



INDIANA UNIVERSITY

## University Graduate School 2008-2009 Academic Bulletin

### Biomolecular Imaging and Biophysics

#### School of Medicine Indianapolis

**Interdepartmental Program Director**  
Professor Thomas Hurley\*

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#### Graduate Faculty

(An asterisk [\*] denotes membership in the University Graduate School faculty with the endorsement to direct doctoral dissertations.)

##### Professors

William Bosron\*, Thomas Hurley\*, Marvin Kemple\*, Eric Long\*, Grant Nicol\*, Peter Roach\*, William Stillwell\*

##### Associate Professors

Barry Muhoberac\*, Christoph Naumann, John Schild, Stephen Wassall\*

##### Graduate Advisor

Professor Thomas Hurley\*, Medical Science Building 4019, (317) 278-2008

#### Degrees Offered

Master of Science in Medical Biophysics and Doctor of Philosophy

##### Program Information

An interdepartmental committee is responsible for the administration of the medical biophysics degree programs. The committee is composed of representatives from the Departments of Biochemistry and Molecular Biology, Pharmacology and Toxicology, and Physiology and Biophysics from the Indiana University School of Medicine and from the Departments of Biology and Chemistry from the Purdue University School of Science at Indianapolis. Graduate training in the program is oriented primarily toward research at the molecular and cellular

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level, with focus points at the boundaries of the traditional disciplines of physics, chemistry, and biology. Research programs include membrane biophysics and structure-function relations in cells and macromolecules. Detailed descriptions of faculty research interests are available.

#### Special Program Requirements

(See also general University Graduate School requirements.)

##### Admission Requirements

Bachelor's degree in biochemistry, biology, biophysics, chemistry, mathematics, physics, or an equivalent major. Graduate Record Examination scores on both the General Test and a Subject Test are required as a part of the application.

#### Master of Science Degree

##### Course Requirements

At least 30 credit hours, of which 20 credit hours must be in biophysics, including 7 credit hours in research; remaining credit hours in related courses.

##### Thesis

Optional.

##### Final Examination

Written or oral or both.

#### Doctor of Philosophy Degree

##### Course Requirements

A total of 90 credit hours, with a minimum of 36 credit hours in course work (including those for the minor). Required core courses include J611 and J612, B807 Biochemistry or equivalent, one course in quantum mechanics (chosen from Purdue School of Science's P550 Introduction to Quantum Mechanics, P660 Quantum Mechanics I, and C672 Quantum Chemistry), one course in cell infrastructure (chosen from F650, G865, F705, and B807). Additional elective courses totaling at least 9 credit hours are determined by the advisory committee in discussion with the student and selected from a list compiled by the faculty. (See list of courses below.)

##### Minor

A minimum of 12 credit hours in course work in a departmental minor or an interdepartmental minor in physical science or in cellular and molecular biology.

##### Qualifying Examination

Written and oral.

## Research Proposal

A dissertation research proposal is required.

## Final Examination

Oral defense of the dissertation.

## Other Provisions

Three research rotations, each a brief project in a preceptor's laboratory, before an advisor is chosen. Presentation of three seminars during graduate study.

## Courses

### General Courses

A610 Research in Biophysics (cr. arr.)  
A611 Seminar in Biophysics (1 cr.)  
A612 Special Topics in Biophysics (cr. arr.)  
A620 X-Ray Crystallography (3 cr.)  
B807 Enzyme Chemistry (3 cr.)  
B808 Physical Biochemistry (3 cr.)  
B841 Methods of Protein Chemistry (3 cr.)  
F616 Molecular Pharmacology (3 cr.)  
F650 Membrane Biophysics (3 cr.)  
F705 Molecular and Cellular Physiology (3 cr.)  
F710 Physiology of Membranes (2 cr.)  
F724 Physiology of the Nervous System (3 cr.)  
F725 Physiology of Muscle (2 cr.)  
F835 Molecular Mechanism of Drug Action (3 cr.)  
G651 Introduction to Biostatistics I (3 cr.)  
G652 Introduction to Biostatistics II (3 cr.)  
G865 Fundamental Molecular Biology (3 cr.)  
G890 Methods in Molecular Biology and Pathology (3 cr.)  
J611 Introduction to Biophysics I (3 cr.)  
J612 Introduction to Biophysics II (3 cr.)  
J805 Immunology (3 cr.)  
Q612 Molecular and Biochemical Genetics (3 cr.)

### Relevant Courses in the Purdue School of Science at Indianapolis

BIOL 569 Cellular Neurobiology (2 cr.)  
BIOL 570 Biological Membranes (3 cr.)  
BIOL 641 Microbial Genetics (2 cr.)  
CHEM 575 Intermediate Physical Chemistry (3 cr.)  
CHEM 636 Biochemical Mechanisms (3 cr.)  
CHEM 657 Reaction Mechanisms (3 cr.)  
CHEM 672 Quantum Chemistry (3 cr.)  
CHEM 675 Chemical Kinetics (3 cr.)  
CHEM 682 Statistical Thermodynamics (3 cr.)  
CHEM 696 Special Topics in Chemistry (1-3 cr.)  
MATH 526 Principles of Mathematical Modeling (3 cr.)  
MATH 532 Elements of Stochastic Processes (3 cr.)  
PHYS 550 Introduction to Quantum Mechanics (3 cr.)  
PHYS 556 Introductory Nuclear Physics (3 cr.)  
PHYS 600 Methods of Theoretical Physics (3 cr.)  
PHYS 630 Advanced Theory of Electricity and Magnetism (3 cr.)  
PHYS 660 Quantum Mechanics I (3 cr.)