

Bioorganic Chemistry

See Biochemistry.

A graduate program

Biophysics and Structural Biology

Courses of Study:
Master of Science
Doctor of Philosophy

Objectives

Graduate Program in Biophysics and Structural Biology

The interdepartmental graduate program in biophysics and structural biology, leading to the degree of Doctor of Philosophy, is designed to develop the student's capacity for independent research. The program is focused on the application of the physical sciences to important problems in molecular and cellular biology. It offers opportunities for study and research in a variety of fields, including protein crystallography and magnetic resonance spectroscopy, molecular microscopy, biophysical chemistry, neuroscience, sensory transduction, and chemo-mechanical energy transduction. Applicants are expected to have strong backgrounds in physical sciences with undergraduate majors in any related field, such as biology, biochemistry, chemistry, engineering, mathematics, or physics. The course requirements for the Ph.D. degree are formulated individually for each student to complement the student's previous academic work, with the goal of providing a broad background in the physics and chemistry of biological processes.

Research for the Ph.D. dissertation is carried out under the personal supervision of a faculty advisor; advisors can be from any department within the School of Science. Prospective applicants should obtain the complete list of faculty research interests and recent publications from the program or view this information at: www.bio.brandeis.edu/biophysics.

How to Be Admitted to the Graduate Program

The general requirements for admission to the Graduate School are given in an earlier section of this *Bulletin*. Applications should include, in addition to letters of reference, a personal statement describing the reasons for the applicant's interest in the field and previous research experience, if any. Applicants are required to take the Graduate Record Examination and are encouraged to visit Brandeis for interviews, if possible.

Faculty Advisory Committee

Jeff Gelles, Chair

(Biochemistry, Volen National Center for Complex Systems)

David DeRosier

(Biology, Rosenstiel Center)

Ulrich Genick

(Biochemistry)

Nikolaus Grigorieff

(Biochemistry, Rosenstiel Center)

Dorothee Kern

(Biochemistry, Volen National Center for Complex Systems)

Christopher Miller

(Biochemistry, Volen National Center for Complex Systems)

Requirements for the Degree of Master of Science

Program of Study

The graduate program does not normally admit students to pursue the M.S. degree. In special cases, however, the M.S. degree may be awarded upon completion of an approved program of study consisting of at least six graduate-level courses in biology, physics, biochemistry, or chemistry with a grade of B- or better. Generally, the courses include BIOP 200b, BIOP 300a, and BIOP 300b.

Residence Requirement

The minimum residence requirement is one year.

Language Requirement

There is no language requirement.

Thesis

To qualify for the M.S., a student must submit a thesis reporting a substantial piece of original research carried out under the supervision of a research advisor or advisors.

Requirements for the Degree of Doctor of Philosophy

Program of Study

The Ph.D. program in biophysics and structural biology is designed to accommodate students with previous academic majors in a wide range of fields, including biology, physical chemistry, engineering, and physics. Consequently, the course requirements for the Ph.D. degree are tailored to the needs of the particular student. In consultation with each entering student, the program chair formulates a program of study for the student based on the student's previous academic accomplishments and scientific interests. Successful completion of the courses listed in the program of study fulfills the course requirements for the Ph.D. degree. Ordinarily, the required program of study consists of seven one-semester courses, of which six are completed in the student's first year. The first year courses include the proseminar (BIOP 200b) and two courses of laboratory rotations (BIOP 300a,b). In addition to the seven courses, the noncredit course CONT 300b (Ethical Practice in Health-Related Sciences) is required of all first-year students.

Teaching Requirement

As part of their Ph.D. training, students are required to assist with the teaching of two, one-semester courses.

Residence Requirement

The minimum residence requirement is three years.

Language Requirement

There is no language requirement.

Financial Support

Students may receive financial support (tuition and stipend) throughout their participation in the Ph.D. program. This support is provided by a combination of University funds, training grants, and faculty research grants.

Qualifying Examinations

To qualify for the Ph.D. degree, each student must write and defend in oral examinations three propositions related to research in biophysics or structural biology. The subject of the second proposition must be outside the immediate area of the student's dissertation research.

Dissertation and Defense

The dissertation must report the results of an original scientific investigation into an approved subject and must demonstrate the competence of the Ph.D. candidate in independent research. The dissertation research must be presented and defended in a Final Oral Examination.

Courses of Instruction**(200 and above) Primarily for Graduate Students****BIOP 200b Biophysics and Structural Biology Proseminar**

Intended for first-year biophysics and structural biology graduate students, but open to other graduate students with permission of the instructor.

Introduces students to quantitative and physical approaches to biological problems through critical evaluation of the original literature. Students analyze scientific papers on a wide range of topics in the fields of biophysics and structural biology. Discussion focuses on understanding of the scientific motivation for and experimental design of the studies. Particular emphasis is placed on making an independent determination of whether the authors' conclusions are well justified by the experimental results. In consultation with the instructor, each student also develops a research proposition based on independent reading and prepares a research plan in the form of a mock-grant proposal. Usually offered every year.

Mr. Genick

BIOP 300a and b Introduction to Research in Biophysics

Students must consult with the program chair prior to enrolling in these courses. Students carry out projects in the research laboratories of faculty members. Projects and faculty are selected from the Departments of Biochemistry, Biology, Chemistry, and Physics. Usually offered every year.

Mr. Gelles and Staff

Each semester after the first year, students must register for Dissertation Research in the 400 series courses within the department of the faculty member with whom they are doing their research.

CONT 300b Ethical Practice in Health-Related Sciences

Required of all first-year graduate students in health-related science programs. Not for credit.

Scientists are becoming increasingly aware of the importance of addressing ethical issues and values associated with scientific research. This course, taught by University faculty from several graduate disciplines, covers major ethical issues germane to the broader scientific enterprise, including areas or applications from a number of fields of study. Lectures and relevant case studies are complemented by two public lectures during the course. Usually offered every year.

Ms. Press

Cross-Listed Courses**BCHM 102a**

Quantitative Approaches to Biochemical Systems

BCHM 104b

Physical Chemistry of Macromolecules

BIOL 105b

(formerly BIBC 105b)
Molecular Biology

Courses of Related Interest**BCHM 171b**

Protein X-Ray Crystallography

BCHM 219b

Enzyme Mechanisms

BCHM 224a

Single-Molecule Biochemistry and Biophysics

BIOL 102b

Structural Molecular Biology

BIOL 103b

Mechanisms of Cell Functions

BIOL 104a

Structural Approaches to Cell Biology

CHEM 111a

Computational Chemistry

CHEM 132b

Advanced Organic Chemistry: Spectroscopy

CHEM 141b

Kinetics

CHEM 229b

Special Topics in Inorganic Chemistry: Introduction to X-Ray Structure Determination

CHEM 235b

Advanced NMR Spectroscopy

NBIO 140b

Principles of Neuroscience

NBIO 145b

Systems Neuroscience

PHYS 104a

Condensed Matter I

An interdepartmental program

Courses of Study:
Minor

Business

Objectives

The Business Program (BUS) introduces undergraduates to the functions and problems of business enterprise and helps them to acquire skills essential to a business career. Administered and staffed by the Brandeis International Business School and the School of Arts and Sciences, the curriculum allows students to combine perspectives and methods from liberal arts disciplines with an intensive education in business thinking and practice.

How to Become a Minor

The Business Program is designed to be accessible to any Brandeis undergraduate and to serve students with a broad range of interests. It welcomes all students who wish to augment their liberal arts education with a brief but sophisticated overview of business issues. Economics majors may complete this program, but students in the International Business Program (IB) may not complete BUS. Students who entered Brandeis before fall 2003 may elect to complete either the IB or the BUS program; for other students, this program replaces the IB. Satisfactory completion of the Business program is noted on the student's permanent record and transcripts.

Committee

Benjamin Gomes-Casseres, Chair
(International Business School/Economics)

Shih-Fen Chen
(International Business School/Economics)

F. Trener Dolbear
(Economics/International Business School)

Richard Gaskins
(American Studies)

Andrew Molinsky
(International Business School/Psychology)

Paroma Sanyal
(Economics/International Business School)

Dessima Williams
(Sociology/Heller School)

Faculty

Benjamin Gomes-Casseres, Chair
(International Business School/Economics)

Edward Bayone
(International Business School)

Shih-Fen Chen
(International Business School/Economics)

Egidio Diodati
(International Business School)

F. Trener Dolbear
(Economics/International Business School)

Jane Hughes
(International Business School/Economics)

Richard Keith
(International Business School)

Requirements for the Minor

A. Two core courses in economics and in business: ECON 2a and BUS 10a (formerly ECON 37b).

B. One core course in accounting and statistics: BUS 4a or BUS 6a. Students who take a statistics course in another department (e.g., ECON 83a, PSYC 51a, MATH 36a, b, or another statistics course approved by the program advising head) should take BUS 6a. Students who do not take any statistics course should take BUS 4a.

C. One course providing an alternative perspective on business: Any cross-listed course (e.g., not BUS), except for ECON courses.

D. Two electives: One should be a BUS course (except BUS 92a or BUS 98a) and the other can be any BUS or cross-listed course, including ECON courses (but not including statistics courses).

Special Notes

No more than two courses may be double-counted for another major or minor. Upon approval of the program advising head, more advanced BUS courses in the International Business School may be used as substitutes for BUS courses in the program.

Student may elect to specialize in various fields, such as globalization and business, finance, entrepreneurship, business and society, and business and government. The program advising head will advise on appropriate courses for specialization. This specialization does not appear on the student's transcript.

Courses of Instruction

BUS 92a Work in the Global Business Environment: Internship and Seminar (formerly IB 92b)

Normally students must arrange an internship placement prior to registration and the internship is concurrent with the seminar. Students wishing to fulfill the internship component of the course in a semester when the seminar is not offered, must obtain approval from the instructor prior to the internship. A structured journal documenting the internship experience is required as a basis for seminar participation. Signature of the instructor required. This course may not be repeated for credit by students who have taken IB 92b in previous years.

Encourages students to pool experiences and lessons drawn from various business environments and to analyze and discuss them in the context of related readings. Usually offered every spring.
Mr. Dolbear

BUS 98a Independent Study

Signature of the instructor required.
Normally available for a student who has taken a course and wishes to pursue further reading or research in that field or study a subject not listed among the department course offerings. Usually offered every year.
Staff

BUS 98b Independent Study

Signature of the instructor required.
Normally available for a student who has taken a course and wishes to pursue further reading or research in that field or study a subject not listed among the department course offerings. Usually offered every year.
Staff

Core Courses

BUS 6a Financial Accounting

(formerly ECON 12a)
[ss]
Prerequisite: ECON 2a. This course may not be repeated for credit by students who have received credit for IEF 204a or taken ECON 12a in previous years. Enrollment limited to 40.
Develops basic concepts and accounts and applies them to income measurement, capital values, and costs. Through the use of cases, develops the basis for rational choice and control of business activity. Usually offered every semester. Will be offered in the fall of 2003.
Mr. Keith

BUS 10a Functions of Capitalist Enterprise (formerly ECON 37b)

[ss]
Prerequisite: ECON 2a (may be taken concurrently) or permission of the instructor. This course may not be repeated for credit by students who have taken ECON 37b previous years. Enrollment limited to 40.

Introduces the internal complexity of modern businesses and the various roles they play in society. First examines the internal workings of firms—marketing, operations, finance, and other functions. Subsequently, the relationships between businesses and their context—the economy, social issues, and government are studied. Usually offered every year. Will be offered in the fall of 2003.
Mr. Bayone

ECON 2a Introduction to Economics

[qr ss]
Common final exam.
A one-semester introduction to economic analysis with policy applications. The economist's approach to social analysis is systematically elaborated. Usually offered every semester in multiple sections. Will be offered in the fall of 2003.
Staff

Elective Courses

The following courses are approved for the minor. Not all are given in any one year. Please consult the *Course Schedule* each semester.

BUS 30a
(formerly IEF 135b)
Creating New Ventures

BUS 40a
(formerly IEF 148a)
Business on the Internet

BUS 70a
(formerly ECON 33a)
Business in the Global Economy

BUS 75a
(formerly ECON 19b)
Issues in Business and Management

Cross-listed Courses

ECON 8b
The Global Economy

ECON 57a
Environmental Economics

ECON 71a
Introduction to Finance

ECON 74b
Law and Economics

ECON 76b
Trade Unions, Collective Bargaining, and Public Policy

ECON 77a
Introduction to Regulation and Public Policy

ECON 80a
Microeconomic Theory

ECON 135a
Industrial Organization

ECON 137a
Economic Theory of Organizations and Management

ECON 139a
Economics of Antitrust

ECON 172b
Money and Banking

ECON 174a
Corporate Finance

ECON 177b
Economic Regulation and Deregulation

The following courses are eligible as "alternative perspectives on business" (refer to requirement item C on previous page):

AAAS 126b
Political Economy of the Third World

AMST 188b
Justice Brandeis and Progressive Jurisprudence

ANTH 163b
Economic Anthropology

COSI 33b
Internet and Society

HIST 160b
American Legal History II

HIST 179a
Globalization: Critical Historical Perspectives

HS 110a
Wealth and Poverty

HS 104b
American Health Care

JOUR 103b
Advertising and the Media

LGLS 129b
Law, Technology, and Innovation

POL 172b
Introduction to International Political Economy

POL 166b
Seminar: Issues in International Political Economy

PSYC 150b
Organizational Behavior

SOC 107a
Global Apartheid and Global Social Movements

SOC 117a
Sociology of Work