

BIOPHYSICS, PH.D.

The doctor of philosophy degree with a major in biophysics is an interdepartmental offering under the supervision of the Biophysics Graduate Degree Program. 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 approximately 45 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 that 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.

For more information, see the Biophysics Handbook (<http://www.biophysics.wisc.edu/handbook/>).

ADMISSIONS

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website. Graduate admissions is a two-step process between academic programs and the Graduate School. **Applicants must meet** the minimum requirements (<https://grad.wisc.edu/apply/requirements/>) **of the Graduate School as well as the program(s)**. Once you have researched the graduate program(s) you are interested in, apply online (<https://grad.wisc.edu/apply/>).

Requirements	Detail
Fall Deadline	December 1
Spring Deadline	The program does not admit in the spring.
Summer Deadline	The program does not admit in the summer.
GRE (Graduate Record Examinations)	Not required but may be considered if available.
English Proficiency Test	Every applicant whose native language is not English or whose undergraduate instruction was not in English must provide an English proficiency test score and meet the Graduate School minimum requirements (https://grad.wisc.edu/apply/requirements/#english-proficiency).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3

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.

Admission to the biophysics Ph.D. program is highly competitive. A committee of biophysics faculty trainers reviews each application and invites selected students for personal interviews in February. Outstanding international students will be offered video-conferencing interviews with members of the admissions committee. Final admissions decisions are made after all interviews are completed. An application for admission consists of:

1. A resume or CV

- A personal statement that discusses a candidate's reasoning for pursuing a biophysics Ph.D. What initially drew you to the field? How will earning a Ph.D. help you accomplish your goals?
- An official transcript of coursework from all undergraduate institutions attended
- Three or more letters of recommendation
- A report, if submitting, from the Educational Testing Service of scores received on the GRE General Test
- A report, if appropriate, of scores received on the TOEFL English language proficiency exam or an appropriate alternative (IELTS, MELAB)

The admissions committee highly weighs the personal statement and letters of recommendation when reviewing applicants. GPA values are evaluated to ensure they meet minimum graduate school requirements (<https://grad.wisc.edu/apply/requirements/>).

FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (<https://grad.wisc.edu/funding/>) is available from the Graduate School. Be sure to check with your program for individual policies and restrictions related to funding.

PROGRAM RESOURCES

The Biophysics Graduate Degree Program offers stipends in the form of traineeships or research assistantships to all Ph.D. candidates, and assists those with outstanding records in competing for University and national awards (fellowships). The program guarantees a full stipend (\$27,000 for 2017–18) for all its Ph.D. candidates who remain in good standing in the program. In addition to the stipend, all students receive tuition remission and are eligible for comprehensive health insurance.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (<http://guide.wisc.edu/graduate/#policiesandrequirements>), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students are able to complete a program with minimal disruptions to careers and other commitments.

Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirements Detail

Minimum Credit Requirement	51 credits
Minimum Residence Credit Requirement	32 credits
Minimum Graduate Coursework Requirement	Half of degree coursework (26 credits out of 51 total credits) must be completed graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university's Course Guide.
Overall Graduate GPA Requirement	3.00 GPA required.
Other Grade Requirements	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.
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 oral preliminary exam by the end of their third year.
Language Requirements	No language requirements.
Doctoral Minor/Breadth Requirements	No minor required.

Required Courses

Code	Title	Credits
Required by the time oral prelim is taken:		
BIOCHEM/ CHEM 665	Biophysical Chemistry	4
CHEM 668	Biophysical Spectroscopy ¹	2-3

Students must take at least 2 additional classes from different categories from the following list of classes (alternative classes may be substituted with approval from the Biophysics Program Steering Committee):

Structure

BIOCHEM 601	Protein and Enzyme Structure and Function
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BIOCHEM 606

BIOCHEM 625	Mechanisms of Action of Vitamins and Minerals	
<i>Modeling</i>		
CHEM 661	Chemical and Statistical Thermodynamics	
MATH/B M I/ BIOCHEM/ BMOLCHEM 609	Mathematical Methods for Systems Biology	
<i>Molecular Biology</i>		
BIOCHEM/ GENETICS/ MICROBIO 612	Prokaryotic Molecular Biology	
BIOCHEM/ GENETICS/ MD GENET 620	Eukaryotic Molecular Biology	
<i>Neuroscience</i>		
NTP/ NEURODPT 610	Cellular and Molecular Neuroscience	
<i>Spectroscopy/Microscopy</i>		
B M E/MED PHYS/ PHMCO-M/ PHYSICS/ RADIOL 619	Microscopy of Life	
Additional Courses		
BIOCHEM 729	Advanced Topics (Ethics) ²	1-3
CHEM/ BIOCHEM 872	Selected Topics in Macromolecular and Biophysical Chemistry ³	1-3
990 Seminar ⁴		

¹ Because CHEM 668 Biophysical Spectroscopy is only offered every other year, students will be advised upon joining the program in which semester they must complete the course.

² Students are also required to take an ethics course that covers all of the items considered necessary by the NIH for ethical and professional scientific training. It is strongly recommended that students take the ethics course during their first year. The recommended ethics course is: BIOCHEM 729 Advanced Topics. The Biophysics Program also conducts a mandatory ethics refresher seminar for all students that is held at the end of every spring semester.

³ Additionally, students are required to participate in seminar courses for the duration of their studies. Initially, all students are required to enroll in CHEM/BIOCHEM 872 Selected Topics in Macromolecular and Biophysical Chemistry for both fall and spring semesters. Once a student has successfully achieved dissertator status, they are eligible to enroll in alternative seminars with permission from the program.

⁴ Finally, all students are expected to register for 990 research credits every semester. These are the courses in which students will be conducting their independent research. First semester students will register for 990 research credits in the department of the Biophysics Program Chair, Meyer Jackson. Once a thesis lab is chosen, these credits will be conducted in the thesis advisor's home department.

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (<https://grad.wisc.edu/acadpolicy/>) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

MAJOR-SPECIFIC POLICIES

PRIOR COURSEWORK

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.

UW–Madison Undergraduate

No credits from a UW–Madison undergraduate degree are allowed to count toward the degree.

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.

PROBATION

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 at the end of a student's first year in the program. The committee consists of at least four other faculty members and the student's advisor and faculty must represent at least two different departments on campus. After gaining dissertator status, students are required to hold yearly progress report meetings with their committee until graduation.

CREDITS PER TERM ALLOWED

15 credits

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.

GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (<https://doso.students.wisc.edu/bias-or-hate-reporting/>)
- Graduate Assistantship Policies and Procedures (<https://hr.wisc.edu/policies/gapp/#grievance-procedure>)
- Hostile and Intimidating Behavior Policies and Procedures (<https://hr.wisc.edu/hib/>)
 - Office of the Provost for Faculty and Staff Affairs (<https://facstaff.provost.wisc.edu/>)
- Dean of Students Office (<https://doso.students.wisc.edu/>) (for all students to seek grievance assistance and support)
- Employee Assistance (<http://www.eao.wisc.edu/>) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (<https://employee disabilities.wisc.edu/>) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (<https://grad.wisc.edu/>) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (<https://compliance.wisc.edu/>) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office of Student Conduct and Community Standards (<https://conduct.students.wisc.edu/>) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (<http://www.ombuds.wisc.edu/>) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (<https://compliance.wisc.edu/titleix/>) (for concerns about discrimination)

Students should contact the department chair or program director with questions about grievances.

OTHER

Fall semester enrollment only. First semester, program-sponsored lab rotations lead to thesis lab selection and research assistantship through the thesis advisor.

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES

Take advantage of the Graduate School's professional development resources (<https://grad.wisc.edu/pd/>) to build skills, thrive academically, and launch your career.

LEARNING OUTCOMES

1. Articulates challenges, frontiers and limits with respect to theory, knowledge or practice within the field of study.
2. Formulates ideas, concepts, designs, and/or techniques beyond the current boundaries of knowledge within the field of study.

3. Creates research, scholarship or performance that makes a substantive contribution.
4. Demonstrates breadth within their learning experiences.
5. Communicates complex or ambiguous ideas in a clear and understandable manner.
6. Evaluates the implications of the discipline to broader social concerns.
7. Fosters ethical conduct and professional guidelines.

PEOPLE

FACULTY

Chair: Dr. Alessandro Senes (Biochemistry) Website (<https://biochem.wisc.edu/faculty/senes/>)

Paul Ahlquist (Oncology) Website (<https://mcardle.wisc.edu/who-we-are/mcardle-faculty/paul-g-ahlquist-phd/>)

Tom Brunold (Chemistry) Website (<http://brunold.chem.wisc.edu/>)

Andrew Buller (Chemistry) Website (<https://www.chem.wisc.edu/users/abuller/>)

Mark Burkard (Medicine) Website (https://www.medicine.wisc.edu/people-search/people/staff/703/Burkard_Mark/)

Judith Burstyn (Chemistry) Website (<http://burstyn.chem.wisc.edu/>)

Briana Burton (Bacteriology) Website (<https://burtonlab.bact.wisc.edu/>)

Sam Butcher (Biochemistry) Website (<https://biochem.wisc.edu/faculty/butcher/>)

Silvia Cavagnero (Chemistry) Website (<http://cavagnero.chem.wisc.edu/>)

Baron Chanda (Neuroscience) Website (<http://bclab.neuro.wisc.edu/>)

Ed Chapman (Neuroscience) Website (<https://chapman.neuro.wisc.edu/>)

Josh Coon (Chemistry) Website (<https://www.chem.wisc.edu/users/jcoon/>)

Gheorghe Craciun (Mathematics) Website (<http://www.math.wisc.edu/~craciun/>)

Cindy Czajkowski (Neuroscience) Website (<https://neuro.wisc.edu/staff/czajkowski-cynthia/>)

Katrina Forest (Bacteriology) Website (https://bact.wisc.edu/people_profile.php?t=rf&p=kforres1)

Brian Fox (Biochemistry) Website (<https://biochem.wisc.edu/faculty/fox/default.aspx>)

Sam Gellman (Chemistry) Website (<http://gellman.chem.wisc.edu/>)

Pupa Gilbert (Physics) Website (<https://home.physics.wisc.edu/gilbert/>)

Randy Goldsmith (Chemistry) Website (<https://goldsmith.chem.wisc.edu/>)

Jeff Hardin (Zoology) Website (<http://worms.zoology.wisc.edu/>)

Katie Henzler-Wildman (Biochemistry) Website (<https://biochem.wisc.edu/faculty/henzler-wildman/>)

Hazel Holden (Biochemistry) Website (<https://biochem.wisc.edu/faculty/holden/default.aspx>)

Aaron Hoskins (Biochemistry) Website (<https://biochem.wisc.edu/faculty/hoskins/default.aspx>)

Meyer Jackson (Neuroscience Department) Website (<https://neuro.wisc.edu/staff/jackson-meyer/>)

Mathew Jones (Neuroscience) Website (<https://neuro.wisc.edu/staff/jones-mathew-2/>)

Jim Keck (Biomolecular Chemistry) Website (<https://bmolchem.wisc.edu/staff/keck-james/>)

Bob Landick (Biochemistry) Website (<https://landick.wisc.edu/>)

John Markley (Biochemistry) Website (<https://biochem.wisc.edu/faculty/markley/>)

Megan McClean (Biomedical Engineering) Website (<http://mccleanlab.bme.wisc.edu/>)

Matthew Merrins (Biomolecular Chemistry) Website (<https://bmolchem.wisc.edu/staff/merrins-matthew/>)

Julie Mitchell (Mathematics) Website (<https://biochem.wisc.edu/faculty/mitchell/default.aspx>)

Regina Murphy (Chemical and Biological Engineering) Website (<http://murphygroup.che.wisc.edu/>)

Jacob Notbohm (Engineering Physics) Website (<http://notbohm.ep.wisc.edu/>)

Vatsan Raman (Biochemistry) Website (<https://biochem.wisc.edu/faculty/raman/>)

Ivan Rayment (Biochemistry) Website (<https://biochem.wisc.edu/faculty/rayment/default.aspx>)

Tom Record (Biochemistry) Website (<https://biochem.wisc.edu/faculty/record/>)

Gail Robertson (Neuroscience) Website (<https://neuro.wisc.edu/staff/robertson-gail/>)

Phil Romero (Biochemistry) Website (<https://biochem.wisc.edu/faculty/romero/>)

Subhojit Roy (Pathology and Laboratory Medicine) Website (<https://pathology.wisc.edu/staff/roy-subhojit/>)

Kris Saha (Biomedical Engineering) Website (<http://sahalab.bme.wisc.edu/>)

David Schwartz (Chemistry) Website (<https://www.chem.wisc.edu/users/schwartz/>)

Nate Sherer (Oncology) Website (<https://mcardle.wisc.edu/who-we-are/faculty/nathan-m-sherer-phd/>)

Raunak Sinha (Neuroscience) Website (<https://neuro.wisc.edu/staff/sinha-raunak/>)

Melissa Skala (Biomedical Engineering) Website (<https://morgridge.org/research/medical-engineering/multiscale-imaging/>)

Lloyd Smith (Chemistry) Website (<https://www.chem.wisc.edu/users/smith/>)

Aussie Suzuki (Oncology) Website (<https://cancerbiology.wisc.edu/staff/suzuki-phd-aussie/>)

Reid Van Lehn (Chemical and Biological Engineering) Website (<http://vanlehngroup.che.wisc.edu/>)

Ophelia Venturelli (Biochemistry) Website (<https://biochem.wisc.edu/faculty/venturelli/>)

Doug Weibel (Biochemistry) Website (<https://biochem.wisc.edu/faculty/weibel/default.aspx>)

Yongna Xing (Oncology): Website (<https://mcardle.wisc.edu/who-we-are/mcardle-faculty/yongna-xing-phd/>)

John Yin (Chemical and Biological Engineering) Website (<https://yin.discovery.wisc.edu/>)

Martin Zanni (Chemistry) Website (<https://zanni.chem.wisc.edu/>)