BIOPHYSICS, PH.D.

The doctor of philosophy degree with a major in biophysics is an interdepartmental offering under the supervision of the biophysics program committee. The biophysics degree is intended for those who wish to emphasize physical principles and methods in solving biological problems. By necessity, the interdisciplinary nature of biophysics generates interaction among, and expands the boundaries of, traditional areas of science. Persons with strong training in biophysics can be expected to be major innovators and contributors in research and applied technology. Biophysics graduates pursue careers in academic, industrial, and government research, and in teaching and administration.

The biophysics program consists of 44 faculty members from 14 departments that span four colleges within the university. State-of-the-art facilities are available within the biophysics program for research in x-ray crystallography, nuclear magnetic-resonance spectroscopy, electron resonance spectroscopy, fluorescence spectroscopy, microscopy and imaging, and computational chemistry. Graduate students in biophysics can choose from an expansive range of research topics including, but not limited to, biomolecular structure and function interactions, protein engineering and biotechnology, virus structure and function, enzyme catalysis and kinetics, membranes, neurochemistry, and electrophysiology.

The program is flexible in its formal course requirements and emphasizes excellence in research. The candidate is encouraged to begin research as quickly as possible, since it is research experience that brings focus and meaning to classroom studies, and research progress that empowers critical judgment and self-confidence for independent work. To enhance self-confidence, students are expected to participate in weekly seminars and to present a seminar.

Financial assistance is available to support qualified graduate students throughout their graduate studies. Types of graduate appointments may be awarded include research assistantships, fellowships, and traineeships. The stipends awarded provide financial support to students during their graduate work, permitting them to devote their efforts to coursework and research. In recognition of the leadership provided by scientists and researchers at University of Wisconsin–Madison, the National Institutes of Health (NIH) have funded a predoctoral training grant in molecular biophysics for the past consecutive 20 years.

A master’s degree is offered officially; however, students are not admitted into the program for a terminal master’s degree. For more information, see the Biophysics Handbook.

FUNDING

Prospective students should see the program website for funding information.

REQUIREMENTS

MINIMUM DEGREE REQUIREMENTS AND SATISFACTORY PROGRESS
To make progress toward a graduate degree, students must meet the Graduate School Minimum Degree Requirements and Satisfactory Progress in addition to the requirements of the program.

DOCTORAL DEGREES
Ph.D.

MINIMUM GRADUATE DEGREE CREDIT REQUIREMENT
51 credits

MINIMUM GRADUATE RESIDENCE CREDIT REQUIREMENT
32 credits

MINIMUM GRADUATE COURSEWORK (50%) REQUIREMENT
Half of degree coursework (26 credits out of 51 total credits) must be completed in graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university's Course Guide.

PRIOR COURSEWORK REQUIREMENTS: GRADUATE WORK FROM OTHER INSTITUTIONS
With program approval, students are allowed to count no more than 9 credits of graduate coursework from other institutions. Coursework earned more than two years prior to admission to the doctoral degree is not allowed to satisfy requirements. No admissions are made into the master’s program.

PRIOR COURSEWORK REQUIREMENTS: UW–MADISON UNDERGRADUATE
No credits from a UW–Madison undergraduate degree are allowed to count toward the degree.

PRIOR COURSEWORK REQUIREMENTS: UW–MADISON UNIVERSITY SPECIAL
With program approval, students are allowed to count no more than 9 credits of coursework numbered 300 or above taken as a UW–Madison Special student. Coursework earned more than two years prior to admission to the doctoral degree is not allowed to satisfy requirements. No admissions are made into the master’s program.

CREDITS PER TERM ALLOWED
15 credits

PROGRAM-SPECIFIC COURSES REQUIRED
Half of degree coursework (26 credits out of 51 total credits) must completed in courses numbered 700 and above and those courses numbered 600 and above considered graduate level in the biophysics program, which currently includes core courses BIOCHEM 601 Protein and Enzyme Structure and Function, BIOCHEM/GENETICS/MICROBIO 612 Prokaryotic Molecular Biology, BIOCHEM/CHEM 665...
Biophysical Chemistry, CHEM 668 Biophysical Spectroscopy and NTP/PHMCOL-M/PHYSIOL 610 Cellular and Molecular Neuroscience, as well as those courses outside biophysics that have been identified as graduate level by the courses' home departments.

**DOCTORAL MINOR/BREADTH REQUIREMENTS**

No minor required.

**OVERALL GRADUATE GPA REQUIREMENT**

3.00 GPA required

**OTHER GRADE REQUIREMENTS**

3.00 overall GPA required. Any grade of BC or lower will not count toward the Biophysics core course requirement. If a student receives a BC or lower, the student must repeat the course in order to receive a higher grade. The student may also substitute to course for an alternate core course.

**PROBATION POLICY**

If students fall below the 3.00 GPA program requirement or have incomplete grades, the biophysics program follows the Graduate School's policy of satisfactory/unsatisfactory progress. This could result in academic probation or suspension.

**ADVISOR / COMMITTEE**

All students are required to have an advisor by the end of their first semester in the program. Thesis committees must be formed prior to their preliminary exam. The committee consists of at least four other faculty members and the student’s advisor. After gaining dissertator status, students are required to hold yearly progress report meetings with their committee until graduation.

**ASSESSMENTS AND EXAMINATIONS**

Students take two rounds of exams in order to achieve dissertator status. At the end of students’ second year, they are required to take their written preliminary exam. Once this exam is passed, students must take their preliminary exam by the end of their third year.

**TIME CONSTRAINTS**

A candidate for a doctoral degree who fails to take the final oral examination and deposit the dissertation within five years after passing the preliminary examination may be required to take another preliminary examination and to be admitted to candidacy a second time.

Doctoral degree students who have been absent for ten or more consecutive years lose all credits that they have earned before their absence. Individual programs may count the coursework students completed prior to their absence for meeting program requirements; that coursework may not count toward Graduate School credit requirements.

**LANGUAGE REQUIREMENTS**

No language requirements.

**ADMISSIONS**

Undergraduate preparation for the biophysics program can vary widely and will be evaluated by the admissions committee on an individual basis. Most applicants have taken courses in general, organic, and physical chemistry; introductory physics; cell and/or molecular biology; calculus through differential equations; and computer sciences. Students can generally make up any deficiencies in their undergraduate background within the first year of graduate study through a broad and flexible course curriculum. The normal undergraduate course prerequisites are:

- two semesters of physics with calculus
- two semesters of calculus
- two semesters of organic chemistry
- one semester of physical chemistry
- one semester of computer sciences
- one semester of statistics
- introduction to biology

Exceptions to these requirements may be granted for incoming biophysics graduate students who otherwise have strong undergraduate training in physics, mathematics, computer sciences, biology, chemistry, or other fields related to biophysics. In such cases, each missing required course will be counted as a deficiency that the student must correct by obtaining a passing grade in an equivalent undergraduate or graduate course taken within the first two years of graduate study.

In addition, it is recommended for entering graduate students to have taken undergraduate courses in general biochemistry; general genetics and/or molecular biology; and biophysical chemistry. Students who have not taken courses in these subjects will be expected to do so as part of their formal graduate coursework.

**COURSES**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOCHEM 601</td>
<td>Protein and Enzyme Structure and Function</td>
<td>2</td>
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<tr>
<td>BIOCHEM/GENETICS/MICROBIO 612</td>
<td>Prokaryotic Molecular Biology</td>
<td>3</td>
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<td>BIOCHEM/GENETICS/MD GENET 620</td>
<td>Eukaryotic Molecular Biology</td>
<td>3</td>
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<td>BIOCHEM/CHEM 665</td>
<td>Biophysical Chemistry</td>
<td>4</td>
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<td>CHEM 668</td>
<td>Biophysical Spectroscopy</td>
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<tr>
<td>CHEM/BIOCHEM 872</td>
<td>Selected Topics in Macromolecular and Biophysical Chemistry</td>
<td>1-3</td>
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<tr>
<td>NTP/PHMCOL-M/PHYSIOL 610</td>
<td>Cellular and Molecular Neuroscience</td>
<td>4</td>
</tr>
<tr>
<td>BIOCHEM 990</td>
<td>Research</td>
<td>1-12</td>
</tr>
</tbody>
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**LEARNING OUTCOMES**

**KNOWLEDGE AND SKILLS**

- Articulates challenges, frontiers and limits with respect to theory, knowledge or practice within the field of study.
- Formulates ideas, concepts, designs, and/or techniques beyond the current boundaries of knowledge within the field of study.
- Creates research, scholarship or performance that makes a substantive contribution.
- Demonstrates breadth within their learning experiences.
- Communicates complex or ambiguous ideas in a clear and understandable manner.
• Evaluates the implications of the discipline to broader social concerns.

**PROFESSIONAL CONDUCT**

• Fosters ethical conduct and professional guidelines.

**PEOPLE**

**Faculty:**

Professors Meyer Jackson (chair), Brunold (Chemistry), Burstyn (Chemistry), Butcher (Biochemistry), Cavangero (Chemistry), Chapman (Neuroscience), Cui (Chemistry), Czajkowski (Neuroscience), Fettiplace (Neuroscience), Forest (Bacteriology), Fox (Biochemistry), Gellman (Chemistry), Gilbert (Physics), Hardin (Zoology), Holden (Biochemistry), Keck (Biomolecular Chemistry), Kiessling (Chemistry), Landick (Biochemistry), Markley (Biochemistry), Mitchell (Mathematics), Murphy (Chemical and Biological Engineering), Raines (Biochemistry), Rayment (Biochemistry), Record (Biochemistry), Robertson (Neuroscience), Schwartz (Chemistry), Smith (Chemistry), van der Weide (Electrical and Computer Engineering), Weisshaar (Chemistry), Yethiraj (Chemistry), Yin (Chemical and Biological Engineering), Zanni (Chemistry); Associate Professors Chanda (Neuroscience), Craciun (Mathematics), Henzler-Wildman (Biochemistry), Jones (Neuroscience), Senes (Biochemistry), Weibel (Biochemistry), Yongna Xing (Oncology); Assistant Professors Goldsmith (Chemistry), Hoskins (Biochemistry), Lou (Neuroscience), Merrins (Biomolecular Chemistry), Murrell (Biomedical Engineering), Raman (Biochemistry)