

Department of Natural Sciences

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MISSION STATEMENT

The Department of Natural Sciences is dedicated to preparing students to live and work in a changing world by ensuring competency in the natural sciences and scientific inquiry. The department strives to provide a basic understanding of classical and contemporary scientific concepts in these areas. While developing an understanding of the scientific process and its application, the following critical skills are stressed: observation, inquiry, data collection, analysis, communication, and correlation of scientific concepts. The department prepares students for careers and professional opportunities in the sciences as well as for life-long learning in the context of a liberal arts curriculum in the Catholic tradition.

PROGRAMS OF STUDY AND CAREER OPTIONS

The Department of Natural Sciences offers majors in Biology, Biology with a Concentration in Neuroscience and Behavior, Biotechnology and Molecular Biology, Neuroscience, Chemistry, Environmental Science, and Environmental Science with a Concentration in Environmental Policy. The Department also offers minors in Biology, Environmental Science, Chemistry, and Physics, and it co-sponsors a concentration in Physical and Occupational Therapy with the Department of Human Services and Rehabilitation Studies. Research opportunities are available at the College and at nearby institutions (e.g., University of Massachusetts Medical School and the Biotechnology Park). Students interested in teaching science in the public school system should work with a science faculty member and a member of the Education Department in planning their course of study. The Department also offers courses for non-majors.

Students who want to pursue careers in medicine, dentistry or one of the many other health professions must complete the necessary prerequisites for admission to the health profession schools of their choice. These individuals should consult their academic advisors and the Health Professions Advisor (Dr. Steven Theroux) when designing their course of study. The Health Professions Program helps students meet the admissions requirements for these professional programs. The Department has agreements with several institutions that offer degrees in the health professions. Students interested in Allopathic or Osteopathic Medicine, Podiatric Medicine, Pharmacy, Physical Therapy, Optometry, Physician Assistant Studies, Nursing, or Biotechnology should discuss these agreements with the Health Professions Advisor, Professor Steven Theroux.

The College has established a collaborative program of study in Engineering with the University of Notre Dame. Students spend three years at Assumption College completing foundational courses in math and science before transferring to Notre Dame to complete engineering studies. Interested students should contact Professor Jimmy Hauri, Director of the 3:2 Engineering Program.

The College also has agreements with several graduate schools. In conjunction with Duke University we offer combined B.A. and Master's degree programs in Environmental Science Management and Forestry Management. There are several options for students interested in the legal profession, especially those interested in practicing environmental law or intellectual property law. Science students interested in the learning more about all of these programs should see Professor Steven Theroux.

The Department offers a post-graduate program for those who have a bachelor's degree in an area other than Biology and who are interested in pursuing admission to a health professions program (e.g., medicine, dentistry, pharmacy, etc.) Details about this certificate program can be obtained from the Health Professions Advisor, Dr. Steven Theroux.

Students who graduate with an undergraduate degree in science can pursue employment in industry, government, or in an educational setting. Some of our students pursue graduate studies in science, one of the health professions, business or law. Upon the completion of the appropriate graduate program our students can pursue research careers in environmental management, or in the biotechnology, pharmaceutical and chemical industries. They can also develop careers in elementary, secondary and higher education, or in the health professions, business management, government, or legal profession.

MAJOR IN ENVIRONMENTAL SCIENCE (17)

Human modification of the environment has been evident since the beginning of civilization and has proceeded at an ever-accelerating rate from the Industrial Revolution to the present day. Human activities have affected the soil, water, vegetation, climate, animal life, and even the surface of the earth itself. An awareness of environmental deterioration has forced us to seek remedies. Thus, there is a need for men and women trained to recognize, quantify, and seek solutions for environmental problems. This major gives students a broad foundation in the fundamentals of environmental science, including chemistry, biology, physics, and mathematics. Students can use the options within the major to focus on one aspect of the field, such as resource conservation, environmental policy, or toxic materials. To insure the best choice and scheduling of courses, close cooperation between students and their faculty advisors is crucial. Students interested in this major are eligible to take courses off campus through the Massachusetts Marine Biology Consortium, the Duke University Marine Biology Consortium, and the Colleges of Worcester Consortium.

After graduation, students can seek employment in government agencies or industry, or they can pursue graduate studies in environmental engineering, environmental science, environmental management, law, education or the health sciences. To facilitate entry into these areas of study the College has established agreements that allow qualified Assumption Environmental Science students to earn a B.S. in Environmental Engineering from The University of Notre Dame, a M.S. in Environmental Management or Forestry Management from Duke University, world-renowned for its work in Environmental Science, or a J.D. in Environmental Law from the Vermont Law School, which U.S. News and World Report currently ranks as the nation's leading environmental law program.

REQUIRED COURSES (17)

Environmental science majors should take CHE 131 and BIO 160 in their first semester.

ENV 150	Introduction to Environmental Science
ENV 480	Environmental Science Seminar
BIO 160	Concepts in Biology
BIO 360	Ecology
CHE 131–132	General Chemistry I and II (Note CHE132 requires MAT114 or higher as a pre-requisite.)
CHE 201–202	Organic Chemistry I and II
CHE 318	Environmental Chemistry
PHY 201–202	Physics I and II
MAT 117	Calculus I OR MAT 132 Honors Calculus I
ECO 115	Statistics OR PSY 224 Statistics

One of the following

GEO 101	Physical Oceanography
GEO 103	Introduction to Meteorology
BIO 260	Bioinformatics
PHY 213	Introduction to Engineering Problem Solving
ENV 350	Wetlands (consortium); Limnology/Aquatic Ecology (consortium)

One of the following

BIO 220	Invertebrate Zoology
BIO 230	Plant Botany
BIO 250	Microbiology
BIO 350	Marine Mammals: Biology and Conservation

One of the following

ECO 235	Environmental Economics
GEO 134	Conservation of Natural Resources
GEO 252	Land Use and Planning Law
POL 321	Public Policy

ENV 260	Water Resources Planning and Management
ENV 280	Coastal Zone Management (consortium)

One additional 300 or above elective

Students can choose from courses listed above which haven't fulfilled a section requirement, as well as ENV 491 Environmental Science Independent Study, CHE 315 Analytical Chemistry, CHE 450 Instrumental Analysis, BIO310 Animal Behavior, or an approved Worcester consortium course.

STUDENT RESEARCH—SUMMER OPPORTUNITIES

Department faculty members oversee research programs on campus that engage upper-level students in the projects associated with their research interests. Summer research positions that provide a stipend are available on a competitive basis. Assumption students have been accepted into prestigious summer research programs at major research institutions around the country. The sponsoring institutions for this research include the National Science Foundation, the National Institutes of Health, and the American Cancer Society.

HEALTH PROFESSIONS PROGRAM

The Health Professions Program is designed to help students enter graduate school in one of the health professions (Medicine, Dentistry, Physical Therapy, Occupational Therapy, Physician's Assistant, etc.). The program focuses on preparing the student to earn good grades and strong scores on the admissions test and graduate school interview. Those who complete the program requirements will have the fact that they did so listed on their transcript. All students interested in a health profession should consult with their advisors and Dr. Steven Theroux, Chairperson of the Health Sciences Committee, at the beginning of their undergraduate careers.

To complete the Health Professions Program, the student must:

- Successfully finish a major in Biology; Biology with a Concentration in Neuroscience and Behavior; Biotechnology and Molecular Biology; Chemistry; Psychology; Psychology with a Concentration in Neuroscience of Human Behavior; or Human Services and Rehabilitation Studies
- Complete the required coursework with a cumulative GPA of 3.0 or better overall and a GPA of 3.0 or better in the major
- Complete the "Social, Economic and Ethical Issues in the Health Professions" course
- submit at least one list of prerequisite courses required for a specific health-related graduate program to which he or she intends to apply
- Submit a statement indicating that the prerequisite courses required for admission to a particular health professions graduate program were successfully completed
- Present evidence from Kaplan that he or she successfully completed a Kaplan Test Preparation Course (e.g., MCAT, DAT, OAT, VCAT, PCAT, GRE, etc.). (The exact course that the student completes will vary depending on the graduate program the individual hopes to enter.)
- Present evidence that he or she took a graduate admissions test (e.g., MCAT, DAT, GRE, etc.) and scored in the top 50% of those taking the test in that year. Kaplan preparation courses are offered on campus at reduced rates. Financial aid is available.

Students who plan to pursue a graduate degree in a health profession should be aware of the timetable in which to fulfill their requirements, which include admissions exams and letters of reference from the Health Sciences Committee. Students should be prepared for entrance exams in their junior year and request a letter of reference at that time. Students must contact Dr. Theroux at least two weeks before the scheduled Committee meeting times in the second week of October, the second week of February, and the second week of May. The letters will usually be ready within four to five weeks of the meeting.

ARTICULATION AGREEMENTS IN THE SCIENCE AND HEALTH PROFESSIONS

Assumption College holds a wide range of agreements with graduate institutions in the health sciences. For a complete list, including agreements with law schools and Notre Dame's College of Engineering, see the "Cooperative Programs of Study and Agreements" section of the catalog and contact the Health Professions Advisor, Prof. Steven Theroux, stheroux@assumption.edu.

Massachusetts College of Pharmacy and Health Sciences B.A./Bachelor of Science in Nursing (B.S.N.)

The Massachusetts College of Pharmacy and Health Sciences (MCPHS) has agreed to provide at least three seats at their Manchester, NH campus and three seats in their Worcester, MA campus for qualified Assumption students who want to earn a Bachelor of Science in Nursing. To qualify for one of the limited number of guaranteed seats, Assumption students must complete the specified prerequisites with a grade of C or better (with no repeats), earn a cumulative GPA of 3.2 in the required prerequisites, and obtain a GPA of 3.2 or higher. Please see the Health Professions Advisor for additional details and requirements.

Massachusetts College of Pharmacy and Health Sciences B.A./Doctor of Pharmacy (Pharm.D.)

The Massachusetts College of Pharmacy and Health Sciences (MCPHS) has agreed to provide two seats at their Manchester, MA campus and five seats at their Worcester, MA campus for qualified Assumption students who want to enter an accelerated doctoral program in pharmacy. To qualify for admission into this 34-month course of study, Assumption students must complete the required prerequisites with a grade of C or better (no repeats). They must also have a GPA of 3.4 in the required prerequisites and an overall GPA of 3.4.

Massachusetts College of Pharmacy and Health Sciences B.A./Master of Science in Physician Assistant Studies (M.S.P.A.S.)

The Massachusetts College of Pharmacy and Health Sciences (MCPHS) has agreed to provide at least one seat at their Manchester, MA campus and one seat at their Worcester, MA campus for qualified Assumption students who want to earn a master's degree in Physician Assistant Studies. This is a 24-month program, and to qualify for one of the limited seats, Assumption students must complete the prerequisites with a grade of C or better (with no repeats). They must also have a GPA of 3.4 in the required prerequisites, an overall GPA of 3.4, and they must pass an interview at MCPHS.

New York Chiropractic College (NYCC) B.A./Doctor of Chiropractic (D.C.)

There are two options at NYCC for Assumption students interested in pursuing a doctorate in Chiropractic.

Traditional Doctoral Program (D.C.) Five seats are available at NYCC each year for qualified Assumption students who want to enter a doctoral program in Chiropractic.

Accelerated Doctoral Program (D.C.) Qualified Assumption students are also eligible to enter an accelerated program of study at NYCC. This course of study allows qualified students to complete a doctorate in chiropractic in six years of study instead of the typical seven.

Barry University B.A./Doctor of Podiatric Medicine (D.P.M.)

Assumption College and Barry University School of Podiatric Medicine have agreed to cooperate in providing an accelerated, seven-year curriculum of undergraduate and professional education leading to the Bachelor of Arts degree with a major in Biology from Assumption College and the Doctor of Podiatric Medicine degree from Barry University School of Podiatric Medicine. Upon successful completion of their first year at Barry University College of Podiatric Medicine, individuals in this program are eligible to graduate with a bachelor's degree from Assumption College. Admission into the School of Podiatric Medicine is not guaranteed.

New England College of Optometry B.A./Doctor of Optometry (O.D.)

Assumption College and the New England School of Optometry have agreed to cooperate in providing an accelerated, seven-year curriculum of undergraduate and professional education leading to the Bachelor of Arts degree with a Major in Biology from Assumption College, and the Doctor of Optometry degree from the New England College of Optometry. The program consists of a three-year curriculum at Assumption College followed by a four-year curriculum in optometry at the New England School of Optometry. Upon successful completion of their first year at the New College of Optometry, individuals in this

program are eligible to graduate with a bachelor's degree from Assumption College. Admission into the School of Optometry is not guaranteed.

Massachusetts College of Pharmacy and Health Sciences B.A./Doctor of Optometry (O.D.)

The Massachusetts College of Pharmacy and Health Sciences (MCPHS) has agreed to provide five seats at their Worcester, MA campus for qualified Assumption students who want to earn a Doctorate in Optometry. To qualify for admission, students must complete the required prerequisites with a grade of C or better (no repeats). They must also have a GPA of 3.2 in the required prerequisites and an overall GPA of 3.2, and they must pass an interview at MCPHS.

Regis College M.S.in Molecular Imaging and Therapeutics

Regis College has reserved two seats for Assumption students who want to enter the Molecular Imaging and Therapeutics M.S. program. To be eligible, Assumption students must complete the prerequisite courses, and they must have a minimal GPA of 3.0. Eligible students receive waivers for the GRE/MAT requirement and the application fee. The top two eligible candidates are also given preferred admission without the competition of the rest of the applicant pool. Prior to starting the program the accepted student must earn a B.A. at Assumption College. For more information, see the Health Professions Advisor, Prof. Steven Theroux.

Northeastern University Graduate School

Northeastern University will reserve space for two qualified Assumption College students in its Master of Science in Biotechnology program. The minimum requirements for acceptance include a GPA of 3.2, satisfactory completion of all prerequisites, and a completed application. The GRE and application fee will be waived for these students. In addition, Northeastern University will waive the application fee and the GRE requirement for qualified Assumption College students who are interested in pursuing graduate studies in Biotechnology, Pharmaceutical Science, Physician Assistant Studies, Health Informatics, Public Health, Exercise Physiology and School Counseling. The minimal requirements for these waivers include a GPA of 3.2.

Duke University Marine Sciences Education Consortium (MSEC)

Assumption students are eligible to study at Duke University's Marine Laboratory in Beaufort, North Carolina. The Duke program offers an opportunity for intensive study in marine science and marine ecology. In addition, Assumption students may participate in the MSEC's study abroad programs which include sites in Singapore, Trinidad, Hawaii, Panama and France. This program should be of particular interest to Environmental Science majors and minors and to those who seek a science-intense study abroad opportunity.

Duke University 3:2 Program in Environmental Science Management and Forestry Management

Students interested in pursuing a master's degree from Duke University in Environmental Science Management (MEM) or Forestry Management (FM) can complete their general education requirements, their major requirements, and their application for admission to the Duke graduate school in three years. If accepted into the Duke professional master's degree program, the student is eligible to receive his or her Assumption College undergraduate degree upon the successful completion of their first year of graduate studies at Duke. At the end of the second year of graduate study, the student is eligible to receive the MEM or the FM from the Nicholas School at Duke University. The Duke agreement does not guarantee that Assumption College students will be accepted into the graduate program, and admission is competitive.

The University of Notre Dame B.S. in Engineering

Assumption College has established an agreement with the University of Notre Dame College of Engineering that allows qualified Assumption students to earn a B.A. in Chemistry, Environmental Science, Mathematics or Computer Science from Assumption College and a B.S. in one of several fields of Engineering from the University of Notre Dame. This program is a 3:2

program, which means students spend three years studying at Assumption College followed by two years at Notre Dame. Contact Professor Joseph Alfano for more information.

Washington University at St. Louis B.S. in Engineering

Assumption College and Washington University offer a 3:2 engineering degree that leads to a B.A. from Assumption and a B.S. in one of several fields of engineering. This program is very similar to the University of Notre Dame's 3:2 degree program described above. To participate a student must have a 3.25 GPA, and admission to Washington University is not guaranteed. Assumption College and Washington University also offer a 3:3 option for those seeking to earn a Master's Degree in Engineering. Students in this course of study spend three years at Assumption College and three years at Washington University, and upon completion they are awarded a B.A. from Assumption College and a Masters in Engineering from Washington University. Participation in the 3:3 program also requires the student to maintain a 3.25 GPA while at Assumption, and admission to Washington University is not guaranteed. Washington University has a highly-regarded and nationally ranked engineering program, and qualified students who enter the 3:2 or 3:3 programs can choose to study Biomedical Engineering, Chemical Engineering, Computer Engineering, Electrical Engineering, Mechanical Engineering or Systems Science and Engineering. Students entering the 3:2 or 3:3 programs are eligible for financial aid from Assumption College and Washington University. For more information contact Prof. James Hauri at 508 767-7359.

POST-BACCALAUREATE CERTIFICATE PROGRAM

IN PREREQUISITES FOR PROFESSIONAL SCHOOLS IN HEALTH FIELDS

This program is designed for individuals who hold Bachelor's degrees, who have not previously made application to Professional Schools in the Health Professions, and who are seeking to complete prerequisites before making an application. Participants will have "non-matriculating" status, and will be charged tuition and fees at the rate listed in the catalog. All courses will be taken with undergraduate students. Programs will be planned in consultation with the College's Advisor for the Health Professions, Dr. Steven Theroux. A participant must complete at least four courses with three different faculty members in the Department of Natural Sciences at Assumption in order to earn a certificate and a recommendation from the Recommendation Committee for the Health Professions. Applicants need to submit a completed application form, available from Dr. Steven Theroux, a written statement describing their motivation for the chosen health career, and official undergraduate transcripts. To be applicants get a seat in the courses that they need to take, these applications should be completed by the end of February prior to their Fall attendance. Completion of this certificate does not guarantee admission to a professional school.

Course Descriptions

ENVIRONMENTAL SCIENCE (ENV)

ENV 120 ENVIRONMENTAL HISTORY OF NEW ENGLAND

In the past 20,000 years, New England has been covered by ice sheets, covered by forests and colonized by humans, the First Americans from Asia and then European settlers. These and other events produced a series of changes in the landscape, some dramatic, some subtle. This course will examine many of these changes chronologically, concentrating on the relationships between humans and their environment, and on the methods of historical science. Two or three integrated lecture-laboratory sessions per week. Lab fee: \$400. This course fulfills the Core Curriculum science requirement. (Fall)

Sholes/Four credits

ENV 150 INTRODUCTION TO ENVIRONMENTAL SCIENCE

The interdisciplinary nature of environmental science will be stressed by covering the chemical, biological, and social aspects of environmental issues and problems in a case study approach. The lab will expose the students to both field and lab work associated with applied environmental work. Three lectures and one three-hour laboratory per week. Lab Fee: \$400.00. Required for all Environmental Science majors. This course fulfills the Core Curriculum requirement for a science with a lab.

Hauri/Four credits

ENV 260 WATER RESOURCES PLANNING AND MANAGEMENT

This is an interdisciplinary introduction to our most precious resources. Water has shaped our bodies, our planet, our history, our culture. How we manage it will shape our future. Because of increasing demand, waste, and pollution, we are depleting—and risk destroying—the limited supply of usable fresh water. This course will look at water through scientific, historical, and cultural viewpoints and survey contemporary water problems in all their dimensions—political, economic, and technological.

Marine Studies Consortium/*Three credits*

ENV 275 SPECIAL TOPICS IN ENVIRONMENTAL SCIENCE

This special topics course will explore an area of environmental science using the literature, and if appropriate, a cross-disciplinary approach. The course will allow the students and faculty an opportunity to investigate areas of environmental science that are not part of the regular curriculum.

Staff/*Three credits*

ENV 280 COASTAL ZONE MANAGEMENT

This course will introduce students to the coastal environment and its resources and uses; coastal zone issues resulting primarily from human activities; the framework established by the Federal Coastal Zone Management Act for collaborative planning and regulation of the U.S. coastal zone; the roles played by the federal, state, and local governments, advocacy groups, and private property owners; the design and achievements of these programs; and international applications of coastal management. Guest speakers and case studies (e.g., Boston Harbor project, nonpoint source plans, Cape Cod Commission) will be used to illustrate themes and the intricacies of public policy development.

Marine Studies Consortium/*Three credits*

ENV 291 INTERNSHIP IN ENVIRONMENTAL SCIENCE

Directed study within an internship program. The student will be expected to keep a journal detailing the internship. The student will also be expected to write a paper (usually approximately 10 pages in length) summarizing an area related to the internship experience. An evaluation by the on-site supervisor will be considered when determining the grade. The student will be required to have a G.P.A. of 3.0 to enroll.

ENV 350 WETLANDS

Wetlands play a vital role in the hydrology and ecology of global landscapes. This course will consider several topics: the function of inland and coastal marshes, swamps, and bogs in water and nutrient cycles; the influence of wetlands on biodiversity, from microbes to vertebrates; the biological links between wetlands and human activities, such as agriculture, coastal development, and fisheries; and the legal framework for the protection and restoration of endangered wetlands.

Prerequisites: CHE 132 and two Biology courses at the 200 level or higher. (Fall)

Marine Studies Consortium/*Three credits*

ENV 480 ENVIRONMENTAL SCIENCE SEMINAR

An in-depth study of a current topic in environmental science. This course will emphasize review and analysis of primary literature. Students will be expected to give oral presentations as part of the course requirements. Some example topics are Global Availability of Drinking Water in the 21st century, Eutrophication, and Environmental Pollution Control. Classes will meet for three hours weekly. Prerequisites: Permission of instructor and six courses in environmental science or other science.

Hauri/*Three credits*

ENV 491–492 INDEPENDENT STUDY

Directed study or experimental research on some aspect of environmental science. Prerequisites: The student is expected to have a GPA of 3.0 and six courses in environmental science or other science. Offered by arrangement. (Fall, Spring)

Staff/*Three credits*