

Department of Natural Sciences

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Field Description

The Department of Natural Sciences is an integrated department consisting of offerings in biology, chemistry, environmental studies, and physics. The mission of the department is threefold: (1) to engage all students in the scientific enterprise through hands-on learning, enabling them to become scientifically literate citizens who are able to make informed decisions about public policy issues; (2) to prepare students for admission to and success in graduate and professional schools and for entry into the scientific workforce; and (3) to promote innovative faculty research on campus that advances science while enhancing teaching and providing research opportunities for Baruch College students. Undergraduates may work with a faculty advisor to design ad hoc majors to prepare for postbaccalaureate careers in science and health related fields or for entry to graduate or professional studies.

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The Major

[Biological Sciences](#)

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Biological Sciences		
Base Curriculum Courses		
<i>No credit toward the major/specialization</i>		
BIO 2010	Principles of Biology I	4.5 credits
CHM 2003	General Chemistry I	4 credits
MTH 2003	Pre-calculus and Elements of Calculus	3 credits
<i>or</i>		
	A more advanced calculus course	3-4 credits
* Please note: Students with credit for MTH 2000 or 2001 must complete a calculus course.		
Program Prerequisites 16.5 – 17.5 credits		
BIO 3001	Principles of Biology II	4.5 credits

CHM 3001	General Chemistry II	4 credits
CHM 3003	Principles of Organic Chemistry I	4 credits
PHY 2003	General Physics I	4 credits
<i>or</i>		
PHY 3010	Quantitative Physics I	5 credits
Required Courses 7 credits		
STA 2100	Statistics for Social Sciences	3 credits
<i>or</i>		
STA 2000	Business Statistics	3 credits
BIO 3015	Principles of Genetics	4 credits
Electives 19 – 20.5 credits		
Electives are based on students' interests and future goals, and are chosen in consultation with a faculty advisor. The major includes five elective courses, at least two of which must be at the 4000-level or higher, chosen from the following list:		
BIO 3005	Molecular and Cellular Biology	4 credits
BIO 3010	Comparative Vertebrate Anatomy	4 credits
BIO 3012	Endocrinology	4 credits
BIO 3020	Biology of Invertebrates	4 credits
BIO 3040	Plants in Action	4 credits
BIO 4004	Microbiology	4 credits
BIO 4010	Human Physiology	4 credits
BIO 4015	Developmental Biology	4 credits
BIO 5000-5004	Independent Study	3-4 credits
BIO 6001H-6003H	Honors	4 credits
CHM 4010	Medicinal Chemistry	4 credits
CHM 4900	Biochemistry	4 credits
CHM 5000-5004	Independent Study	3-4 credits
CHM 6001H-6003H	Honors	4 credits
ENV 3001	Introduction to Environmental Science	4 credits
ENV 3002	Energy Conservation	4 credits

ENV 3003	Human Conservation	4 credits
ENV 3005	Economic and Legal Aspects of Ecology	4 credits
ENV 3006	Global Ecology	4 credits
ENV 3008	Air and Water Pollution	4 credits
ENV 3009	Conservation Biology and Sustainable Development	4.5 credits
ENV 3015	Tropical Reef Ecology (plus lab ENV 3015L)	3 credits
ENV 3050	Freshwater Ecology (BIO 3050)	4 credits
ENV 4005	Ecosystem Sustainability	4 credits
ENV 4020	Microbial Ecology	4 credits
ENV 4900	Topics in Environmental Science	4 credits
ENV 5000-5004	Independent Study	3-4 credits
ENV 6001H-6002H	Honors	4 credits

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Arts And Sciences Ad Hoc Major in Natural Science Areas

When a student's educational objectives cannot be fully attained solely by study within an existing department, program, or school, he or she is given the option of devising an ad hoc pattern of courses in an area of concentration of his or her own choosing. A student may embark upon an ad hoc major following preparation and acceptance of a proposal outlining the area of study, the desired outcomes, and the educational values of the program. The program must be approved by the Office of the Associate Dean, Weissman School of Arts and Sciences.

The Department of Natural Sciences offers a preprofessional specialization that enables students to include chemistry and physics courses as part of an arts and sciences ad hoc major. Students prepare for entry into professional schools of medicine, dentistry, and other health care fields; graduate study in biological sciences; and teaching of biology, chemistry, and general sciences. Students combine basic courses in chemistry and physics with advanced electives.

The department also offers a specialization in environmental studies as part of an arts and sciences ad hoc major. This major includes a variety of courses in the sciences and additional courses from the Weissman School of Arts and Sciences, the Zicklin School of Business, and the School of Public Affairs. This ad hoc major integrates ecological principles in the dual context of science and society.

Prospective students are urged to register with the office of the Department of Natural Sciences early in their college careers. Each student will be assigned an individual advisor who will assist in formulating the specific ad hoc major program designed to attain the desired educational objectives. The department can be contacted at 646-660-6200.

The Weissman School of Arts and Sciences ad hoc major requires 30 – 33 credits.

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The Minors

[Natural Sciences](#)
[Interdisciplinary Minor in Environmental Sustainability](#)
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Natural Sciences Minor

Students may wish to minor in natural sciences in order to pursue general intellectual interests or specific career objectives. For example, students can complete some of the science courses required for admission to medical school by doing a minor in natural sciences. For the natural sciences minor, students take two natural sciences courses at the 3000 level or above, followed by a capstone course at the 4000 level. The capstone course must be taken at Baruch College. All 4000- level courses offered by the Department of Natural Sciences or an independent studies course may serve as the capstone. Interested students should contact the department.

Tier III Interdisciplinary Minor in Environmental Sustainability

The Department of Natural Sciences, the Weissman School of Arts and Sciences, and the Zicklin School of Business offer a joint interdisciplinary program in environmental sustainability that satisfies Baruch College's Tier III liberal arts requirement. The environmental sustainability minor is an interdisciplinary program suitable for both business and liberal arts students who have an interest in developing a critical understanding of interactions between human society and the broader global ecosystem. The program emphasizes economic, legal, and philosophical issues of environmental sustainability.

To satisfy the Tier III minor in environmental sustainability (11--12 credits) students must take one course at the 3000 level or above in environmental studies (ENV) offered by the Department of Natural Sciences, any other course from the electives listed below, and a required capstone course (ENV 4005 or 4900).

Program Prerequisite

ENV 1020	Principles of Ecology
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Required Capstone Course

ENV 4005	Ecosystem Sustainability
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or

ENV 4900	Topics in Environmental Science
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Electives

BIO 3009	Conservation Biology and Sustainable Development (ENV 3009)
BIO 3020	Biology of Invetebrates
BIO 3040	Plants in Action
BIO 3050 / ENV 3050	Freshwater Ecology
CIS 3700	Green IT*
ENV 3001	Introduction to Environmental Science
ENV 3002	Energy Conservation
ENV 3003	Human Conservation
ENV 3005	Economic and Legal Aspects of Ecology
ENV 3008	Air and Water Pollution
ENV 3015L / ENV 3015	Tropical Reef Ecology (Lecture and Lab)
ECO 3511	Contemporary Economic Development
GEOG 3009	Introduction to Human Geography

GEOG 3036	World Regional Geography
ENG 3800	Environmental Reporting
LAW 3122	Law and the Environment*
LAW 3400	Law, Business and Sustainability*
Paf 3442	The Environment, Political Choices, and Public Policy
PHI 3200	Environmental Ethics
POL 3317	The Politics of Energy and the Environment
*For the purposes of this program, this course counts as an Arts and Sciences course.	

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Physics

The Department of Natural Sciences of the Weissman School of Arts and Sciences offers a Minor in Physics that satisfies Baruch College's Tier III liberal arts and sciences requirement. The Physics Minor is suitable for students with an interest in the application of mathematical tools to fundamental scientific laws. The program emphasizes both mathematical ideas and classic experiments. Students with no previous exposure to physics are encouraged to take [PHY 1003](#) Concepts in Physics, before beginning the Physics Minor.

To satisfy this Tier III Minor, students must take three courses, two at the 3000-level or above, and a capstone at the 4000-level or above, from among the following list:	
PHY 3001	General Physics II (Not open to students who have completed PHY 3010 and/or PHY 3020)
PHY 3010	Quantitative Physics I [recommended] (Not open to students who have completed PHY 2003 and/or PHY 3001)
PHY 3020	Quantitative Physics II [recommended] (Not open to students who have completed PHY 3001)
PHY 4130	Modern Physics
PHY 4200	Astrophysics
PHY 5000-5004	Independent Study
PHY 6001H-6002H	Honors
Recommended Courses in the Department of Mathematics: <i>Students are encouraged to take each of the following courses:</i>	
MTH 2610	Calculus I

MTH 3010	Elementary Calculus II
MTH 3020	Intermediate Calculus

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Natural Sciences Laboratory Equipment

Facilities for advanced studies in biology, chemistry, and physics are available on the Baruch campus. In addition to equipment standard to biology research, the Department of Natural Sciences has laboratories equipped for microbiology and microbial ecology, cell biology, ecology, and physiology.

A student research lab offers incubators, microscopes, balances, centrifuges, growth chambers, and water baths to permit a wide range of research. Computers for data analysis and presentation design are also available. Faculty research labs are dedicated to specific areas of inquiry: cell-cell communication, molecular systematics and evolutionary biology, and microbial ecology. Research facilities are available for prokaryotic and eukaryotic cell culture, growth and maintenance of various plant and invertebrate animal species, histology, video microscopy, DNA amplification, cell fractionation, and various standard biochemical techniques, including UV/visible spectroscopy, electrophoresis, and chromatography.

Laboratories in chemistry are equipped for specific areas of experimentation: general chemistry, environmental chemistry, organic chemistry, and organic synthesis (electrochemistry apparatus, dissolved oxygen meters, atomic absorption apparatus, and instruments for nuclear magnetic resonance, gas chromatography/mass spectroscopy, high-performance liquid chromatography, UV/visible spectroscopy, and infrared spectroscopy).

The physics area has a special computer lab for student research and a faculty laser optics research lab.

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Courses

Courses in Biology (BIO)

BIO 1003	Survey of the Living World	2 lecture hours; 4 lab hours; 4 credits
BIO 1005	General Biology - Structure and Function - A Human Orientation	2 lecture hours; 4 lab hours; 4 credits
BIO 1012	Fundamentals of Biology: Human Biology Laboratory	3 hours; 3 credits
BIO 1016	"Fundamentals of Biology" Laboratory Research in Genetics, Evolution, and Ecology"	3 hours; 3 credits
BIO 2010	Principles of Biology I	2 lecture hours; 1 recitation hour; 3 lab hours; 4.5 credits
BIO 2013	Comparative Vertebrate Anatomy	2 lecture hours; 4 lab. hours; 4 credits
BIO 2016	Principles of Genetics	2 lecture hours; 4 lab. hours; 4 credits
BIO 2020	Principles of Biology II	2 lecture hours; 1 recitation hour; 3 lab hours; 4.5 credits
BIO 2030	Population Biology: Evolution Ecology	2 lecture hours; 3 lab. hours; 1 recitation hour; 4.5 credits
BIO 2040	The Biology of Cells	2 lecture hours; 3 lab. hours; 1 recitation hour; 4.5 credits
BIO 3001	Principles of Biology II	6 hours; 4.5 credits
BIO 3002	Reading Science	1 hour; 1 credit
BIO 3005	Molecular and Cellular Biology	2 lecture hours; 4 lab. hours; 4 credits

BIO 3009	Conservation Biology and Sustainable Development	2 lecture hours; 1 recitation hour; 3 lab hours; 4.5 credits
BIO 3010	Comparative Vertebrate Anatomy	2 lecture hours; 4 lab. hours; 4 credits
BIO 3011	Developmental Biology	2 lecture hours; 4 lab. hours; 4 credits
BIO 3012	Endocrinology	2 lecture hours; 4 lab. hours; 4 credits
BIO 3015	Principles of Genetics	2 lecture hours; 4 lab. hours; 4 credits
BIO 3020	Biology of Invertebrates	4 hours; 4 credits
BIO 3025	Human Physiology	2 lecture hours; 4 lab. hours; 4 credits
BIO 3030	History and Evolution of Life	2 lecture hours; 1 recitation hour; 2 lab. hours; 4 credits
BIO 3040	Plants in Action	2 lecture hours; 4 lab hours; 4 credits
BIO 3050	Freshwater Ecology	2 lecture hours; 4 lab hours; 4 credits
BIO 4004	Microbiology	2 lecture hours; 4 lab. hours; 4 credits
BIO 4010	Human Physiology	2 lecture hours; 4 lab. hours; 4 credits
BIO 4015	Development Biology	2 lecture hours; 4 lab. hours; 4 credits
BIO 5000	Ind Stud Bio I	Hours and credits to be arranged
BIO 5001	Ind Stud Bio II	Hours and credits to be arranged
BIO 5002	Ind Stud Bio IV	Hours and credits to be arranged
BIO 5003	Ind Stud Bio III	Hours and credits to be arranged
BIO 5004	Ind Stud Bio V	Hours and credits to be arranged
BIO 5051	Special Problems	4 credits
BIO 5052	Special Problems	4 credits
BIO 5053	Special Problems	4 credits
BIO 1003H	Survey of the Living World	2 lecture hours; 4 lab hours; 4 credits
BIO 1005H	General Biology - Structure and Function - A Human Orientation	2 lecture hours; 4 lab hours; 4 credits
BIO 1011L	Fundamentals of Biology: Human Biology Lecture	"2 lecture, 1 recitation; 3 credits"
BIO 1015L	"Fundamentals of Biology ?é?Çô Genetics, Evolution, and Ecology"	3 hours; 3 credits
BIO 2010H	Principles of Biology I	2 lecture hours; 1 recitation hour; 3 lab hours; 4.5 credits
BIO 3009H	Conservation Biology and Sustainable Development	2 lecture hours; 1 recitation hour; 3 lab hours; 4.5 credits
BIO 3010H	Comparative Vertebrate Anatomy	2 lecture hours; 4 lab. hours; 4 credits
BIO 4004H	Hon Microbiology	2 lecture hours; 4 lab. hours; 4 credits
BIO 6001H	Hon Biology I	Hours to be arranged; usually 4 credits per semester

BIO 6002H	Biology Honors II	Hours to be arranged; usually 4 credits per semester
BIO 6003H	Biology Honors III	Hours to be arranged; usually 4 credits per semester

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Courses in Environmental Science (ENV)

ENV 1004	Fundamentals of Ecological Research	3 hours; 3 credits
ENV 1020	Principles of Ecology	2 lecture hours; 4 lab. and field hours; 4 credits
ENV 1021	Environmental Conservation	2 lecture hours; 4 lab. and field hours; 4 credits
ENV 3001	Introduction to Environmental Science	3 lecture hours; 2 lab. hours; 4 credits
ENV 3002	Energy Conservation	3 lecture hours; 2 lab. hours; 4 credits
ENV 3003	Human Conservation	3 lecture hours; 2 lab. hours; 4 credits
ENV 3005	Economic and Legal Aspects of Ecology	3 lecture hours; 2 lab. hours; 4 credits
ENV 3006	Global Ecology	3 lecture hours; 2 lab. hours; 4 credits
ENV 3008	Air and Water Pollution	3 lecture hours; 2 lab. hours; 4 credits
ENV 3009	Conservation Biology and Sustainable Development	2 lecture hours; 1 recitation hour; 3 lab hours; 4.5 credits
ENV 3015	Tropical Reef Ecology	3 credits; 1 lecture hour
ENV 3030	History and Evolution of Life	2 lecture hours; 1 recitation hour; 2 lab. hours; 4 credits
ENV 3050	Freshwater Ecology	2 lecture hours; 4 lab hours; 4 credits
ENV 4005	Ecosystem Sustainability	3 lecture hours; 2 lab hours; 4 credits
ENV 4020	Microbial Ecology	2 lecture hours; 4 lab. hours; 4 credits
ENV 4900	Topics in Environmental Science	3 lecture hours; 2 lab hours; 4 credits
ENV 5000	Ind Stud Env I	Hours and credits to be arranged
ENV 5001	Ind Stud Env II	Hours and credits to be arranged
ENV 5002	Ind Stud Env III	Hours and credits to be arranged
ENV 5003	Ind Stud Env IV	Hours and credits to be arranged
ENV 5004	Ind Stud Env V	Hours and credits to be arranged
ENV 1003L	Fundamentals of Ecology	3 hours; 3 credits
ENV 1020H	Hon Prin of Ecology	2 lecture hours; 4 lab. and field hours; 4 credits
ENV 1021H	Hon Env conservation	2 lecture hours; 4 lab. and field hours; 4 credits
ENV 3003H	Hon Human Conserv	3 lecture hours; 2 lab. hours; 4 credits

ENV 3015L	Tropical Reef Ecology Laboratory	4 lab hours; 0 credits
ENV 6001H	Hon Env Stud I	Hours to be arranged; usually 4 credits per semester
ENV 6002H	Hon Env Stud II	Hours to be arranged; usually 4 credits per semester

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Courses in Chemistry (CHM)

CHM 1000	Chemistry and the Environment	2 lecture hours; 4 lab. hours; 4 credits
CHM 1004	Fundamentals of Chemical Laboratory Techniques	3 hours; 3 credits
CHM 1005	Select Topics in Chemistry	1 hour; 1 credit
CHM 2003	General Chemistry I	2 lecture hours; 4 lab. hours; 4 credits
CHM 3001	General Chemistry II	2 lecture hours; 4 lab. hours; 4 credits
CHM 3003	Principles of Organic Chemistry I	2 lecture hours; 4 lab. hours; 4 credits
CHM 3006	Principles of Organic Chemistry II	2 lecture hours; 4 lab. hours; 4 credits
CHM 4003	Physical Chemistry I	2 lecture hours; 4 lab. hours; 4 credits
CHM 4004	Physical Chemistry II	2 lecture hours; 4 lab. hours; 4 credits
CHM 4010	Medicinal Chemistry	3 lecture hours; 3 lab hours; 4.5 credits
CHM 4900	Biochemistry	2 lecture hours; 4 lab. hours; 4 credits
CHM 5000	IND STUD CHM I	2 hours; 2 credits
CHM 5001	IND STUD CHM II	4 hours; 4 credits
CHM 5002	IND STUD CHM III	4 hours; 4 credits
CHM 1000H	Hon Chm & Environmnt	2 lecture hours; 4 lab. hours; 4 credits
CHM 1003L	Fundamentals of Chemistry	
CHM 2003H	Hon General Chemistry I	2 lecture hours; 4 lab. hours; 4 credits
CHM 6001H	HON CHEMISTRY I	4 hours; 4 credits
CHM 6002H	HON CHEMISTRY II	4 hours; 4 credits
CHM 6003H	HON CHEMISTRY III	4 hours; 4 credits

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Courses in Physics (PHY)

PHY 1003	Concepts in Physics	3 lecture hours; 1 recitation hour; 2 lab hours; 4 credits
PHY 2001	Fundamentals of Experimental Physics	3 hours; 3 credits
PHY 2003	General Physics I	3 lecture hours; 1 recitation hour; 2 lab. hours; 4 credits
PHY 2005	Hyper complex Numbers with Applications in Physics	2 lecture hours; 1 recitation hour; 2 computer workshop hours; 4 credits
PHY 3001	General Physics II	3 lecture hours; 1 recitation hour; 2 lab. hours; 4 credits
PHY 3010	Quantitative Physics I	4 lecture hours; 2 lab hours; 5 credits
PHY 3020	Quantitative Physics II	4 lecture hours; 2 lab hours; 5 credits
PHY 3500	Biological Applications of Physics	6 hours; 4 credits
PHY 4130	Modern Physics	3 lecture hours; 3 lab hours; 4 credits
PHY 4200	Astrophysics	3 lecture hours; 1.5 lab hours; 1.5 field excursion hours; 4 credits
PHY 5000	Ind Stud Phy I	Hours and credits to be arranged
PHY 5001	Ind Stud Phy II	Hours and credits to be arranged
PHY 5002	Ind Stud Phy III	Hours and credits to be arranged
PHY 1003H	Hon Concepts Phy	3 lecture hours; 1 recitation hour; 2 lab hours; 4 credits
PHY 2002L	Fundamentals of Physics: Theory and Practice	3 hours; 3 credits
PHY 3010H	Hon Quant Phy I	4 lecture hours; 2 lab hours; 5 credits
PHY 6001H	Hon Physics I	Hours to be arranged; usually 4 credits per semester
PHY 6002H	Hon Physics II	Hours to be arranged; usually 4 credits per semester

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