Department of Natural Sciences

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Field Description

The Department of Natural Sciences is an integrated department offering a wide selection of courses 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 provide research opportunities for Baruch College students.

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The Majors

Biological Sciences
Arts And Sciences Ad Hoc Major in Natural Science Areas

Whether you're a new student interested in the sciences, or a returning student planning a career change, the Department of Natural Sciences at Baruch's Weissman School of Arts and Sciences offers you flexible programs that can be tailored to suit your interests and to help you achieve your career goals. The Biological Sciences Major (code 020) offers a rich variety of courses in biology, chemistry, and environmental studies. Students, in consultation with a faculty advisor, may design programs that prepare them for careers or advanced studies in many science and health-related fields.

In small classes, students receive personal attention from faculty, who are recognized experts in their fields. Advanced students can participate in faculty research projects on campus or at institutions where Baruch professors have collaborative arrangements. These research activities not only provide a unique learning experience, but students can earn academic credit as independent study and honors courses.

Interested students should contact the Department of Natural Sciences at 646 660-6250.

Biological Sciences		
Base Curriculum Courses *No credit toward the major/specialization*		
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
or		
	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
or		
PHY 3010	Quantitative Physics I	5 credits
Required Courses	7 credits	
STA 2100	Statistics for Social Sciences	3 credits
or		
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 3009	Conservation Biology and Sustainable Development (ENV 3009)	4.5 credits
BIO 3010	Comparative Vertebrate Anatomy	4 credits
BIO 3012	Endocrinology	4 credits
BIO 3020	Biology of Invertebrates	4 credits
BIO 3035	Introduction to Molecular Biotechnology	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 3015L	Tropical Reef Ecology (plus lab ENV 3015)	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 pre-professional 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

Chemistry

Natural Sciences

Interdisciplinary Minor in Environmental Sustainability

Physics

Chemistry ***(Effective spring 2016)***

Students may wish to minor in chemistry in order to pursue general intellectual interests or specific career objectives. For example, students can complete the chemistry courses required for admission to medical school by doing a minor in chemistry. The chemistry minor will consist of two chemistry 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 chemistry courses at the 4000-level or above (including independent study and honors) offered by the Department of Natural Sciences may serve as the capstone. Interested students should contact the department.

Examples of possible course sequences in the chemistry minor:

Biochemistry

CHM 3001 General Chemistry II

CHM 3003 Principles of Organic Chemistry I

CHM 4900 Biochemistry (co-requisite of CHM 3006—Principles of Organic Chemistry II)

Medicinal Chemistry

CHM 3001 General Chemistry II

CHM 3003 Principles of Organic Chemistry I

CHM 4010 Medicinal Chemistry (co-requisite of CHM 3006—Principles of Organic Chemistry II)

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.

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. 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 complete the 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

Required Capstone Course

ENV 4005	Ecosystem Sustainability

or

ENV 4900	Topics in Environmental Science

Electives

BIO 3009	Conservation Biology and Sustainable Development (ENV 3009)
BIO 3020	Biology of Invertebrates
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 (ANT 3009)
GEOG 3036	World Regional Geography (ANT 3036)
JRN 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 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 minor.

To satisfy this 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 3200	Methods of Theoretical Physics
PHY 4130	Modern Physics
PHY 4140	Introduction to Nuclear and Particle Physics
PHY 4200	Astrophysics
PHY 5000-5004	Independent Study
PHY 6001H-6002H	Honors
Recommended Courses in the Department of Mathematics: *Students are encouraged to take each of the following courses:*	
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 1011L	Fundamentals of Biology: Human Biology Lecture	2 lecture, 1 recitation; 3 credits
BIO 1012	Fundamentals of Biology: Human Biology Laboratory	3 hours; 3 credits
BIO 1015L	Fundamentals of Biology - Genetics, Evolution, and Ecology	2 lecture, 1 recitation; 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 2030	Population Biology: Evolution Ecology	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 (ENV 3009)	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 3035	Introduction to Molecular Biotechnology	2 lecture hours; 4 lab hours
BIO 3040	Plants in Action	2 lecture hours; 4 lab hours; 4 credits
BIO 3050	Freshwater Ecology (ENV 3050)	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	Independent Study I	Hours and credits to be arranged
BIO 5001	Independent Study II	Hours and credits to be arranged
BIO 5052	Special Problems	4 hours; 4 credits
BIO 5053	Special Problems	4 hours; 4 credits
BIO 6001H	Biology Honors 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 Chemistry (CHM)

CHM 1000	Chemistry and the Environment	2 lecture hours; 4 lab. hours; 4 credits
CHM 1003L	Fundamentals of Chemistry	3 hours; 3 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	Independent Study I	Hours to be arranged; usually 4 credits per semester
CHM 5001	Independent Study II	Hours to be arranged; usually 4 credits per semester
CHM 5002	Independent Study III	Hours to be arranged; usually 4 credits per semester
CHM 6001H	Honors Chemistry I	4 hours; 4 credits
CHM 6002H	Honors Chemistry II	4 hours; 4 credits

CHM 6003H	Honors Chemistry III	4 hours; 4 credits

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Courses in Environmental Science (ENV)

ENV 1003L	Fundamentals of Ecology	3 hours; 3 credits
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 (BIO 3009)	2 lecture hours; 1 recitation hour; 3 lab hours; 4.5 credits
ENV 3015	Tropical Reef Ecology Laboratory	4 lab hours; 0 credits
ENV 3015L	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 (BIO 3050)	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	Independent Study I	Hours and credits to be arranged
ENV 5001	Independent Study II	Hours and credits to be arranged
ENV 5002	Independent Study III	Hours and credits to be arranged
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 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 2002L	Fundamentals of Physics: Theory and Practice	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 3200	Methods of Theoretical Physics	3 hours; 3 credits
PHY 3500	Biological Applications of Physics	6 hours; 4 credits
PHY 4130	Modern Physics	3 lecture hours; 3 lab hours; 4 credits
PHY 4140	Introduction to Nuclear and Particle Physics	3 hours; 3 credits
PHY 4200	Astrophysics	3 lecture hours; 1.5 lab hours; 1.5 field excursion hours; 4 credits
PHY 5000	Independent Study I	Hours and credits to be arranged
PHY 5001	Independent Study II	Hours and credits to be arranged
PHY 5002	Independent Study III	Hours and credits to be arranged
PHY 6001H	Honors Physics I	Hours to be arranged; usually 4 credits per semester
PHY 6002H	Honors Physics II	Hours to be arranged; usually 4 credits per semester

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