research laboratories, a faculty-student lounge, and classrooms. In addition, the University Counseling Center is available as a training facility for doctoral students in the counseling psychology program, and the Laboratory for Social Research provides a number of interdisciplinary training and research services.

#### *Application*

In order to be considered for admission in August, applications and supporting materials must be received by January 2 of that year (the University's deadline is February 1). No applicants are considered for January admission. The program is oriented to students who plan to attend on a full-time basis. Applicants will be expected to have completed undergraduate courses in general and experimental psychology and statistics. Applicants must take the Graduate Record Examination. Advanced subject test in psychology is preferred, but not required.

#### *Course Descriptions*

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

#### *I. Quantitative Methods Courses*

##### *506. Formal Representations of Psychological Hypotheses* (3-0-3) Wenger

This course would serve as an introduction to methods for representing hypotheses regarding psychological processes and phenomena as mathematical and/or computational models. Emphasis is placed on stochastic process models, and analytic and computational tools for constructing and exploring such models, in the context of particular psychological phenomena, will be introduced. Issues of model identifiability and testability will be emphasized. Students will be responsible for constructing and exploring the predictions of a formal representation of a hypothesis in their own area of expertise and interest.

##### *507. Quantitative Methods in Psychology I* (3-0-3) Maxwell, Schuster

*Prerequisite:* Elementary Statistics or its equivalent.

All first-year psychology graduate students at Notre Dame are required to take a two-semester statistics sequence. The first semester begins with an introduction to descriptive statistics, probability theory, and statistical inference. Well-known one- and two-sample tests will be presented. In addition the course introduces students to regression analysis for analyzing the dependence of a continuous variable onto one or more other variables. Emphasis is given to an adequate specification of the regression model by including polynomial and interaction terms in the regression functions and to the evaluation of the regression model by means of model comparison and residual analysis. (Fall)

##### *508. Quantitative Methods in Psychology II* (3-0-3) Maxwell

*Prerequisite:* PSY 507.

The second semester of the required sequence focuses on experimental design and analysis of variance as a method for investigating mean differences among groups, whether or not the groups are formed experimentally. The course begins by developing principles for assessing the validity of various types of experimental and non-experimental approaches for investigating psychological phenomena. This semester continues the model comparison theme developed in the first semester by showing how questions of mean differences can be conceptualized in terms of various statistical models. Special emphasis is placed on repeated measures designs, including the multivariate approach to data analysis. (Spring)

##### *509. Exploratory and Graphical Data Analysis* (3-0-3) Boker

The process by which psychological knowledge advances involves a cycle of theory development, experimental design and hypothesis testing. But after the hypothesis test either does or doesn't reject a null hypothesis, where does the idea for the next experiment come from? Exploratory data analysis completes this research cycle by helping to form and change new theories. After the planned hypothesis testing for an experiment is finished, exploratory data analysis can look for patterns in these data that may have been missed by the original hypothesis tests. Successful exploratory analyses help the researcher modify theories and modify or design novel experiments with focused hypothesis tests. A second use of exploratory data analysis is in diagnostics for hypothesis tests. There are many reasons why a hypothesis test might fail. There are even times when a hypothesis test will reject the null for an unexpected reason. By becoming familiar with data through exploratory methods, the informed researcher can understand what went wrong (or what went right for the wrong reason).

##### *510. Seminar in Quantitative Psychology* (3-0-3) Boker, Maxwell, Schuster, Yuan

This seminar is designed to facilitate the acquisition of a minor in quantitative psychology and to assist quantitative students in the development of their early research projects. Methodological and analytical tools will be highlighted and discussed, the procedures for doing research on quantitative issues will be examined, and direction on how to write up the results will be provided.

##### *565. Quantitative Genetics* (3-0-3) Bergeman

Quantitative genetic research provides a powerful tool for studying both genetic and environmental influences on individual differences in behavioral development. This course covers the genetic principles, methods (including family, twin, and adoption designs), and analytical techniques (e.g., intraclass correlations and model-fitting analyses) necessary for understanding hereditary and environmental influences on behavior. The use of multivariate and longitudinal models is stressed.

*607. Multivariate Analysis*

(3-0-3) Boker, Maxwell, Schuster

*Prerequisite:* PSY 508.

Multivariate analysis provides the fundamental basis for psychometric measurement and the identification of underlying common factors associated with behavior. This course begins with a review of linear algebra and provides the student with a background in multivariate regression, multivariate analysis of variance and covariance, factor analysis, canonical correlation, and discriminant function analysis. This course provides the foundations for more advanced methods for longitudinal modeling. (Fall)

*608A. Structural Equation Modeling*

(3-0-3) Boker, Yuan

*Prerequisite:* PSY 508.

Structural equation modeling has become one of the most powerful tools available for the analysis of experimental and epidemiological data arising in gerontological research. This course presents a variety of models in the context of practical theory in order to develop the student's ability to translate competing theories into testable alternative structural models. (Spring)

*608B. Advanced Structural Equation Modeling*

(3-0-3) Boker, Yuan

This course builds on the practical approach used in PSY 608A by introducing a general algebraic method for calculating covariance and means expectations. Multigroup structural modeling with means are introduced and models from twin studies, growth curve analysis models, and missing data models are used as examples.

*609. Psychological Measurement*

(3-0-3) Bergeman, Yuan

*Prerequisite:* PSY 507.

This course introduces concepts from classical test theory, generalizability theory, and item response theory. Students review the foundations of test instruments construction from these three perspectives in creating self-report, standardized, and observation/interview measures. The course also highlights issues of equality across groups, assessing change versus measurement error, criterion-referenced tests, and clinical versus statistical prediction. (Every other spring)

*610. Advanced Research Methods*

(3-0-3) Carlson, Day

This course offers students an overview of philosophy of science, study design, threats to internal and external validity, measurement, qualitative research methods, and research

ethics. Techniques of scientific writing and journal editing are described and practiced.

*611. Dynamical Systems Data Analysis*

(3-0-3) Boker

Questions posed by researchers in psychology require studying evolving behavior over time. Dynamical systems methods were developed to study just such evolving systems and can be helpful in both experimental design as well as analysis of resulting data. This course presents methods that can be used to analyze intra-individual variability from a dynamical systems perspective. Recently developed techniques such as mutual information, state-space embedding, fractal dimension, and surrogate data tests are presented along with more traditional time series and linear statistical methods.

*613. Longitudinal Data Analysis*

(3-0-3) Maxwell

The first reading in this course is a book chapter by John Nesselroade describing two fundamentally different ways of conceptualizing change: change in individual differences or individual differences in change. The former can be studied by such techniques as multiple regression and standard longitudinal applications of structural equation modeling, but the latter requires a different approach. In particular, this course focuses on multilevel models (i.e., hierarchical linear modeling, or HLM) as a methodology for studying individual growth and individual differences in change.

*617. Seminar in Quantitative Psychology*

(3-0-3) Boker, Maxwell, Schuster, Yuan

Discussion-oriented course focusing on special topics in quantitative psychology.

*618A. Formal Representations of Psychological Hypotheses 1*

(3-0-3) Wenger

*Prerequisite:* Permission of instructor.

This course serves as an introduction to methods for representing hypotheses regarding psychological processes and phenomena as mathematical and/or computational models. Emphasis is placed on stochastic models, and analytic and computational tools for constructing and exploring such models in the context of particular psychological phenomena will be introduced. Issues of model identifiability and testability will be emphasized. Students will be responsible for constructing and exploring the predictions of a formal representation of a hypothesis in their own area of expertise.

*618B. Formal Representations of Psychological Hypotheses II*

(3-0-3) Wenger

*Prerequisite:* Permission of instructor.

This course extends the methods introduced in PSY 618A by considering particular forms of stochastic models in psychology. Course content will vary by semester and will include one-dimensional and multidimensional signal detection theory (as an approach to both modeling and measurement), deterministic and stochastic linear dynamic systems theory as methods for modeling phenomena, and simple neural networks and learning models. In all cases, issues of model identifiability and testability will be considered. Students will be responsible for constructing and exploring the predictions of a formal representation of a hypothesis in their own area of expertise.

*692C. Introduction to Categorical Data Analysis*

(3-0-3) Schuster

The course provides an introduction to analyzing categorical data by means of log-linear models. The log-linear model approach is very well suited to analyze the joint distribution of categorical variables and the association among categorical variables, as well as the dependence of categorical variables upon other variables. Hence, research questions pertaining to the joint distribution, the association, and/or the dependence of categorical variables can be answered using log-linear models. Participants of the course are expected to have a basic understanding of statistical inference (hypothesis testing and parameter estimation) and regression analysis.

*II. Cognitive Area**514. Cognitive Psychology*

(3-0-3) Carlson

A general overview of the field of cognitive psychology, including issues in perception, attention, memory, language, problem solving, reasoning, cognitive neuropsychology, and cognitive science.

*515, 516. Instructional Systems Design*

(3-0-3) (3-0-3) Crowell

This course provides an introduction to the field of instructional technology with particular emphasis on computer-based learning. Topics for consideration include instructional design and measurement, computer hardware components/requirements and approaches to instructional programming. A project requirement will enable students to get practical experience in the development of educational courseware.

*518. Memory*

(3-0-3) Radvansky, West

A specialized course covering basic issues in human memory, including models of memory, forms of memory representation, basic memory phenomena, developmental changes in memory performance, and current research.

*519. Learning*

(3-0-3) Crowell, West

A study of the methods, theories, and facts associated with the investigation of the basic processes in learning. Emphasized areas include classical conditioning, instrumental learning, and operant training. The various research paradigms used in these areas will be closely examined. Some attention also is given to basic motivation theory. (Every other fall)

*520. Psycholinguistics*

(3-0-3) Eberhard

This course focuses on the major theoretical issues motivating research in each of the three primary areas of psycholinguistics: language acquisition, comprehension, and production. Topics that will be covered include the debate over whether the mechanisms of language and acquisition are innate, past and present theoretical perspectives on the interaction between linguistic and discourse processes during language comprehension, and the pragmatic and linguistic factors involved in communicating thoughts through speech.

*521. Perception and Attention*

(3-0-3) Gibson, Wenger

A specialized course covering basic foundations and recent theories of perceptual processing attention.

*522. Human Reasoning and Problem Solving*

(3-0-3) Radvansky

A specialized course covering issues of how people perform tasks that require logical reasoning. Also covered are topics on how people solve problems that confront them in the world, including issues of analogical reasoning. Emphasis will be on current issues in human reasoning and problem solving.

*525. Cognitive Methods*

(3-0-3) Carlson

This course will focus on methodology specific to studies in cognitive psychology and cognitive science. The goal is to equip the student with the necessary skills to set up and run a lab. To that end, topics will include basic programming (enough to get an experiment up and running in Basic, C, and Pascal), basic electronics (enough to en-

able interface of peripherals to a computer), use of various test equipment (oscilloscope, function generator), exposure to more sophisticated equipment (scleral reflectance eye tracker, purkinje eye tracker, head mounted eye tracker, ERP system), data manipulation, trimming, and analysis.

*529. Neuropsychology*

(3-0-3) Gibson, West

This course investigates the relationship between mind and brain from the perspectives of cognitive psychology, neuroscience, and computer science. Major topics include brain imaging techniques (e.g., PET, MRI, fMRI, and ERP), hemispheric specialization, motor control, object recognition, spatial processing, attention, language, memory, executive functions, and consciousness. The major objective of the course is to show how each of these mental processes can be linked to neuroanatomical substrates.

*563. Cognitive Development*

See course description under the developmental area course offerings.

*612. Language and Thought*

See course description under the developmental area course offerings.

*615A. Seminar in Cognition: Memory*

(3-0-3) Radvansky, Wenger, West

*615B. Seminar in Cognition: Learning*

(3-0-3) Crowell

*615C. Seminar in Cognition: Perception*

(3-0-3) Dawson, Gibson, Carlson, Wenger

*615D. Seminar in Cognition: Language*

(3-0-3) Eberhard, Carlson

*615E. Seminar in Cognition: Attention*

(3-0-3) Gibson, Carlson

*615G. Seminar in Cognition: Spatial Cognition*

(3-0-3) Carlson

*619. Seminar in Psychophysiology*

(3-0-3) West

The research, theories, and methodologies employed in the electrophysiological study of the thinking, feeling, and behaving organism are discussed. Particular emphasis is placed on the interrelationships among the cognitive, affective, and neurologic processes and the manner in which these components relate and contribute to the total functioning system.

*620. Seminar in Psychophysics*

(3-0-3) Dawson

A study of the relations between physical variables and their psychological effects. Topics will vary with the interests of the students and the instructor.

*621. Research Projects in Learning*

(0-0-3) Crowell, Whitman

Supervised research in learning.

*622. Research Projects in Perception*

(0-0-3) Carlson, Dawson, Gibson, Wenger

Supervised research in perception.

*623. Research Projects in Cognitive Processes*

(0-0-3) Borkowski

Supervised research in cognitive processes.

*III. Counseling Area**501A–H. Science/Practice Seminar*

(2-0-1) Smith

Classic and contemporary topics in the science and practice of counseling psychology. Topics rotating by semester. Typical topics include ideographic versus nomothetic research, clinical versus actuarial prediction, evidence based practice, and manualized treatment.

*502. Research Seminar*

(3-0-3) Staff

This seminar focuses on specific topics within counseling psychology research. The course is intended to help students to develop research expertise and hone their critical thinking and presentation skills. (Spring)

*531. Personality*

(3-0-3) Kelly, Meara, Merluzzi

This course considers the history and background of the study of personality as well as the influence that heredity, culture, learning, and motivation have on the development of personality throughout the life span. It also deals with personality abnormality, perceptual-cognitive influences on personality, creativity, and other topics. (Spring)

*532. Professional Psychology: Methods and Practice*

(3-0-3) Kelly, Merluzzi

Students will be introduced to the key research methods, empirical findings, and theories from the clinical/counseling psychology literature. Prospects for developing and testing new theories of psychotherapy will be discussed. Students will be encouraged to begin conceptualizing research projects and developing their own integrated theoretical approaches to treating clients. (Fall)

*533. Adult Psychopathology*

(3-0-3) Staff

DSM IV classification of mental illness. Theoretical and research approaches to an understanding of the etiology of personality disturbances. (Spring)

*534. Group Dynamics and Consultation*

(3-0-3) Merluzzi

The course will cover the theoretical foundations of small group behavior. Research on interpersonal behavior, communication, and small group dynamics will be used as the basis for laboratory experiences in which these processes can be observed and coded. The theory and research on interpersonal behavior, communication, and small group dynamics will be applied to group therapy and family therapy through a series of laboratory classes. Finally, the information on group dynamics will be applied to the consultation process. Models of consulting will be reviewed ranging from clinical supervision to consulting in commercial business and health care. (Spring)

*535. Developmental Psychopathology*

(3-0-3) Cummings

This course articulates principles for a life-span perspective on the origins and development of individual patterns of adaption and maladaptation. (Spring)

*536. Diversity Issues: Gender, Race, Sexuality*

(3-0-3), Pope-Davis

This course provides students with theory, knowledge, and skills in diversity issues pertaining to clinical and counseling psychology. (Spring)

*537. History and Systems/Ethics*

(3-0-3) Pope-Davis, Merluzzi

This course has two sections. The first covers historical trends and influential theorists in psychology. The second covers ethical and professional issues involved in psychological research and practice. In the latter section issues of ethics ethnicity and culture are reviewed. (Fall)

*538. Preventive Intervention and Program Evaluation*

(3-0-3) Staff

This course covers preventive practices as well as evaluating the effectiveness of such practices. (Spring)

*539. Clinical Skills and Interventions I*

(3-0-1) Corning

Prerequisite to practicum. Prepares doctoral students in foundational clinical skills and various counseling techniques. (Fall)

*540. Clinical Skills and Interventions II*

(3-0-1) Corning

Prerequisite to practicum. Prepares doctoral counseling students in various dimensions of the therapeutic, including providing an advanced skill base for clinical case management. (Spring)

*542. Neuropsychological Assessment*

(3-0-3) Staff

This course covers brain physiology and normal and abnormal neuropsychological functioning. In addition, procedures for assessing the integrity of neuropsychological functioning are described.

*631A. Adult Individual Psychological Assessment*

(2-4-3) Smith

An examination of the theoretical foundations and practical applications of individual intelligence tests and projective techniques. (\$10 fee) (Fall)

*631B. Adult Individual Psychological Assessment—Laboratory*

(2-3-3) Staff

Supervised experience in using psychological assessment instruments with adults. (Spring)

*633. Supervised Counseling Practicum*

(1-6-3) Staff

Supervised counseling experiences with various types of clients.

A. University Counseling Center

B. University Counseling Center

C &amp; D. Community placements

E &amp; F. Advanced practicum

(Fall, spring, summer)

*637, 638, 639. Supervised Internship in Counseling Psychology*

(0-0-1) (0-0-1) (0-0-1) Staff

Work with clients individually, in groups, and in field setting as a full-time counseling trainee. (Every year)

*642A. Psychological Assessment of Children*

(3-0-3) Staff

This course is designed to provide (1) an overview of the procedures available for the psychological assessment of children and (2) supervised experience in the utilization of these procedures. (Fall)

*642B. Psychological Assessment of Children—Laboratory*

(2-3-3) Staff

Supervised experience in using psychological assessments with children. (Spring)

*644. Supervision of Counseling*

(3-0-3) Pope-Davis, Steibe-Pasalich

An examination of strategies for supervising counseling as well as practice at being a supervisor of counseling activities. (Fall)

*IV. Developmental Area**A. General Courses**535. Developmental Psychopathology*

See course description under the counseling area course offerings.

*561. Theories of Development Across the Life Span*

(3-0-3) Bergeman, Narváez, Day

A survey of the issues, theories, and research relevant to human psychological change across the life span.

*562. Socio-Emotional Development I*

(3-0-3) Braungart-Rieker

Current research and theory in social and emotional development in infancy and early childhood are reviewed. Some of the topics covered include: attachment, temperament, emotion regulation, parenting and family issues, and peer relationships.

*563. Cognitive Development*

(3-0-3) Day, West, Narváez

Major theories in cognitive development and data relevant to those theories are reviewed. Mechanisms that might account for observed developmental changes across the life span (e.g., processing speed) are discussed.

*564. Psychology of Aging*

(3-0-3) Bergeman

A broad survey of topics relevant to the psychology of aging including social and biological aspects, personality, maladjustment and psychopathology, psychological correlates of aging, and special problems related to the psychological and physical well-being of the elderly.

*565. Behavioral Genetics*

(3-0-3) Bergeman

Behavioral genetic research provides a powerful tool for studying both genetic and environmental influences on individual differences in development. The course will cover the genetic principles and methods necessary for understanding hereditary influences on behavior and will overview genetic and environmental influences on behavioral, biomedical, and biobehavioral attributes.

*566. Socio-Emotional Development II*

(3-0-3) Gondoli

This course focuses on socio-emotional development from adolescence to late adulthood. Topics include the life-span view of attachment, developmental changes in the nature and importance of friendship and social support, and autonomy and connection in family and peer relationships.

*612. Language and Thought*

(3-0-3) Staff

The psychology of language is approached from a number of different perspectives, drawing on research from linguistics, cognitive psychology, language acquisition, developmental psychology, and philosophy. Issues covered include: the production and understanding of speech, children's acquisition of their first language, the development and structure of concepts and categories, and the relations between cognition and language.

*632. Adult Personality Assessment*

(3-0-3) Staff

This course is a continuation of PSY 630 and focuses on more complex issues in psychological assessment of adults. Topics include projective testing, neuropsychological screening, learning disabilities, assessment responses to specific questions (i.e., potential for violence, dementia vs. depression), and an introduction to forensic assessment issues (i.e., parenting, competency). This course assumes prior understanding of basic assessment techniques such as intelligence and achievement testing, self-report personality inventories, and basic report writing skills.

*635. Laboratory II and III*

(3-0-3) Staff

Supervised clinical practicum for second-year doctoral students in counseling psychology.

*636A. Practicum IV and V*

(3-0-3) Staff

Supervised clinical practicum for third-year doctoral students in counseling psychology.

*645. Marriage, Children, and the Family*

(3-0-3) Cummings

This course focuses on current trends and findings in several major areas of research on family relationships and their implications for human development, including marital relationships, parent-child relationships, marital relationships and children, sibling relationships, the role of extended family in family functioning, and intergenerational transmission of family patterns. Themes include a

family systems perspective, that is, an assumption that relationships are bidirectional, or more complex, the relevance of research to understanding adjustment, and research design and methodology for the study of family.

*646. Seminar in Family Therapy*

See course description under counseling area course offerings.

*646A. Children/Families in Conflict*

(3-0-3) Cummings

Current trends and findings pertaining to conflict within families and the effects of conflicts within families on children will be considered. A focus will be on interrelations between family systems (marital, parent-child, and sibling) and methodologies for studying these questions. A particular concern will be how positive and negative conflict processes in the marital relationship affect children.

The role of interparental conflict in various family contexts (divorce, parental depression, violence and abuse, custody, and physical illness or disability) and relations between family and community conflict and violence, will be examined. The positive side of family conflict will also be considered, including the elements of constructive marital and family conflict and strategies for promoting for constructive conflict processes within families.

*646B. Marital Therapy Seminar*

(3-0-3) Smith

This didactic course covering the principles and practice of couples therapy prepares trainees for the companion practicum (646C), through which they will subsequently carry cases at the Marital Therapy and Research Clinic. Sample topics include communication, problem-solving, domestic violence, parenting, and sex/intimacy.

*646C. Marital Therapy Practicum*

(V-V-V) Smith

Trainees who have successfully completed the Marital Therapy Seminar (646B) register for this supervised practicum every semester. They carry cases at the Marital Therapy and Research Clinic.

*661. Seminar in Developmental Psychology*

(3-0-3) Bergeman, Borkowski, Day

Contemporary topics will be offered from either the child development or the life span development area.

*662. Research Projects in Developmental Psychology*

(3-0-3) Staff

Supervised research in developmental psychology.

*663. Teaching and the Development of Thought*

(3-0-3) Day

An examination of current research in cognition and instruction. The focus is on how cognitive processes can be enhanced through education. Also included are readings and discussions on how individual differences, such as special aptitudes, may influence learning in the classroom.

*664. Personality, Psychopathology, and Aging*

(3-0-3) Bergeman

The personality development and psychopathological problems of the elderly are considered in connection with biological, social, and personal factors that relate to changes beyond young adulthood. Etiologies of mental health disorders and therapeutic interventions are covered.

*665. Motivation and Academic Learning*

(3-0-3) Turner

The course examines student motivation for learning as a function of both individual differences and classroom environments. We study the major theories of achievement motivation and will discuss them from theoretical, empirical, and developmental points of view. Formulating motivational implications for teaching and learning in K through 12 and college classrooms is an integral part of the course.

*666. Seminar: Theory and Research in Aging*

(3-0-3) Bergeman

This course covers contemporary research topics in gerontological research, theoretical approaches to these issues, and types of research designs used in the study of the aged.

*B. Mental Retardation Courses**667. Seminar: Experimental Analysis of Behavior*

(3-0-3) Whitman

The basic principles governing human behavior within the framework of social, operant, and respondent learning. The technology derived from these principles is surveyed with special attention to the analysis of behavior and application of change procedures within educational, home, and institutional settings.

*668. Seminar: Mental Retardation*

(3-0-3) Borkowski, Whitman

A general descriptive, theoretical, and empirical overview of the area of mental retardation with special emphasis on the etiology and modification of retardation within a learning-developmental framework.



*669. Seminar: Comparative Approaches to Cognition and Intelligence*

(3-0-3) Borkowski

Methods, data, and theory relating to cognitive changes in normal and handicapped children, adults, and the aged are considered. The content focus is on the use of theories of intelligence and cognition to understand the performance of "special" children.

*670. Developmental Issues in Mental Retardation*

(3-0-3) Borkowski, Whitman

Effect of early experience upon the incidence and development of mental retardation is examined. Special attention is given to the defect vs. difference theories and the controversies surrounding the issue of intelligence.

*671. Sociocultural Aspects of Mental Retardation*

(3-0-3) Borkowski, Whitman

An examination of the reciprocal effects of the mentally retarded and society upon each other. The effects of the family, institutionalization, and normalized community programs upon the retarded and their ethical implications are examined within a psychological and sociological perspective.

*672. Research and Theory in Mental Retardation*

(3-0-3) Borkowski, Whitman

Current research literature in mental retardation with emphasis devoted to the types of theories and methodologies being employed.

*673. Mental Retardation: Learning, Memory, and Cognition*

(3-0-3) Borkowski, Whitman

Current research in learning, memory, and cognition in both normal and retarded children. Focus is on theories and techniques that yield behavioral generalization across time and settings.

*675, 676. Practicum: Behavioral Assessment and Programming with the Mentally Retarded*

(3-0-3) (3-0-3) Borkowski, Whitman

A practicum providing the student with the opportunity to develop, use, and assess the effects of behavior modification procedures in institutional, school, and other community settings.

*677A, B. Research Projects in Mental Retardation*

(0-0-V) (0-0-V) Borkowski, Whitman

Students are supervised during the conceptualization, conduct, data analysis, and formal written presentation of projects using mentally retarded subjects.

*695A. Research/Special Topics*

(V-V-V) Staff

*695B. Reading/Special Topics*

(V-V-V) Staff

*V. Additional Course Offerings*

*685. Seminar in Social Psychology*

(3-0-3) Staff

Contemporary topics in social psychology. Student participation includes presenting research results and experimental proposals and leading discussions. Sample topics include social cognition, person perception, attitudes, and stereotypes.

*VI. Research and Unspecified Courses*

*593, 594. Seminar: Special Topics*

(3-0-3) (3-0-3) Staff

Topics and prerequisites to be specified by the instructor.

*595A, B. Seminar in Behavioral Techniques in Business*

(3-0-3) (3-0-3) Staff

An ongoing seminar on the principles of behavioral techniques and their application to ongoing organizational and work settings.

*596A, B. Practicum in Behavior Management*

(V-V-V) (V-V-V) Crowell

Supervised internship in practice of behavior management.

*599. Thesis Direction*

(V-V-V) Staff

For students doing work for a research master's degree, maximum of six hours allowed.

*600. Nonresident Thesis Research*

(0-0-1) Staff

For master's degree students.

*647. Seminar: Computer Programming and Applications*

(3-0-3) Staff

An introduction to computer programming for psychologists.

*695. Seminar: Special Topics*

(3-0-3) Staff

Topics and prerequisites to be specified by the instructor.

*696. Seminar: Instrumentation in Psychology*

(3-0-3) Staff

Practical training in the use of instruments and types of equipment often employed in psychological research.

*699. Research and Dissertation*

(V-V-V) Staff

For resident graduate students who have completed all course requirements for the Ph.D.; maximum of 12 hours allowed.

*700. Nonresident Dissertation Research*

(0-0-1) Staff

For doctoral students.

*701A. Graduate Seminar: Introduction to Teaching*

(1-0-1) Staff

Designed to be taken concurrently with the first two semesters of a student's teaching assistantship, ordinarily in years one, two, or three. It will meet five times (approximately every third week) per semester for 1-1/2 hours. The primary goals of the course are to orient students to the profession of teaching, assist them in their assigned tasks as TAs, and practice the skills of observing and reflecting on their experiences in the classroom setting. An additional five hours of observing/interviewing in other departments of the University and in local schools/colleges/universities will be required. The courses will be graded Satisfactory or Unsatisfactory.

*N.B. Those who are assigned teaching assistantships, but who do not plan to take the above course for credit, would be welcome to participate as fully as they wish in the meetings, especially the processing of their experience as TAs, but they would not be responsible for any materials or activities outside these meetings.*

*701B. Graduate Seminar: Theories and Methods*

(3-0-3) Day

Recent theory and research on students' learning is reviewed, particularly as such learning occurs in institutions of higher education. Models of effective instruction are described. Other topics include writing lesson plans, developing a teaching philosophy, testing, and grading. (Offered every other fall for students in their second year or beyond.)

*702A. Graduate Practicum: Course Planning*

(3-0-3) Staff

Students will meet on a regular basis as they prepare to be the instructor of record in an Intro or Stats/Methods or 300-level content course (e.g., abnormal, developmental, cognitive, etc.). Ordinarily, students will have their teaching assignment for the following year by this point and can focus on a specific preparation. They will write objective, create syllabi, critique planned assignments, design tests,

discuss grading, etc. In conjunction with the current instructor of record, they may be responsible for giving a lecture/presenting a unit in the instructor's class. Grading is S/U. (Offered every spring for students in their second year or beyond.)

*702B. Graduate Practicum: Course Delivery and Evaluation*

(1-0-1) Staff

(May be elected for a maximum of two semesters.) Graduate students who are new instructors of record, ordinarily in their fourth or fifth years, will meet throughout the semester to reflect on their experience of teaching, engage in group problem solving, and revise their syllabi. A central component of this level of the teaching practicum is being observed by other class members as well as the supervisor, and learning to improve teaching skills through the integration of constructive feedback. Grading is S/U. (Offered fall and spring semesters).

*702C. Graduate Practicum*

(V-V-V) (V-V-V) Staff

Supervised teaching in the classroom or laboratory for first year composition or other departmental courses. May be elected for a maximum of two semesters.

*Faculty*

*Cognitive Area*

D. Chris Anderson, *Professor Emeritus*. B.S., Univ. of Portland, 1955; M.A., *ibid.*, 1957; Ph.D., *ibid.*, 1966. (1967)

Laura A. Carlson, *Director of Graduate Studies and Associate Professor*. B.A., Dartmouth College, 1987; M.A., Michigan State Univ., 1991; Ph.D., Univ. of Illinois, 1994. (1994)

Charles R. Crowell, *Associate Professor and Director of the Computer Applications Program*. B.A., Univ. of Notre Dame, 1969; M.A., Univ. of Iowa, 1972; Ph.D., *ibid.*, 1973. (1974)

William E. Dawson, *Associate Professor*. B.S., Wayne State Univ., 1961; M.A., *ibid.*, 1963; Ph.D., Harvard Univ., 1968. (1969)

Kathleen M. Eberhard, *Assistant Professor*. B.A., Univ. of Rochester, 1987; M.A., Michigan State Univ., 1991; Ph.D., *ibid.*, 1993. (1996)

Bradley S. Gibson, *Associate Professor*. B.S., Colorado State Univ., 1982; Ph.D., Univ. of Arizona, 1992. (1994)

Gabriel A. Radvansky, *Associate Professor*. B.A., Cleveland State Univ., 1987; M.A., Michigan State Univ., 1989; Ph.D., *ibid.*, 1992. (1993)

Michael J. Wenger, *Assistant Professor*. B.S., Univ. of Washington, 1982; M.S., *ibid.*, 1989; Ph.D., Binghamton Univ., 1994. (1999)

Robert L. West, *Assistant Professor*. B.A., Western Kentucky Univ., 1991; M.A., *ibid.*, 1993; Ph.D., Univ. of South Carolina, 1996. (1999)

*Counseling Area*

Willis E. Bartlett, *Associate Professor Emeritus*. B.S., Ohio State Univ., 1960; M.A., *ibid.*, 1962; Ph.D., *ibid.*, 1967. (1968)

Alexandra Corning, *Assistant Professor*. B.S., Univ. of Florida, 1988; M.S., Loyola Univ., 1990; Ph.D., Ohio State Univ., 1994. (2000)

George S. Howard, *the Morahan Director of the Arts and Letters Core Course Program, Professor, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Marist College, 1970; M.A., Southern Illinois Univ., 1972; Ph.D., *ibid.*, 1975. (1981)

Anita E. Kelly, *Associate Professor*. B.S., Northwestern Univ., 1986; M.S., Univ. of Florida, 1988; Ph.D., *ibid.*, 1991. (1994).

Sheridan P. McCabe, *Associate Professor Emeritus*. A.B., St. Mary's Seminary, 1952; S.T.B., *ibid.*, 1954; M.A., Catholic Univ. of America, 1956; Ph.D., *ibid.*, 1958. (1967)

Naomi M. Meara, *the Nancy Reeves Dreux Professor of Psychology Emerita*. B.A., Ohio State Univ., 1958; B.Sc., *ibid.*, 1960; M.A., Syracuse Univ., 1962; Ph.D., Ohio State Univ., 1967. (1986)

Thomas V. Merluzzi, *Associate Professor*. A.A., St. Thomas Seminary, 1966; M.A., Ohio State Univ., 1971; Ph.D., *ibid.*, 1975. (1974)

Donald Pope-Davis, *Associate Vice President for Graduate Studies and Associate Dean of the Graduate School, Professor of Psychology, Director of McNair Program, Fellow in the Center for Social Concerns, and Fellow in the Institute for Educational Initiatives*. B.A., Illinois Benedictine College, 1976; M.Sc., Indiana Univ., 1978; Ph.D., Stanford Univ., 1989. (2000)

David A. Smith, *Associate Professor*. B.A., Univ. of Minnesota, 1983; M.A., *ibid.*, 1986; Ph.D., State Univ. of New York, Stony Brook, 1991. (1997)

William F. Tageson, *Associate Professor Emeritus*. B.A., San Luis Rey College, 1948; M.A., Catholic Univ. of America, 1955; Ph.D., *ibid.*, 1960. (1969)

*Developmental Area*

Cindy S. Bergeman, *Chair and Associate Professor*. B.S., Univ. of Idaho, 1979; M.S., Pennsylvania State Univ., 1987; Ph.D., *ibid.*, 1989. (1990)

John G. Borkowski, *the McKenna Family Professor of Psychology and Fellow in the Institute for Educational Initiatives*. A.B., St. Benedict's College, 1960; M.A., Ohio Univ., 1962; Ph.D., Univ. of Iowa, 1964. (1967)

Julia M. Braungart-Rieker, *Associate Professor*. B.S., Syracuse Univ., 1987; M.S., Pennsylvania State Univ., 1990; Ph.D., *ibid.*, 1992. (1992)

E. Mark Cummings, *the Notre Dame Professor of Psychology, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Johns Hopkins Univ., 1972; M.A., Univ. of California, Los Angeles, 1973; Ph.D., *ibid.*, 1977. (1996)

Jeanne D. Day, *Professor*. B.A., Univ. of California, San Diego, 1974; M.A., Univ. of Illinois, 1977; Ph.D., *ibid.*, 1980. (1980)

Dawn M. Gondoli, *Assistant Professor*. B.A., State Univ. of New York at Buffalo, 1986; M.S., Univ. of Arizona, 1991; Ph.D., *ibid.*, 1994. (1996)

Darcia Narváez, *Associate Professor*. B.A., Univ. of Northern Colorado, 1976; M.Div., Luther Northwestern Seminary, 1984; Ph.D., Univ. of Minnesota, 1993. (2000)

John Francisco Dos Santos, *Professor Emeritus*. B.S., Tulane Univ., 1948; M.S., *ibid.*, 1952; Ph.D., *ibid.*, 1958. (1965)

Julianne C. Turner, *Assistant Professor and Concurrent Assistant Professor in the Institute for Educational Initiatives*. B.A., College of New Rochelle, 1968; M.Ed., Boston College, 1975; Ph.D., Univ. of Michigan, 1992. (1995)

Thomas L. Whitman, *Professor*. B.S., St. Norbert College, 1962; M.A., Univ. of Illinois, 1965; Ph.D., *ibid.*, 1967. (1967)

### Quantitative Area

Steven M. Boker, *Assistant Professor*. B.S., Univ. of Denver, 1972; M.A., Univ. of Virginia, 1994; Ph.D., *ibid.*, 1996. (1996)

Rev. William A. Botzum, C.S.C., *Professor Emeritus*. B.A., Univ. of Notre Dame, 1938; Ph.D., Univ. of Chicago, 1950. (1948–51, 1966)

Scott E. Maxwell, *the Matthew A. Fitzsimons Professor of Psychology*. B.S., Duke Univ., 1972; M.A., Univ. of North Carolina, 1974; Ph.D., *ibid.*, 1977. (1982)

Christof Schuster, *Assistant Professor*. B.A., Technical Univ. of Berlin, 1987; M.S., *ibid.*, 1992; Ph.D., *ibid.*, 1997. (1999)

Anre Venter, *Associate Professional Specialist*. B.A., Univ. of Cape Town, 1980; M.A., Univ. of Notre Dame, 1994; Ph.D., *ibid.*, 1996. (1996)

Ke-Hai Yuan, *Associate Professor*. B.S., Beijing Institute of Technology, 1985; M.A., *ibid.*, 1988; Ph.D., Univ. of California at Los Angeles, 1995. (2001)

## Sociology

### Chair:

Daniel J. Myers

### Director of Graduate Studies:

David M. Klein

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### The Program of Studies

The Department of Sociology offers training leading to the conferral of two graduate degrees: the master of arts (M.A.) and the doctor of philosophy (Ph.D.). Although the M.A. degree is available to graduate students, admission is given to applicants whose goal is the doctorate.

The principal aims of this graduate training are to educate students in the theory and methods of social science, and to develop in them a competence as professionals in specific fields of sociology. A mastery of sociology in general and a strong background in the techniques that are used in scholarship and teaching in the discipline will enhance the potential of graduates for employment as academic and applied researchers, as instructors

in colleges and universities, and as practitioners in government and the private sector.

Preference for admission to the graduate program in sociology is given to students who have taken social science at the undergraduate level. A course in elementary statistics is also preferred. If a student does not have this course, it may be made up while in graduate school.

The M.A. degree requires 30 hours of credit, of which six credit hours may be earned for the master's thesis. All students must complete and defend a research thesis for the master's degree.

The doctoral program normally occupies four years of full-time work for students with the bachelor's degree. Core requirements must be fulfilled in the first two years according to scheduled sequencing. Intensive independent study in the student's field of specialization is generally initiated in the second year. It is expected that the student will have completed all but the dissertation requirement by the conclusion of the third or fourth year of graduate study.

Several basic courses are required of all students who enter with only a bachelor's degree; in addition, they are required of other students who cannot demonstrate previous equivalent work at the graduate level. These courses include: one semester of classical sociological theory, for three credit hours; a one-semester overview of sociological methods, for three credit hours; one semester of advanced social statistics (SOC 593), for three credit hours (the student must have taken a more elementary statistics course as a prerequisite, or have received the permission of the instructor); a proseminar, extending across two semesters for a total of three credit hours (includes an introduction to faculty and facilities at the University and sessions on professional skills such as computing); and one semester of participation in a research practicum for a total of three credit hours.

Students are required to take at least four seminars, including at least one from each of the following two divisions: (1) advanced seminars in sociological theory and (2) advanced seminars in sociological methods or social statistics.

Beyond these, students may choose their areas of specialization in sociology, but the department is particularly strong in methodology and statistics, theory, organizations, social

psychology, family, sociology of religion, comparative historical, political sociology, sociology of education, and sociology of culture.

If the emphasis and needs of the student's interests require course work in other departments, the student may undertake such courses with the approval of his or her adviser and the director of graduate studies. It is also possible for the student to construct specialty areas provided faculty specialization is available.

To fulfill the training and research requirements, each candidate must select two specialty areas and pass a comprehensive examination in each. Dissertation research must be undertaken in at least one of the specialty areas.

Faculty members in sociology are affiliated with various institutes and centers providing additional opportunities for graduate studies: the Center for Research on Educational Opportunity, the Helen Kellogg Institute for International Studies, the Erasmus Institute, the Institute for Latino Studies, and the Nanovic Institute for European Studies.

Teaching and research assistantships, fellowships for applicants from minority groups, dissertation-year fellowships, and tuition scholarships are available.

For a more detailed description of the graduate program requirements, the student is urged to send for a copy of the department's special bulletin.

### Course Descriptions

Each course listing includes:

- Course number
- Title
- (Lecture hours per week—laboratory or tutorial hours per week—credits per semester)
- Instructor
- Course description
- (Semester normally offered)

### 502. Population Dynamics (3-0-3) Williams

Demography, the science of population, is concerned with virtually everything that influences, or can be influenced by, population size, distribution, processes, structure, or characteristics. This course pays particular attention to the causes and consequences of population change. Changes in fertility, mortality, migration, technology, lifestyle, and culture have dramatically affected the

United States and the other nations of the world. These changes have implications for a number of areas: hunger, the spread of illness and disease, environmental degradation, health services, household formation, the labor force, marriage and divorce, care for the elderly, birth control, poverty, urbanization, business marketing strategies, and political power. An understanding of these is important as business, government, and individuals attempt to deal with the demands of the changing population.

*503. The Information Society*

(3-0-3) Hachen

This seminar explores the social, political, economic, cultural, and organizational impacts of the information technology revolution. Among the topics examined are globalization, networked enterprises, transformation of work and employment, mass communication, conceptions of time and space, new social movements, the role of the nation state, and the crisis of democracy. Attention is also given to assessing the adequacy of existing sociological theories for understanding the changes that are occurring as the result of the information technology revolution.

*504. Exploring Identities*

(3-0-3) Pínglé

How do we define ourselves? What are the various components of one's identity and how do we begin to understand these issues sociologically? These themes form the outlines of this course. We will explore identities, their formation, and their consequences, in post-colonial and in Western societies, in peaceful, and in societies experiencing ethnic/racial conflict, among women and men, and in developed and in developing countries. Drawing on novels, films, autobiographies, and sociological arguments we will piece together a framework for understanding the identity landscapes of which we are a part.

*510. The Legacy of Exile: Cubans in the U.S.*

(3-0-3) Guillermo, Grenier

This class deals with one of the most visible and political of all U.S. immigrant groups: Cubans. The theme of the class is that the Cuban presence has been shaped by the experience of exile. In understanding the case of the Cuban immigration to the United States, the students will gain insight into the dynamics of U.S. immigration policy, the differences between immigrants and exiles, inter-ethnic relations among newcomers and established residents, and the economic development of immigrant communities. The class will

explore the long tradition of Cuban immigration to the United States, the elements of Cuban culture that have emerged and reinforced this tradition of migration, and the impact that Cubans have had on the Miami area as well as the changes within the community as it develops into a well-established minority group within the United States.

*511. Classical Social Theory*

(3-0-3) Halton, Valenzuela, Weigert

An examination of the characteristics of the 19th-century episteme in knowledge and the space occupied by the human sciences. Specific theorists are discussed. (Fall)

*513. Research Methods*

(3-0-3) LeClere, Williams, Pínglé

Introduction to the philosophy of science, theory construction, research design, measurement, and sampling as they apply to sociological research. (Spring)

*515. Political Sociology*

(3-0-3) Fishman, Valenzuela

A survey of the major theoretical traditions in the field, followed by a special focus on issues such as the process of state formation, sequences and forms of political development, the social bases of parties and their formation, the characteristics of party systems, the origins of democracies, the breakdown of democracies, the characteristics of authoritarian regimes, etc. Examples and case studies will be drawn from Europe and the Americas.

*516. Visual Sociology: Exploring Society*

*Photographically*

(3-0-3) Cárdenas

This course examines the uses of photography and film in sociology and explores the impact of visual expression on society. This includes introductory work in documentary photography and film, gender advertising, ethnographic film, political cinema, muralism, and social protest art. This is a sociology course and emphasizes the study of societal aspects of photography, film, and artistic expression, rather than technique, without ignoring the relationship between the two aspects. The course does not emphasize the technical/lab training in photography. This course, while broad in scope, relies on content that is very heavily grounded on a social problem context as is found in the U.S., the American Southwest, Mexico, and Latin America.

*517. International Migrations and Human Rights*

(3-0-3) Bustamante

This seminar focuses on research reports on

U.S. immigration from Mexico and critiques research methods and basic differences in the interpretation of data. A review of the literature is discussed with an emphasis on policymaking on immigration in the U.S. and Mexico. A comparison is made between the debate concerning migrants' human rights in various parts of the world. A critique of scientific theories focusing on the relationship between international migrations and human rights is also included.

*519. Social Stratification in American Society*

(3-0-3) Carbonaro

This course is designed to give students an overview of the major theories and empirical research that describe and explain social and economic inequality in American society. In the course, we will cover the following topics: social mobility across generations; gender and racial inequalities in status and income; the role of labor markets in creating inequality; studies of the "underclass" (or urban poor); and the role of social policy in ameliorating the social problem of poverty. Special attention will be given to the role of education as a mechanism of stratification in each of the topics covered.

*520. Organizations*

(3-0-3) Hachen

This seminar is an in-depth introduction to theories of and research on organization. Theoretical perspectives on social organization examined include functionalism, systems theory, contingency models, action frameworks, and both Marxian and Weberian approaches. The utility of theoretical perspectives is assessed by examining organizational dynamics. Among the topics investigated are goals and strategies, technologies, decision making, conflict, power, legitimation processes, forms of control, and organization-environment relations.

*521. Labor Markets and Social Class*

(3-0-3) Hachen

In alternating years, focuses on social class and labor markets. The seminar on social class examines theories of and research on class structure, class formation, and social inequalities. Special attention is given to issues concerning the nature of the "middle class," historical changes in class structures, the relation between class and income, intergenerational mobility, and debates about the emergence of new social classes. The seminar on labor markets focuses on economic and sociological approaches to understanding labor market processes and structures. After examining economic analyses of supply and

demand in labor markets, various sociological perspectives are discussed, including segmentation theories, discussions of internal labor markets, research on job mobility, and models of employment relations. Historical, case study, quantitative, and comparative research is surveyed.

*524. Cultural Studies: Art and Cultural Critique*

(3-0-3) Halton

Cultural studies is a catchall term describing a wide array of writings in the social sciences and humanities, the common concern of which involves a concept of culture and a sense that the borders between disciplines are either unnecessary or, at the least, highly permeable. Although the term "culture" has come into the foreground in the social sciences, literary criticism, and philosophy, it often signifies a highly contested terrain with widely diverse understandings of what constitutes a culture. The seminar will explore the ways the arts relate to cultural critique, both as expression of new modes of feeling and understanding and as a source for a critical perspective.

*525. Sociology of Culture*

(3-0-3) Spillman

Examines thinking about values, norms, symbols, and rituals in sociological analysis. We read important classical and contemporary texts with concrete illustrations.

*527. Culture and Power*

(3-0-3) Spillman

How do norms, values, symbols, and rituals operate to dominate or empower? In this class we will examine a number of important classical and contemporary texts that offer answers to this question, which has been a theme of recent work in a variety of fields in sociology. At the same time we will examine concrete cases selected from studies of development, deviance, gender, mass communications, organizations, social movements, and stratification.

*528. Social Ties, Social Networks, Social Capital*

(3-0-3) Fishman

This course examines three fundamental and interrelated sociological concepts, each of which offers us an approach to the study of social connections and their impact on the human experience. Social ties, social networks, and social capital overlap substantially in their scholarly usage but the concepts are far from identical. We will review theoretical and methodological literature on all three

concepts as well as major empirical studies that examine the world through one or more of these perspectives. We will explore both theoretical and practical arguments for the selection of one or more of these conceptual approaches as the basis for studying how social connections shape the human experience. The course is intended to stimulate a critical reading of recent literature on contemporary society and to assist students who wish to use one or more of these concepts in their work.

*530. Crime and Deviance in Ideological Perspective*

(3-0-3) Welch, McVeigh

This seminar course examines selected issues in the study of crime and deviance such as white-collar crime, gang violence, and pornography. Issues will change each time the course is offered. We compare responses made by those representing the left and right in American society and critique the adequacy of these responses from a sociological viewpoint.

*531. Social Interaction*

(3-0-3) Weigert

This course develops a symbolic interactionist perspective within social psychology. Readings focus on theoretical and empirical aspects of the interactional dimensions of the way we live as selves in relationship to others and social organizations. Students are responsible for discussions and a term paper.

*534. The Schooled Society: How Schools Shape Who We Are and How Society Works*

(3-0-3) Carbonaro, Sikkink

Everyone knows schools teach students the "three Rs" (reading, 'riting, and 'rithmetic). However, few people think about the fourth "R" that schools teach us: our roles in society. In this course, we will examine how our experiences in school affect who we are as individuals. How do schools influence the way in which we play our many roles in life? Do schools have a "hidden curriculum" to make us good workers, conscientious citizens, responsible family members, etc.? What stake do various actors in society have in the people we become? We will examine both functionalist and conflict interpretations of how schools reproduce social relations and who benefits from such social arrangements.

*535. World Families*

(3-0-3) Aldous, Klein

World Families is a course designed to examine families across space and through time. The families to be studied come from a number of societies other than the United States. Also considered will be families in the United

States as they existed in earlier periods to give another basis for comparison among families today.

*539. Sociology of Education*

(3-0-3) William Carbonaro

Sociologists have identified the school as a fundamentally important social institution that both shapes, and is shaped by, the larger society. In this course, we will examine where schools "came from," how schools "work," and focus on how they "fit" with society's main social, economic, and political institutions. Topics covered in the course will include school expansion, the school as an agent of socialization, schools and social inequality, school organization, and school reform.

*541. Family Policy Seminar*

(3-0-3) Aldous

The seminar covers family policy in the United States and in other countries, with a concentration in the United States. There are comparisons of the background, content, and consequences of policies in the various countries. Such provocative topics as welfare policy, parental leave, and child care are discussed. The relation between families and the work setting or families and government will also be addressed. A discussion format is used. Students write a term paper on some aspect of family policy.

*542. Labor Movement Formation and Politics*

(3-0-3) Valenzuela

There have been two important changes in the position of workers within national societies since their early "heroic" period of protest. First, workers have won the right to organize into unions, and second, organized workers have created new political parties or established privileged links to existing ones. The course focuses on this dual process of change by examining various theoretical perspectives.

*545. Family I*

(3-0-3) Aldous, Klein

Covers current theoretical developments in the area of the family as well as particular data collection methods. Contemporary and continuing issues that family scholars have addressed are covered in the context of theory and research. Application of family research findings to policy, therapy, and other service-oriented fields is also covered. (Typically offered in the fall)

*546. Family Problem Solving*

(3-0-3) Klein

This course provides an in-depth analysis of the processes families use to solve the prob-

lems they face. Material is drawn from the social psychology of small groups, the sociology of formal organizations, and research and theory directly concerned with family problem solving.

*547. Designing Research Projects: Practical Problems and Theoretical Issues*

(3-0-3) Fishman

The course is intended to familiarize students with practical problems and options—as well as some underlying theoretical issues—encountered by social scientists in the course of qualitative or field research. Themes covered include consideration of the relationship between broad interpretive categories and specific empirical observations as well as the delineation of a research problem. Research strategies discussed include comparative historical work, historical case studies, observation, survey research, and qualitative interviewing. Students are asked to formulate a research proposal and to carry out practical exercises involving the use of several research strategies.

*549. Sociology of Masculinity*

(3-0-3) Staff

This seminar explores the social construction of masculinity in its many forms, both traditional and emerging, through readings, movies, discussions, and writing assignments. Members of the seminar will seek a better understanding of shifting roles, identities, and social structures that influence the way both males and females develop the meaning of masculinity. Topics include socialization, role conflicts, gender violence, sexuality, the impact of fathering, and men's movements. The course draws attention to the often unnoticed existence of multiple masculinities in the United States and around the world. This course is intended to complement the study of gender in other disciplines.

*550. Sociology of Development: Theories and Issues*

(3-0-3) Bustamante, Valenzuela

The first part examines critically major theoretical statements, classical and contemporary, that inform the field. Readings are from Smith, Marx, Durkheim, Weber, and present-day modernization and dependence perspective authors. The second part discusses specific issues of Third World development. Topics vary but generally include trends in urbanization, impact of multinational corporations on host countries, political authoritarianism or democracy, equity versus growth, etc.

*551. Sociology of Religion I*

(3-0-3) Christiano, Welch, Yamane

Classical and contemporary theories in the sociology of religion. Culture, stratification, ideology, and determinations of experience are some of the key issues related to societal and personal formulations of religion. Classical authors such as Durkheim, Marx, and Weber are considered.

*553. Building Democratic Institutions in Latin America and European First Wave Democracies*

(3-0-3) Valenzuela

Elements of democratic regimes emerged long before the regimes as such can be identified as being minimally in place. Beginning with a brief discussion of the essential features of democracies, the course examines how and why such institutions emerged, and the critical moments in which the actual transitions to the new democratic regimes occurred. The course focuses on democratizations that took place before World War II, and will examine key European and Latin American cases.

*557. Historical and Comparative Sociology*

(3-0-3) Valenzuela

Reviews some of the basic techniques in historical research, discusses comparative research designs in the social sciences, and examines critically major works using comparative analysis. Students are encouraged to write proposals using comparative analysis.

*560. Research in Sociology of Education*

(3-0-3) Hallinan

This seminar is a research practicum in the sociology of education. It will address theoretical, empirical, and policy-related issues in education from a sociological perspective. Ongoing research and analysis of major longitudinal surveys will be discussed. Students will have the opportunity to participate in the analyses of these data. The seminar would be useful to students beginning research on a master's thesis or doctoral dissertation in the sociology of education.

*565. Religion in Postwar America*

(3-0-3) Yamane

This course surveys the major developments in religious life in the United States since the 1950s through an in-depth examination of several of the most important recent books on the subject, such as: Wade Clark Roof's *Spiritual Marketplace*, Tom Beaudoin's *Virtual Faith*, Christian Smith's *American Evangelicalism*, and Helen Berger's *A Community of Witches*. With these works as the backdrop, each student will research and write his or her family's religious history across three generations.

*566. Sociology of Consumption*

(3-0-3) Halton

Consumption touches on themes that were not only crucial to the founders of sociology, but that reach from the sources of identity and small-scale processes to the problems of the emerging global economy and culture. Consumption studies are becoming increasingly prominent throughout the social sciences.

Today's consumer societies offer the promises of affluence, of conveniences, of "the good life." Yet it is by no means clear that the massive technological advances and material gains in advanced industrial societies have contributed to a better way of life—many would say increased meaninglessness is the actual result; a "goods life" instead of "the good life." This seminar will consider some of the central issues and works in the emerging field of consumption studies.

*567. Schools in Society*

(3-0-3) Hallinan

This seminar examines and discusses major contemporary issues about schools and the schooling process. Topics include the role of schools in society; the political, economic, and social dimensions of schooling; education reform and its underpinnings; the social and organizational structure of schools; and the transformation of higher education. Invited speakers from off and on campus lead or participate in the discussions.

*569. School Organization and Community*

(3-0-3) Hallinan

This course will provide students with knowledge about the current state of educational practice in the United States. Contemporary educational issues will be analyzed from the perspective of sociological theory and research. The seminar will have two components. First, students will read and critique studies published in sociology and education journals. Second, students will make progress on their own research projects in sociology of education, make presentations of this work in class, and submit a final paper as a course requirement.

*570. School Organization in Public Policy*

(3-0-3) Hallinan

In this seminar students employ sociological theory and research to examine current educational issues and policies. Topics may include school organization, student achievement, national assessment, school choice, school integration, student networks, and school financing.

*571. Protests, Riots, and Movements*

(3-0-3) Myers

This course is concerned with how people act together to pursue collective political aims via extrainstitutional forms of behavior: When and why do people go outside the conventional political structure to address social issues important to them? During the course, we examine political behavior ranging from the relatively mild (like a letter writing campaign) to the severe (like rioting, looting, and killing). We also discuss aspects of collective behavior that are less political in nature (like panics and fads). Some of the social movements we discuss include the civil rights movement, the women's movement, the anti-war movement, the gay and lesbian movement, pro-life and pro-choice movements, and the environmental movement (among many others). In the end, we try to explain how grievances, resources, the political environment, repression, individuals, decision making, and movement tactics all contribute to the success and failure of protest movements, their impact on social change, and the future of activism.

*574. Society and Identity*

(3-0-3) Weigert

This course looks at sources, dynamics, and consequences of identity in contemporary society. Identity is conceived as definitions of an individual that self and others use as a basis for interacting with one another. Significant outcomes of the way we are defined are the life chances, evaluations, and emotional meanings we experience. The course format is a discussion seminar. Grades are based on participation, an essay examination, and a 15-page research paper.

*575A, B. Research Practicum (M.A.)*

(3-0-3) (3-0-3) Fishman, Hachen, Hallinan

The aim of this research practicum is to assist second-year graduate students in writing their master's theses.

*576. Social Breakdown in American Society*

(3-0-3) Welch

This course examines the apparent weakening of the fabric of social life in America that has occurred within the past half-century. It investigates the past influences of both the market economy and the political welfare state on several central societal problems, such as the deterioration of interpersonal trust, the erosion of social obligations and informal social control, and the lessening of altruistic concern for others. Students will discuss the significance of these problems, as well as potential solutions.

*577. Families and their Interrelations with Gender*

(3-0-3) Aldous

A consideration of the part gender plays in family processes like the couple formation through cohabitation and/or marriage, having and rearing children, division of labor, and the post-children era.

*578. CREO Seminar*

(3-0-3) Hallinan

Most sessions of the CREO Seminar feature a presentation of educational research by an invited speaker from off campus or by a Notre Dame faculty member or graduate student. The content of the presentation is discussed and students write a brief reaction. Other sessions are devoted to a discussion of chapters in the *Handbook on the Sociology of Education*. The seminar runs for both semesters during the academic year and students receive three credits for the entire year.

*585. Materials and Methods of Demographic Analysis*

(3-0-3) LeClerc

This course is a survey course in techniques widely used in demographic analysis. These techniques include those that describe population structure, analyze demographic dynamics, and evaluate demographic data. In addition, many of the analytic skills and techniques stressed throughout the course have more general applicability in social science research. The aim of the course is to acquaint students with the nature and structure of a variety of techniques and to provide students with the experience in applying those techniques.

*586. Primary Data Collection and Survey Methodology*

(3-0-3) LeClerc

This course is offered to graduate students in sociology and other social sciences who have an interest in the design, implementation, and use of social surveys and databases in social science research. The course examines all practical aspects of survey design including sample design and selection, questionnaire design, measurement, mode of administration, field methods, data editing, and database development. We also cover theoretical developments in survey methodology, including research on cognitive process and questionnaire response, the role of social theory in questionnaire design, and other specialized topics. This course will prove useful for both conducting primary data collection and interpreting data from secondary sources.

*590. Computing for Social Science Research*

(1-0-1) LeClerc

This is a laboratory course designed to introduce first-year graduate students to the basic computational and statistical techniques used in social science quantitative research. The main goal of the course is to show students how to build and access a data set for analysis. As such, it is complementary to the core statistical and econometrics course offered in the social sciences. Students will be exposed to the different operating systems available at Notre Dame, and to a variety of statistical software applications. Topics treated include reading data in different formats and checking it for errors, carrying out exploratory analyses, recoding and creation of new variables, merging data sets, performing extracts, and moving a data set between different operating environments.

*591. Proseminar*

(2-0-2) Hachen, Myers, Williams

Designed to acquaint first-year graduate students with the resources available in the department and at the University to assist them with their research. The key component of the seminar is a series of presentations by faculty on their current research.

*592. Statistics I*

(3-0-3) Myers, Sikkink, Williams

*Prerequisite:* Prior course in statistics.

This course reviews basic descriptive statistics and probability, then concentrates on inferential hypothesis testing (analysis of variance, linear regression, dummy variables, standardized coefficients, chi-square tests and basic contingency table analysis). (Fall)

*593. Statistics II*

(3-0-3) Myers, Sikkink, Williams

The second course in the graduate sequence focuses on the general linear model in all its forms: special topics in multiple regression (multicollinearity, autocorrelation, heteroscedasticity), nonlinear models, causal modeling (recursive and nonrecursive systems), structural equations, logit equations, and probit models. (Spring)

*599. Thesis Direction*

(V-V-V) Staff

Reserved for the six-credit-hour thesis requirement of the master's degree.

*600. Nonresident Thesis Research*

(0-0-1) Staff

For master's degree students.

*604. Seminar in the Family*

(3-0-3) Aldous, Klein

This seminar is directed to the advanced students interested in specific topics and research developments in the family area. The students are encouraged to plan their own research and theory projects or to work on their thesis proposals. Offered to students specializing in family.

*610. Seminar in Theory and Social Psychology*

(3-0-3) Weigert

A discussion of current theoretical approaches in sociological social psychology. Attention is paid to the interrelationship between macrosociological processes and the formation of self-identity. Application is made to contemporary interpretations of American culture.

*613. Contemporary American Theory*

(3-0-3) Halton

A survey of current developments including social Darwinism, pragmatism, structural functionalism, and Chicago school.

*615. Advanced Theory Construction*

(3-0-3) Klein

Techniques of formalized theory building are covered, including axiomatic systems, causal models, and cybernetic systems. The course is based on principles in the philosophy of science and gives students experience in shaping the structural and linguistic features of the theories to be used in their dissertation research.

*617. Advanced Theory Seminar: Interpretation*

(3-0-3) Halton

Social theory, formerly more the province of sociologists, has come to the forefront of contemporary intellectual life for philosophers, literary critics, and others in the humanities. This seminar will be geared toward coming to terms with some of the principal issues and controversies animating contemporary theory, particularly the nature of signification and interpretation, and will reveal how much in the sociological tradition figures into these contemporary debates. We will explore the traditions of interpretation that form the basis for much contemporary social theory, including semiotics and semiology, phenomenology, pragmatism, and interpretive sociology.

Topics will include: What is the place of the act and of action/practice as a basis for interpretation? Are there natural bases for signification and social construction? What are the varieties of ways in which the self can be seen as a complex of signs, relativism, and objective interpretation?

*618. Meaning, Materialism, and Modern Life*

(3-0-3) Halton

In the 20th century the problem of meaning has come to the forefront of modern civilization, animating revolutionary movements in art, forming the basis of a variety of philosophies and social theories, looming as the silent spectre behind mass society and its drama of consumption. Yet despite its obsession with meaning—or perhaps because of it—the 20th century as a whole might be said to avoid the central questions of the purpose of life: Why are we here? Where are we going?

By exploring the rise of the modernist world view, key expressions of 20th-century modern culture and recent criticisms of modernity and “post-” culture, we will attempt to achieve a new understanding of the problem of meaning and the possibilities of a transformed civilization. Key topics to be taken up in the course include the problem of meaning, the rise of modern materialism, the modern metropolis, artistic modernism and post-modernism, and the prospects of epochal transformation.

*619. Seminar in Social Theory*

(3-0-3), Halton, Klein, Weigert

Content specified by agreement among faculty, students, and the committee for graduate studies. May be directed to the analysis and research of topics such as issues on the epistemology of the social sciences, specific orientations in contemporary sociological theory, the theoretical contributions of particular individuals, etc. Offered to students specializing in social theory.

*622. Event History Analysis*

(3-0-3) Hachen, LeClere

This course provides an in-depth introduction to event history analysis methods for analyzing change in discrete dependent variables. The course draws on methodological and empirical research from the social sciences. Special attention is given to the relationship between theories of social change, life-cycle processes, and dynamic models. The course begins by examining nonparametric discrete-time life table models and then turns to continuous-time discrete-state models for the analysis of hazard rates. Parametric and partially parametric models that allow for dependency of rates both on explanatory factors and time are introduced. Problems concerning censored data and competing risks are also addressed.

*646. Family II*

(3-0-3) Aldous, Klein

Focuses on a critical analysis of current issues in the family. Such topics as work-family relations, changing gender roles, and historical studies are included. Other issues of particular interest to participating students and faculty are explored. (Typically offered in the spring)

*652. Sociology of Religion II*

(3-0-3) Christiano, Welch, Yamane

Contemporary empirical studies in the sociology of religion are examined. Current developments and movements of religious behavior are related to such issues as political action, family structure, economic actions, and leisure.

*659. Sociology of Education*

(3-0-3) Hallinan, Sikkink, Carbonaro

This seminar examines in depth the various ways schools and classrooms are organized for instruction and the consequences of that organization for students' cognitive and social development. Of particular concern are issues of equity and organization. More general topics related to equity issues in education are also discussed, including school desegregation plans, public versus private schools, and school funding. Social science research informing these issues will be highlighted. The focus is on stratification and equity in elementary and secondary schools, rather than higher educational institutions.

*675A, B. Research Practicum (Ph.D.)*

(3-0-3)(3-0-3) Fishman, Hachen, Hallinan

The aim of the research practicum is to assist graduate students in writing their dissertation proposals.

*680. Writing for Academic Journals*

(3-0-3) Welch

This seminar is intended for advanced (post-M.A.) graduate students in sociology. It requires students to develop and submit a paper to an appropriate academic journal. The course takes students through the following steps: (1) final preparation of a manuscript, (2) pre-submission review, (3) selecting an appropriate journal, (4) submitting the paper, (5) reviewing process, (6) interpreting reviewers' and editors' comments, (7) revising the paper, and (8) re-submission.

*697A, B. Directed Readings*

(V-V-V) Staff

*Prerequisite:* Departmental permission. Reading and research on highly specialized topics that are immediately relevant to the student's interests and that are not routinely covered in the regular curriculum.



*699. Research and Dissertation*

(V-V-V) Staff

For resident graduate students who have completed all course requirements for the Ph.D.

*700. Nonresident Dissertation Research*

(0-0-1) Staff

For doctoral students.

*701. Graduate Teaching Seminar*

(3-0-3) Christiano, Klein

The purpose of this course is to prepare graduate students in sociology for a career in teaching at colleges and universities. Course content includes treatment of practical concerns of teachers such as construction of a syllabus, selection of readings, composition of lectures, and grading of student performance. In addition, seminar time is devoted to discussion of larger issues, including the role of sociology in the liberal arts curriculum, the mission of teachers in the American professoriate, and the state of the academic labor market. A term project is required of all participants.

*702. Graduate Teaching Practicum*

(3-0-3) Christiano, Klein

Supervised experience for graduate students in the teaching of undergraduate sociology. Enrollment normally is limited to those students who have taught one course on their own or who will be teaching such a course. The purpose is to contribute to the professional development of students.

*Upper-level Undergraduate Courses*

A sampling of all possible 400-level courses to fulfill noncredit prerequisites or to fill up to 10 credit hours of the credit-hour requirement:

*414. Minorities in America**419. Self, Society, and Environment**423. Race, Ethnicity, Identities**425. Ethnicity in America**431. The Fifties**432. Blues in American Culture**442. Family Careers (Family Development)**463. Health and Sickness**466. Sex Inequality in the Workplace**467. Global Food Systems**Faculty*

Joan Aldous, *the William R. Kenan Jr. Professor of Sociology*. B.S., Kansas State Univ., 1948; M.A., Univ. of Texas, 1949; Ph.D., Univ. of Minnesota, 1963. (1976)

Jorge A. Bustamante, *the Eugene and Helen Conley Professor of Arts and Letters and Fellow in the Helen Kellogg Institute for International Studies*. LL.B., Centro Univ. Mexico, 1954; M.A., Univ. of Notre Dame, 1970; Ph.D., *ibid.*, 1975. (1986)

William Carbonaro, *Assistant Professor and Fellow in the Institute for Educational Initiatives*. B.A., Washington Univ. in St. Louis, 1990; M.A., *ibid.*, 1991; M.A., Univ. of Wisconsin-Madison, 1996; Ph.D., *ibid.*, 2000. (2000)

Gilberto Cárdenas, *Director of Center for Latino Studies, the Julian Samora Professor of Latino Studies, Assistant Provost for Institutional Relations and Diversity, and Fellow in the Helen Kellogg Institute for International Studies*. A.A., East Los Angeles College, 1967; B.A., California State Univ., Los Angeles, 1969; M.A., Univ. of Notre Dame, 1972; Ph.D., *ibid.*, 1977. (1999)

Kevin J. Christiano, *Associate Professor*. B.A., College of William and Mary, 1977; M.A., Princeton Univ., 1980; Ph.D., *ibid.*, 1983. (1983)

Leonard F. Chrobot, *Adjunct Professor, Concurrent Professor of History, and Coordinator of American Polish Research*. B.A., St. Mary's College, Orchard Lake, Mich., 1960; M.Div., SS. Cyril and Methodius Seminary, 1964; M.A., Purdue Univ., 1967; Ph.D., Wayne State Univ., 1975. (1989)

Fabio B. DaSilva, *Professor Emeritus*. B.A., Univ. of Sao Paulo, 1957; M.A., *ibid.*, 1960; Ph.D., Univ. of Florida, 1963. (1967)

Robert M. Fishman, *Associate Professor, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Nanovic Institute for European Studies*. B.A., Yale College, 1977; M.A., Yale Univ., 1979; M. Phil., *ibid.*, 1980; Ph.D., *ibid.*, 1985. (1992)

David S. Hachen Jr., *Associate Professor*. B.A., Lake Forest College, 1974; M.A., Univ. of Wisconsin, 1978; Ph.D., *ibid.*, 1983. (1987)

Maureen T. Hallinan, *Director of the Center for Research on Educational Opportunities, Chair of Graduate Admissions, and the William P. and Hazel B. White Professor of Arts and Letters*. B.A., Marymount College, 1961; M.S., Univ. of Notre Dame, 1968; Ph.D., Univ. of Chicago, 1972. (1984)

Eugene W. Halton, *Professor*. A.B., Princeton Univ., 1972; Ph.D., Univ. of Chicago, 1979. (1982)

Rev. C. Lincoln Johnson, *Associate Professor*. B.A., Univ. of Arkansas, 1963; B.D., Southern Methodist Univ., 1966; M.A., New School for Social Research, 1968; Ph.D., Univ. of Kansas, 1973. (1971)

David M. Klein, *Director of Graduate Studies and Associate Professor*. B.A., Univ. of Washington, 1967; Ph.D., Univ. of Minnesota, 1978. (1976)

Richard A. Lamanna, *Associate Professor Emeritus*. B.S., Fordham Univ., 1954; M.A., *ibid.*, 1961; Ph.D., Univ. of North Carolina, 1964. (1964)

Felicia B. LeClere, *Director of the Laboratory for Social Research, Associate Professor of Sociology, and Fellow in the Center for Social Concerns*. A.B., Mount Holyoke College, 1980; M.A., Univ. of Minnesota, 1985; M.S., Pennsylvania State Univ., 1987; Ph.D., *ibid.*, 1990. (1997)

Rory M. McVeigh, *Assistant Professor*. B.A., Univ. of Arizona, 1991; M.A., Univ. of North Carolina-Chapel Hill, 1993; Ph.D., *ibid.*, 1996. (2002)

Daniel J. Myers, *Chair and Associate Professor, and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., Ohio State Univ., 1988; M.A., *ibid.*, 1991; M.S., Univ. of Wisconsin, 1995; Ph.D., *ibid.*, 1997. (1998)

Monique Payne, *Visiting Instructor*. B.A., Duke Univ., 1997; M.A., Northwestern Univ., 1999; Ph.D., *ibid.* (2003)

Vibha Pingle, *Assistant Professor and Fellow in the Helen Kellogg Institute for International Studies*. B.A., Delhi Univ., 1988, M.A., Brown Univ., 1990; Ph.D., Brown Univ. 1996. (2000)

Ann Marie Power, *Professional Specialist*. B.A., Westchester Univ., 1974; M.Ed., Boston Univ., 1977; M.A., Univ. of Notre Dame, 1993; Ph.D., *ibid.*, 1999. (2000)

David Sikkink, *Assistant Professor and Fellow in the Institute for Educational Initiatives*. B.A., Bethel College, 1985; M.A., Univ. of North Carolina, 1994; Ph.D., *ibid.*, 1998. (1999)

Lynette P. Spillman, *Associate Professor and Fellow in the Helen Kellogg Institute for International Studies*. B.A., Australian National Univ., 1982; M.A., Univ. of California, Berkeley, 1984; Ph.D., *ibid.*, 1991. (1992)

J. Samuel Valenzuela, *Professor, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Nanovic Institute for European Studies*. Lic., Univ. de Concepcion, 1970; Ph.D., Columbia Univ., 1979. (1986)

Robert H. Vasoli, *Associate Professor Emeritus*. A.B., LaSalle College, 1952; M.A., Univ. of Notre Dame, 1953; Ph.D., *ibid.*, 1964. (1957)

Andrew J. Weigert, *Professor and Fellow in the Joan B. Kroc Institute for International Peace Studies*. B.A., St. Louis Univ., 1958; M.A., *ibid.*, 1960; B.A., Woodstock College, 1964; Ph.D., Univ. of Minnesota, 1968. (1968)

Michael R. Welch, *Associate Professor*. B.A., LeMoyne College, 1972; M.A., Univ. of North Carolina, 1975; Ph.D., *ibid.*, 1980. (1981)

Richard A. Williams, *Associate Professor*. B.A., Creighton Univ., 1977; M.S., Univ. of Wisconsin, 1981; Ph.D., *ibid.*, 1986. (1986)

David Yamane, *Assistant Professor*. A.B., Univ. of California, Berkeley, 1991; M.S., Univ. of Wisconsin, 1991; Ph.D., *ibid.*, 1998. (1998)

# Teaching and Research Faculty

The following list represents the Teaching and Research Faculty in the academic year 2003–2004.

JOHN H. ADAMS, *Associate Professor of Biological Sciences*

ASMA AFSARUDDIN, *Associate Professor of Classics and Fellow in the Joan B. Kroc Institute for International Peace Studies*

SUDHIR AKI, *Assistant Research Professor of Chemical and Biomolecular Engineering*

MARK S. ALBER, *Professor of Mathematics*

JOAN ALDOUS, *the William R. Kenan Jr. Professor of Sociology*

SAMUEL AMAGO, *Assistant Professor of Spanish*

JOSEPH P. AMAR, *Associate Professor of Classics and Concurrent Associate Professor of Theology*

KARL AMERIKS, *the McMabon-Hank Professor of Philosophy and Fellow in the Nanovic Institute for European Studies*

ROBERT L. AMICO, *Professor of Architecture*

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- STEVEN B. SKAAR, *Associate Chair and Professor of Aerospace and Mechanical Engineering*
- ROGER B. SKURSKI, *Professor of Economics*
- THOMAS P. SLAUGHTER, *the Andrew V. Tackes Professor of History*
- PHILLIP R. SLOAN, *Professor in the Program of Liberal Studies and Concurrent Professor of History*
- BRADLEY D. SMITH, *Professor of Chemistry and Biochemistry*
- DAVID A. SMITH, *Associate Professor of Psychology*
- PETER H. SMITH, *Associate Professor of Music*
- THOMAS GORDON SMITH, *Professor of Architecture*
- BRIAN SMYTH, *Professor of Mathematics*
- JAMES SMYTH, *Professor of History*
- GREGORY SNIDER, *Associate Professor of Electrical Engineering*
- DONALD C. SNIEGOWSKI, *Associate Professor Emeritus of English*
- DENNIS M. SNOW, *Professor of Mathematics*
- WILLIAM D. SOLOMON, *the W. P. and H. B. White Director of the Center for Ethics and Culture and Associate Professor of Philosophy*
- ANDREW J. SOMMESE, *the Vincent J. Duncan and Annamarie Micus Duncan Professor of Mathematics*
- LYNETTE P. SPILLMAN, *Associate Professor of Sociology and Fellow in the Helen Kellogg Institute for International Studies*
- MARK A. STADTHER, *Director of Graduate Studies and Professor of Chemical and Biomolecular Engineering*
- JOHN STAMPER, *Associate Professor of Architecture*
- MICHAEL M. STANISIC, *Associate Professor of Aerospace and Mechanical Engineering*
- NANCY K. STANTON, *Professor of Mathematics*
- THOMAS A. STAPLEFORD, *Assistant Professor in the Program of Liberal Studies*
- SERGEI STARCHENKO, *Associate Professor of Mathematics*
- JAMES P. STERBA, *Professor of Philosophy and Fellow in the Joan B. Kroc Institute for International Peace Studies*
- GREGORY E. STERLING, *Associate Dean of Arts and Letters and Professor of Theology*
- ROBERT L. STEVENSON, *Professor of Electrical Engineering and Concurrent Professor of Computer Science and Engineering*
- WILHELM F. STOLL, *the Vincent J. Duncan and Annamarie Micus Duncan Professor Emeritus of Mathematics*
- STEPHAN A. STOLZ, *the Rev. John A. Zahm, C.S.C., Professor of Mathematics*
- DANIEL C. STOWE, *Associate Professional Specialist in Music*
- WILLIAM C. STRIEDER, *Professor of Chemical and Biomolecular Engineering*
- AARON STRIEGEL, *Assistant Professor of Computer Science and Engineering*
- DUNCAN G. STROIK, *Associate Professor of Architecture*
- LEOPOLD STUBENBERG, *Director of Graduate Studies and Associate Professor of Philosophy*
- JAMES X. SULLIVAN, *Assistant Professor of Economics*
- ROBERT E. SULLIVAN, *Director of the Erasmus Institute and Concurrent Associate Professor of History*
- THOMAS R. SWARTZ, *Professor of Economics*
- ALBIN A. SZEWCZYK, *Professor Emeritus of Aerospace and Mechanical Engineering*
- PAULO TABUADA, *Assistant Professor of Electrical Engineering*
- WILLIAM F. TAGESON, *Associate Professor Emeritus of Psychology*
- JEFFREY W. TALLEY, *Assistant Professor of Civil Engineering and Geological Sciences*
- JENNIFER L. TANK, *the Galla Assistant Professor of Biological Sciences*
- CAROL E. TANNER, *Associate Professor of Physics*
- ERDINCH R. TATAR, *Adjunct Assistant Professor of Physics*
- LEE A. TAVIS, *the C. R. Smith Professor of Business Administration (Finance), Director of the Program on Multinational Managers and Developing Country Concerns, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Joan B. Kroc Institute for International Peace Studies*
- JAMES I. TAYLOR, *Professor Emeritus of Civil Engineering and Geological Sciences*
- LAURENCE R. TAYLOR, *Professor of Mathematics*
- RICHARD E. TAYLOR, *Director of Graduate Studies and Associate Professor of Chemistry and Biochemistry*
- MARTIN P. TENNISWOOD, *the Coleman Professor of Life Sciences*
- JEFFREY H. TERRY, *Adjunct Assistant Professor of Physics*
- FLINT O. THOMAS, *Professor of Aerospace and Mechanical Engineering*
- JULIA THOMAS, *Associate Professor of History*
- ALVIN R. TILLERY JR., *Assistant Professor of Political Science*
- MARIA TOMASULA, *Associate Professor of Art, Art History, and Design*
- STEVE TOMASULA, *Assistant Professor of English*
- ALAIN P. TOUMAYAN, *Associate Professor of French Language and Literature and Fellow in the Nanovic Institute for European Studies*
- JAMES C. TURNER, *the Rev. John J. Cavanaugh, C.S.C., Professor of the Humanities and Fellow in the Nanovic Institute for European Studies*
- JULIANNE C. TURNER, *Assistant Professor of Psychology and Concurrent Assistant Professor in the Institute for Educational Initiatives*
- JOHN J. UHRAN JR., *Senior Associate Dean for Academic Affairs in the College of Engineering, Professor of Computer Science and Engineering, and Professor of Electrical Engineering*
- EUGENE C. ULRICH, *the Rev. John. A. O'Brien Professor of Old Testament Studies*
- NIKOLAI G. URALTSEV, *Adjunct Associate Professor of Physics*
- ROBERT A. VACCA, *Assistant Professor of Classics*
- J. SAMUEL VALENZUELA, *Professor of Sociology, Fellow in the Helen Kellogg Institute for International Studies, and Fellow in the Nanovic Institute for European Studies*
- JOHN H. VAN ENGEN, *the Andrew V. Tackes Professor of History*
- PETER VAN INWAGEN, *the John Cardinal O'Hara Professor of Philosophy*
- CHRIS R. VANDEN BOSSCHE, *Professor of English*
- VANCE D. VANDERBURG, *Adjunct Professor of Physics*
- JAMES C. VANDERKAM, *the John A. O'Brien Professor of Old Testament Studies*
- ARVIND VARMA, *Director of the Center for Molecularly Engineered Materials and the Arthur J. Schmitt Professor of Chemical Engineering*
- ROBERT H. VASOLI, *Associate Professor Emeritus of Sociology*

- EDWARD VASTA, *Professor Emeritus of English*
- KEVIN T. VAUGHAN, *Assistant Professor of Biological Sciences*
- RAIMO VÄYRYNEN, *Professor of Political Science, Fellow in the Helen Kellogg Institute for International Studies, and Senior Fellow in the Joan B. Kroc Institute for International Peace Studies*
- ANRE VENTER, *Associate Professional Specialist in Psychology*
- HUGO J. VERANI, *Research Professor of Spanish Language and Literature*
- IGOR VERETENNIKOV, *Research Assistant Professor of Chemistry and Biochemistry*
- VLADETA VUCKOVIC, *Associate Professor Emeritus of Mathematics*
- DAVID WALDSTREICHER, *Associate Professor of History*
- ANDRZEJ S. WALICKI, *Professor Emeritus of History*
- A. PETER WALSH, *Director of the African Studies Program, Professor of Political Science, and Fellow in the Joan B. Kroc Institute for International Peace Studies*
- REV. JOSEPH WALTER, C.S.C., *Chair of Preprofessional Studies and Associate Professor of Chemistry and Biochemistry*
- JAMES H. WALTON, *Professor of English*
- JADWIGA WARCHOL, *Research Professor of Physics*
- TED A. WARFIELD, *Associate Professor of Philosophy*
- JENNIFER L. WARLICK, *Associate Professor of Economics*
- STEPHEN H. WATSON, *Professor of Philosophy*
- JOSEPH P. WAWRYKOW, *Director of Graduate Studies and Associate Professor of Theology*
- MITCHELL R. WAYNE, *Associate Dean of the College of Science and Professor of Physics*
- FRIDOLIN WEBER, *Visiting Professor of Physics*
- J. ROBERT WEGS, *Professor of History and Fellow in the Helen Kellogg Institute for International Studies*
- ANDREW J. WEIGERT, *Professor of Sociology and Fellow in the Joan B. Kroc Institute for International Peace Studies*
- REV. CHARLES WEIHER, C.S.C., *Assistant Professor Emeritus of Philosophy*
- PAUL J. WEITHMAN, *Chair and Professor of Philosophy*
- MICHAEL R. WELCH, *Associate Professor of Sociology*
- JOHN P. WELLE, *Professor of Italian Language and Literature, Concurrent Professor of Film, Television, and Theatre, and Fellow in the Nanovic Institute for European Studies*
- CHRISTOPHER J. WELNA, *Acting Director of the Kellogg Institute for International Studies, Director of Latin American Studies, and Concurrent Assistant Professor of Political Science*
- JOELLEN J. WELSH, *Professor of Biological Sciences*
- MICHAEL J. WENGER, *Assistant Professor of Psychology*
- THOMAS A. WERGE, *Professor of English and Concurrent Professor in the Master of Education Program*
- ROBERT L. WEST, *Assistant Professor of Psychology*
- JOANNES J. WESTERINK, *Associate Professor of Civil Engineering and Geological Sciences*
- CARROLL WILLIAM WESTFALL, *the Frank Montana Professor of Architecture*
- THOMAS L. WHITMAN, *Professor of Psychology*
- TODD D. WHITMORE, *Associate Professor of Theology and Fellow in the Joan B. Kroc Institute for International Peace Studies*
- MICHAEL C. F. WIESCHER, *the Frank M. Freimann Professor of Physics*
- OLAF GUENTER WIEST, *Associate Professor of Chemistry and Biochemistry*
- CHARLES K. WILBER, *Counselor to the Director of the Joan B. Kroc Institute for International Peace Studies and Professor Emeritus of Economics*
- E. BRUCE WILLIAMS, *Professor of Mathematics*
- RICHARD A. WILLIAMS, *Associate Professor of Sociology*
- REV. OLIVER F. WILLIAMS, C.S.C., *Academic Director of the Center for Ethics and Religious Values in Business, Associate Professor of Management, and Fellow in the Joan B. Kroc Institute for International Peace Studies*
- IVY GLENN WILSON, *Instructor of English*
- JAMES R. WILSON, *Adjunct Professor of Physics*
- ALBERT K. WIMMER, *Director of Graduate Studies and Associate Professor of German Language and Literature, Fellow in the Medieval Institute, and Fellow in the Nanovic Institute for European Studies*
- JENNIFER R. WOERTZ, *Assistant Professor of Civil Engineering and Geological Sciences*
- TOMASZ WOJTOWICZ, *Visiting Research Associate Professor of Physics*
- CHRISTINA WOLBRECHT, *the Packey J. Dee Associate Professor of Political Science*
- EDUARDO E. WOLF, *Professor of Chemical and Biomolecular Engineering*
- MARTIN H. WOLFSON, *Associate Professor of Economics*
- PIT-MANN WONG, *Professor of Mathematics*
- WARREN J. WONG, *Professor Emeritus of Mathematics*
- HEATHER A. WOOD, *Assistant Professor of Classics*
- FREDERICO J. XAVIER, *Professor of Mathematics*
- DAVID YAMANE, *Assistant Professor of Sociology*
- KWANG-TZU YANG, *the Viola D. Hank Professor Emeritus of Aerospace and Mechanical Engineering*
- XIAOSHAN YANG, *Assistant Professor of East Asian Languages and Literatures*
- CHENGXU YIN, *Assistant Professional Specialist in East Asian Languages and Literatures*
- SUSAN L. YOUENS, *Professor of Music*
- SAMIR YOUNÉS, *Director of the Rome Studies Center and Associate Professor of Architecture*
- KE-HAI YUAN, *Associate Professor of Psychology*
- RANDALL C. ZACHMAN, *Associate Professor of Theology*
- EWA ZIAREK, *Professor of English and Fellow in the Nanovic Institute for European Studies*
- KRZYSZTOF ZIAREK, *Associate Professor of English and Fellow in the Nanovic Institute for European Studies*
- CATHERINE ZUCKERT, *the Nancy Reeves Dreux Professor of Political Science*
- MICHAEL ZUCKERT, *the Nancy Reeves Dreux Professor of Political Science*

# Academic Calendar 2003-2004

## Fall Semester 2003

Aug. 18-	
Sept. 3	<i>Web enrollment</i>
Aug. 26	<i>Classes begin</i>
Aug. 26	<i>Mass—formal opening of school year</i>
Sept. 3	<i>Last day for course changes</i>
Oct. 18-26	<i>Midsemester break</i>
Oct. 27	<i>Classes resume</i>
Oct. 31	<i>Last day for course discontinuance</i>
Nov. 1	<i>Application deadline for admission to the Graduate School for spring semester 2004</i>
Nov. 12-	
Dec. 3	<i>Registration for spring semester 2004</i>
Nov. 26	<i>Last day for application for admission to candidacy for the doctor's or master's degree in January 2004</i>
	<i>Last day for master's examinations and Ph.D. dissertation defenses for graduation in January 2004</i>
Nov. 27-	
Nov. 30	<i>Thanksgiving holiday</i>
Dec. 1	<i>Classes resume</i>
Dec. 5	<i>Last day for presenting completed theses and dissertations in the Graduate School office for graduation in January 2004</i>
Dec. 10	<i>Last class day</i>
Dec. 11-14	<i>Reading days</i>
Dec. 15-19	<i>Final examinations</i>
Dec. 22	<i>All grades due in Registrar's office by 3:45 p.m.</i>
Jan. 4	<i>January official graduation date (no ceremony)</i>

**For more information, visit the Office of the Registrar's web site at <http://registrar.nd.edu>.**

## Spring Semester 2004

Jan. 5-21	<i>Web enrollment</i>
Jan. 13	<i>Classes begin</i>
Jan. 21	<i>Last day for course changes</i>
Feb. 1	<i>Deadline for applying to the Graduate School for fall semester 2004 admission and financial aid</i>
Mar. 6-14	<i>Midsemester break</i>
Mar. 15	<i>Classes resume</i>
Mar. 17	<i>Registration for summer semester 2004</i>
Mar. 19	<i>Last day for course discontinuance</i>
Apr. 6-21	<i>Registration for fall semester 2004</i>
Apr. 8	<i>Last day for application for admission to candidacy for the doctor's or master's degree in May 2004</i>
	<i>Last day for master's examinations and Ph.D. dissertation defenses for graduation in May 2004</i>
Apr. 16	<i>Last day for presenting completed theses and dissertations in the Graduate School office for graduation in May 2004</i>
Apr. 9-12	<i>Easter holiday</i>
Apr. 13	<i>Classes resume</i>
Apr. 28	<i>Last class day</i>
Apr. 29- May 2	<i>Reading days</i>
May 3-7	<i>Final examinations</i>
May 10	<i>All grades due in Registrar's office by 3:45 p.m.</i>
May 14	<i>Graduate School reception for Ph.D. and master's degree candidates and their guests</i>

## Summer Session 2004

June 17	<i>Web enrollment begins</i>
June 22	<i>Classes begin</i>
July 2	<i>Last day for master's examinations and Ph.D. dissertation defenses for graduation in August 2004</i>
July 9	<i>Last day for presenting completed theses and dissertations in the Graduate School office for graduation in August 2004</i>
Aug. 5	<i>Last class day</i>
Aug. 6	<i>Final examinations</i>
Aug. 11	<i>August official graduation date (no ceremony)</i>

# Academic Calendar 2004-2005

## Fall Semester 2004

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Aug. 17-	
Sept. 1	<i>Web enrollment</i>
Aug. 24	<i>Classes begin</i>
Aug. 24	<i>Mass—formal opening of school year</i>
Sept. 1	<i>Last day for course changes</i>
Oct. 16-24	<i>Midsemester break</i>
Oct. 25	<i>Classes resume</i>
Oct. 29	<i>Last day for course discontinuance</i>
Nov. 1	<i>Application deadline for admission to the Graduate School for spring semester 2005</i>
Nov. 10-	
Dec. 1	<i>Registration for spring semester 2005</i>
Nov. 24	<i>Last day for application for admission to candidacy for the doctor's or master's degree in January 2005</i>
	<i>Last day for master's examinations and Ph.D. dissertation defenses for graduation in January 2005</i>
Nov. 25-	
Nov. 28	<i>Thanksgiving holiday</i>
Nov. 29	<i>Classes resume</i>
Dec. 3	<i>Last day for presenting completed theses and dissertations in the Graduate School office for graduation in January 2005</i>
Dec. 8	<i>Last class day</i>
Dec. 9-12	<i>Reading days</i>
Dec. 13-17	<i>Final examinations</i>
Dec. 20	<i>All grades due in Registrar's office by 3:45 p.m.</i>
Jan. 2	<i>January official graduation date (no ceremony)</i>

**For more information, visit the Office of the Registrar's web site at <http://registrar.nd.edu>.**

## Spring Semester 2005

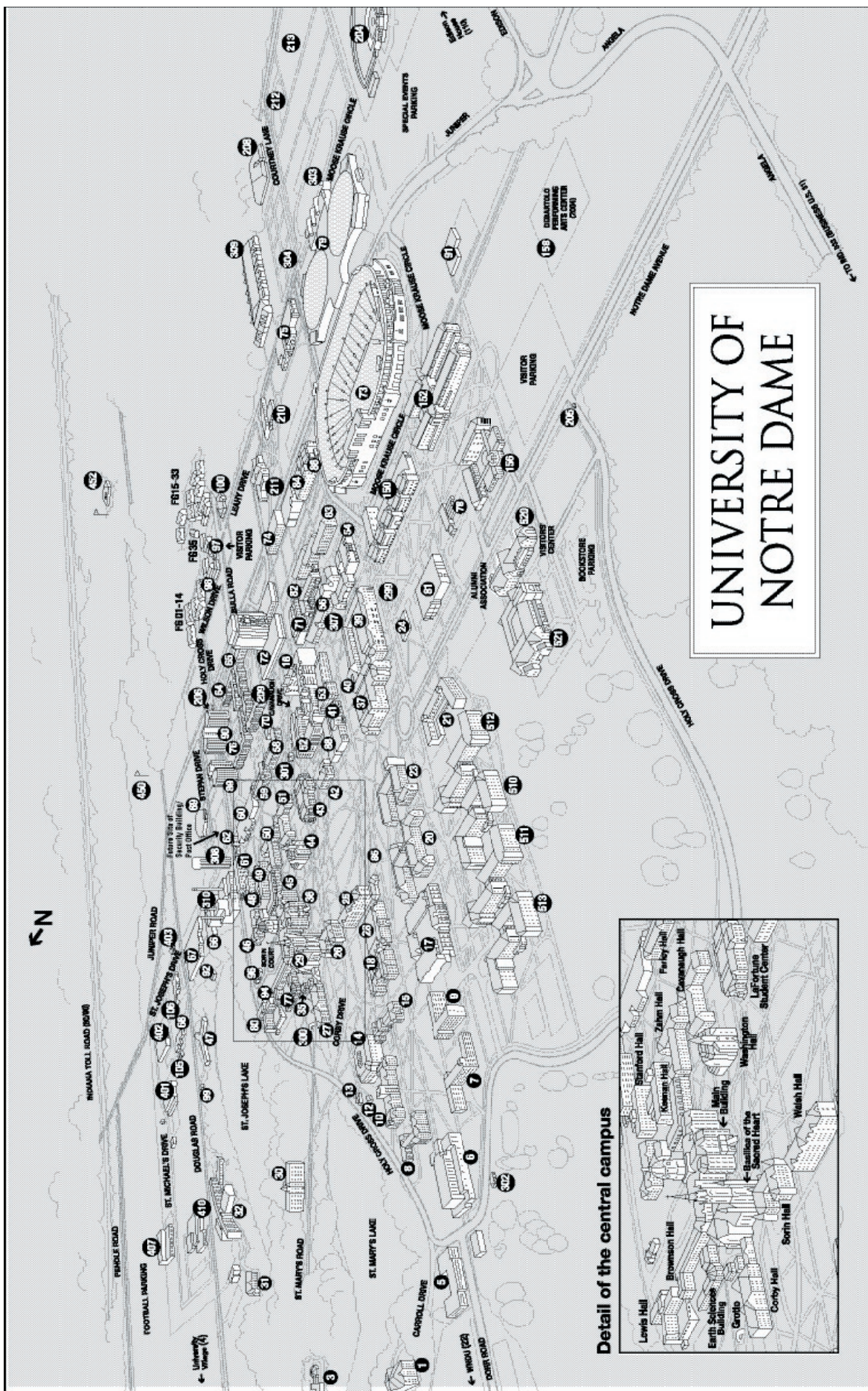
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Jan. 3-19	<i>Web enrollment</i>
Jan. 11	<i>Classes begin</i>
Jan. 19	<i>Last day for course changes</i>
Feb. 1	<i>Deadline for applying to the Graduate School for fall semester 2005 admission and financial aid</i>
Mar. 5-13	<i>Midsemester break</i>
Mar. 14	<i>Classes resume</i>
Mar. 18	<i>Last day for course discontinuance</i>
Mar. 25-28	<i>Easter holiday</i>
Mar. 29	<i>Classes resume</i>
Apr. 4-22	<i>Registration for fall semester 2005</i>
Apr. 8	<i>Last day for application for admission to candidacy for the doctor's or master's degree in May 2005</i>
	<i>Last day for master's examinations and Ph.D. dissertation defenses for graduation in May 2005</i>
Apr. 15	<i>Last day for presenting completed theses and dissertations in the Graduate School office for graduation in May 2005</i>
Apr. 27	<i>Last class day</i>
Apr. 28-	
May 1	<i>Reading days</i>
May 2-6	<i>Final examinations</i>
May 9	<i>All grades due in Registrar's office by 3:45 p.m.</i>
May 13	<i>Graduate School reception for Ph.D. and master's degree candidates and their guests</i>
May 13-15	<i>Commencement weekend</i>

## Summer Session 2005

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June 16	<i>Web enrollment begins</i>
June 21	<i>Classes begin</i>
July 1	<i>Last day for master's examinations and Ph.D. dissertation defenses for graduation in August 2005</i>
July 8	<i>Last day for presenting completed theses and dissertations in the Graduate School office for graduation in August 2005</i>
Aug. 4	<i>Last class day</i>
Aug. 5	<i>Final examinations</i>
Aug. 10	<i>August official graduation date (no ceremony)</i>



UNIVERSITY OF  
NOTRE DAME

Detail of the central campus

## ALPHABETICAL LISTING OF CAMPUS BUILDINGS

Admissions (Main Building).....	36	Early Childhood Development Center.....	100	Ivy Softball Field.....	212	Province Archives Center.....	99
Alumni Association.....	520	East Gate.....	206	Joyce Center (Joyce Athletic and Convocation Center).....	79	Radiation Research Building.....	71
Alumni-Senior Club.....	91	Eck Baseball Stadium.....	204	Keenan Hall.....	49	Reckers/Public Cafeteria.....	17
Alumni Soccer Field.....	213	Eck Center.....	520/521	Keough Hall.....	510	Reyniers Life Annex.....	105
Alumni Hall.....	23	Notre Dame Alumni Association/ Eck Notre Dame Visitors' Center.....	520	Knights of Columbus Council Hall.....	85	Reyniers Life Building.....	68
Architecture.....	14	Hammes Notre Dame Bookstore.....	521	Knott Hall.....	65	Riley Hall of Art and Design.....	53
Art Gallery.....	54	Eck Tennis Pavilion.....	208	Krause Stadium.....	303	Rockne Memorial.....	6
Athletic and Convocation Center (Joyce Center).....	79	Edison House.....	110	LaFortune Student Center.....	43	Rolfs Aquatic Center.....	79
Ave Maria Press.....	410	Facilities Building.....	310	(St. Michael's) Laundry.....	401	Rolfs Sports Recreation Center.....	75
Badin Hall.....	18	Facilities/Maintenance Center.....	67	Laundry Pick-up Center.....	96	(Basilica of the) Sacred Heart.....	29
Band Building.....	210	Farley Hall.....	59	Law School.....	37	Sacred Heart Parish Center.....	31
Basilica of the Sacred Heart.....	29	Fatima Retreat House and Shrine.....	3	Lewis Hall.....	80	Security Office.....	5
Boat House.....	92	Fieldhouse Mall.....	301	(Hesburgh) Library.....	72	Sesquicentennial Common.....	299
Bond Hall (Architecture).....	14	Fire Station.....	62	Lofus Sports Center.....	309	Shaheen Mestrovic Memorial.....	307
(Hammes Notre Dame) Bookstore.....	521	First Year of Studies.....	28	Log Chapel.....	12	Siegfried Hall.....	209
Breen-Phillips Hall.....	58	Fischer Graduate Community Center ., FG35	FG35	Lyons Hall.....	8	Snite Museum of Art.....	54
Brownson Hall.....	94	Fischer Graduate Residences..... FG01-FG33	FG33	Mail Distribution Center.....	96	Solitude of St. Joseph (Columba Hall).....	30
Burke Memorial Golf Course.....	302	Fisher Hall.....	9	Main Building.....	36	Sorin Hall.....	26
Cafeteria (LaFortune Student Center/ Huddle).....	43	Fitzpatrick Hall of Engineering.....	39	Main Gate.....	205	South Dining Hall.....	17
Cafeteria (North Dining Hall).....	60	Flanner Hall.....	89	Malloy Hall.....	82	St. Edward's Hall.....	45
Cafeteria (South Dining Hall/Reckers).....	17	Food Services Support Facility.....	407	Mason Support Services Center.....	402	St. Michael's Laundry.....	401
Campus Security Building.....	5	Freimann Life Science Center.....	84	McGlenn Hall.....	513	Stadium.....	73
Carroll Hall.....	1	Galvin Life Sciences Center.....	84	McKenna Hall (Center for Continuing Education).....	81	Stanford Hall.....	48
Cartier Field.....	303	Golf Courses.....	302, 450	Mendoza College of Business.....	152	Stepan Center.....	69
Cavanaugh Hall.....	51	Burke Memorial Golf Course.....	302	Meyo Field.....	309	Stepan Chemistry Hall.....	16
Center for Continuing Education (McKenna Hall).....	81	Warren Golf Course.....	450	Moreau Seminary.....	32	Student Center.....	43
Center for Social Concerns.....	70	Grace Hall.....	90	Morse Center for Academic Services.....	28	Tennis Courts.....	304
Clarke Memorial Fountain.....	301	Grotto of Our Lady of Lourdes.....	300	Morris Inn.....	21	University Club.....	78
Coleman Center for Campus Ministry.....	28	Haggard Fitness Complex.....	309	Morrissey Hall.....	10	University Health Services.....	46
Coleman-Morse Centers.....	28	Haggard Hall.....	61	Nieuwland Science Hall.....	52	University Village.....	4
Columba Hall.....	30	Hammes Notre Dame Bookstore.....	521	North Dining Hall.....	60	(Eck) Visitors' Center.....	520
Corby Hall.....	27	Hank Family Center for Environmental Sciences.....	86	Notre Dame Credit Union.....	106	Walsh Hall.....	25
Courtney Tennis Center.....	304	Hayes-Healy Center.....	88	O'Hara-Grace Graduate Residences.....	97	Warren Golf Club House.....	452
(Notre Dame) Credit Union.....	106	Hesburgh Center for International Studies.....	156	Old College.....	13	Warren Golf Course.....	450
Crowley Hall of Music.....	42	Hesburgh Library.....	72	O'Neill Hall.....	511	Washington Hall.....	44
Cushing Hall of Engineering.....	40	Hessert Aerospace Research Center.....	66	O'Shaughnessy Hall.....	56	Water Tower.....	308
DeBartolo Center for the Performing Arts.....	158	Holy Cross House.....	47	Pangborn Hall.....	7	Welsh Hall.....	512
DeBartolo Hall.....	150	Howard Hall.....	15	Paris House (Marital Therapy and Research Clinic).....	403	Wilson Commons.....	98
Decio Faculty Hall.....	83	Huddle.....	43	Pasquerilla Center (ROTC).....	211	WNDU Stations.....	22
Dillon Hall.....	20	Hurley Hall.....	41	Pasquerilla Hall East.....	64	Zahm Hall.....	50
		Information Technology Center (OIT).....	74	Pasquerilla Hall West.....	76		
		Institute for Educational Initiatives Building.....	77	Post Office.....	24		
		Isis Gallery (Riley Hall of Art and Design).....	53	Power Plant.....	63		
				Presbytery.....	35		



# GRE Subject Test Requirements

The following is a list of the graduate programs at the University and the graduate degrees conferred. Please note that the University requires *all* applicants to take the GRE. Many programs also require the GRE Subject Test.

Program	Degrees Offered	Subject Test Required	Subject Test Not Required	Subject Test Not Required But Strongly Recommended
Aerospace and Mechanical Engineering	<i>M.E.M.E., M.S.Aero.E., M.S.M.E., Ph.D.</i>		■	
Architecture	<i>M.Arch.</i>		■	
Art, Art History, and Design	<i>M.A., M.F.A.</i>		■	
Biochemistry	<i>Ph.D.</i>			■
Biological Sciences	<i>M.S., Ph.D.</i>			■
Chemical and Biomolecular Engineering	<i>M.S.Ch.E., Ph.D.</i>		■	
Chemistry	<i>Ph.D.</i>			■
Civil Engineering and Geological Sciences <sup>†</sup>	<i>M.S., M.S.BioE., M.S.C.E., M.S.Env.E., Ph.D.</i>	■		
Computer Science and Engineering	<i>M.S.C.S.E., Ph.D.</i>		■	
Creative Writing	<i>M.F.A.</i>		■	
Early Christian Studies	<i>M.A.</i>		■	
Economics <sup>†††</sup>	<i>M.A., Ph.D.</i>		■	
Education (ACE participants only)	<i>M.Ed.</i>		■	
Electrical Engineering	<i>M.S.E.E., Ph.D.</i>		■	
English	<i>M.A., Ph.D.</i>	■		
German Language and Literature	<i>M.A.</i>		■	
History	<i>Ph.D.</i>		■	
History and Philosophy of Science	<i>Ph.D.</i>		■	
Literature	<i>Ph.D.</i>		■	
Mathematics	<i>M.S.A.M., Ph.D.</i>	■		
Medieval Studies	<i>M.M.S., Ph.D.</i>		■	
Music	<i>M.A., M.M.</i>			■
Peace Studies <sup>††</sup>	<i>M.A.</i>		■	
Philosophy	<i>Ph.D.</i>		■	
Physics	<i>Ph.D.</i>	■		
Political Science	<i>Ph.D.</i>		■	
Psychology	<i>Ph.D.</i>			■
Romance Languages and Literatures	<i>M.A.</i>		■	
Sociology	<i>M.A., Ph.D.</i>		■	
Theology	<i>M.A., M.T.S., M.Div., Ph.D.</i>		■	

<sup>†</sup> Includes Bioengineering and Environmental Engineering

<sup>††</sup> Separate application required. Contact the Graduate Admissions Office, University of Notre Dame, 502 Main Bldg., Notre Dame, IN 46556-5602 requesting the peace studies application. E-mail contact is [Grad.Ad.1@nd.edu](mailto:Grad.Ad.1@nd.edu) or for specific questions, [kroc-admissions.1@nd.edu](mailto:kroc-admissions.1@nd.edu).

<sup>†††</sup> Admissions to the graduate program have been suspended for academic year 2003-2004.

## Where to write for GRE and TOEFL information:

GRE•ETS  
P.O. Box 6000  
Princeton, NJ 08541-6000  
U.S.A.

TOEFL  
P.O. Box 6151  
Princeton, NJ 08541-6151  
U.S.A.

GRE and TOEFL application booklets generally are available at U.S. colleges and universities and at U.S. consulates and U.S. Information Services offices abroad. Check with these sources before writing to Princeton.

Web: <http://www.gre.org>      Web: <http://www.toefl.org>

# Correspondence

The University's address is University of Notre Dame, Notre Dame IN 46556.

The area code for all telephone calls is 574. The University's main number is 631-5000. The Graduate School's fax number is 631-4183 and e-mail is gradsch@nd.edu.

**Admissions (Graduate):** 502 Main Building (631-7706) gradad@nd.edu

**Graduate Studies and Research, Office of:** Vice President for Graduate Studies and Research and Dean of the Graduate School, 416 Main Building (631-6291) research@nd.edu

**Campus Ministry:** 103 Hesburgh Library (631-7800) ministry@nd.edu

**Career Development:** 248 Flanner Hall (631-5200) ndcps@nd.edu

**Center for Social Concerns:** Center for Social Concerns (631-5293) ndctrsc@nd.edu

**Counseling Center:** University Health Center (631-7336)

**Financial Aid:** 115 Main Building (631-6436) finaid@nd.edu

**Graduate School Office:** 502 Main Building (631-6291) gradsch@nd.edu

**Graduate Student Union:** LaFortune Student Center (631-6963) gsu@nd.edu

**Health Services:** University Health Center (631-7497 or 7567)

**Housing:** Student Residences, 305 Main Building on-campus housing (631-5878) off-campus housing (631-5583) University Village (631-9145) orlh@nd.edu

**Insurance:** Accounts and Insurance, 109 University Health Center (631-6114)

**International Student Services and Activities (ISSA):** 204 LaFortune Student Center (631-3825) issa@nd.edu

**Library:** Director, 221 Hesburgh Library (631-5252)

**Registrar:** 105 Main Building (631-7043) ndreg@nd.edu

**Security:** Security Office (631-5555) ndspd@nd.edu

**Student Accounts:** 100 Main Building (631-7113) stdacct@nd.edu

**Student Activities:** 315 LaFortune Student Center (631-9314) sao@nd.edu

**Student Affairs:** 316 Main Building (631-5550)

**Summer Session:** 510 Main Building (631-7282) sumsess@nd.edu

## Departments

The following represent the telephone numbers (Prefix: 631) and e-mail addresses of the departments, centers, and institutes affiliated with the Graduate School.

4379 **Aerospace and Mechanical Engineering** amedept@nd.edu

8630 **Applied Mathematics, Center for** cam@nd.edu

3096 **Architecture** arch@nd.edu

7602 **Art, Art History, and Design** art@nd.edu

6552 **Biological Sciences** biosadm@nd.edu

7366 **Center for Tropical Disease Research and Training** kmerz@nd.edu  
www.science.nd.edu/biology/programs/parasitology.html

5580 **Chemical Engineering** chegdept@nd.edu

7058 **Chemistry and Biochemistry** chemistry.webmaster@www.chem.nd.edu

5510 **Church Life, Institute for** icl@nd.edu

5381 **Civil Engineering and Geological Sciences** dash.1@nd.edu

8802 **Computer Science and Engineering** csewww@nd.edu

5441 **Cushwa Center for the Study of American Catholics** cushwa@nd.edu

7090 **Early Christian Studies** bdaley@nd.edu

8873 **East Asian Languages and Literatures** eall@nd.edu

7698 **Economics** jrate@nd.edu

5482 **Electrical Engineering** eeegrad@nd.edu

6618 **English** english@nd.edu

5572 **German and Russian Languages and Literatures** grl@nd.edu

9017 **Government and International Studies** govtgrad@nd.edu

7266 **History** history@nd.edu

5015 **History and Philosophy of Science** nd.reilly.31@nd.edu

8294 **Institute for Educational Initiatives** hallinan@nd.edu

6580 **Kellogg Institute for International Studies** kellogg@nd.edu

3555 **Keough Institute for Irish Studies** irishstu@nd.edu

6970 **Kroc Institute for International Peace Studies** peaceins@nd.edu

5825 **Maritain Center, Jacques** maritain@nd.edu

7245 **Mathematics** math@nd.edu

6603 **Medieval Institute** medinst@nd.edu

6093 **Molecular Biosciences Program** biosadm@nd.edu

6211 **Music** music@nd.edu

5600 **Office of Information Technologies** info.1@nd.edu  
www.nd.edu/~ndoit

6841 **Office of Multicultural Student Programs and Services** omsa@nd.edu

7157 **Office for Students with Disabilities** osd@nd.edu

5435 **Pastoral Liturgy, Notre Dame Center for** ndcpl@nd.edu

0481 **Ph.D. Program in Literature** litprog@nd.edu

4278 **Philosophy** ndphil@nd.edu

7339 **Philosophy of Religion, Center for** cprelig@nd.edu

7182 **Physics** physics@nd.edu

6650 **Psychology** psych@nd.edu

6163 **Radiation Laboratory** ndrllcdc@nd.edu

6886 **Romance Languages and Literatures** romlang@nd.edu

5293 **Social Concerns, Center for** ndctrsc@nd.edu

7458 **Social Research, Laboratory for** lsrweb@nd.edu

6585 **Sociology** kipker.1@nd.edu

5574 **South Bend Center for Medical Education** sbcmce@nd.edu

4254 **Theology—M.A. and M.T.S. Program** theo@nd.edu

5682 **Theology—M.Div. Program** mdiv.1@nd.edu

5732 **Theology—Ph.D. Program** theodgs@nd.edu

## WWW ND Home Page

You can find complete information about all of Notre Dame's graduate programs online. The URL for the Graduate School's site on the World Wide Web is <http://www.nd.edu/~gradsch>.

To request an application, submit the online inquiry form or send an e-mail message to gradad@nd.edu.

## For More Information

For further admissions information, contact:

University of Notre Dame  
Office of Graduate Admissions  
502 Main Building  
Notre Dame IN 46556-5602  
631-7706

## Business and Law

Information concerning business and law degrees is obtained by writing or calling:

Mendoza College of Business  
Graduate Division,  
631-8488

Notre Dame Law School  
Office of Admissions,  
631-6627