

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.

MINOR IN PHYSICS (6)

Students interested in furthering their knowledge of physics can choose to minor in this discipline. Required courses for the minor are: PHY 201–202, and PHY 480. Students must also complete three of the following eight courses, and no more than two of the three may be from the mathematics offerings: CHE 311, CHE 312, PHY 213, PHY 275, PHY 301, PHY 302, PHY 491, PHY 492, MAT 331, MAT 351, MAT 355.

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

PHYSICS (PHY)

PHY 112 INTRODUCTION TO ASTRONOMY

Introduction to stars, galaxies, and clusters of galaxies; earth, moon, planets, and comets; origin, life cycle, and death of both planetary and galactic systems; theories of the origin, structure, and end of the universe. The laboratory familiarizes the student with the tools of the astronomer and with the analysis of data. No prerequisite. Lab Fee: \$400.00. This course fulfills the Core Curriculum requirement for a science with a lab. (Fall)

Staff/Four credits

PHY 201 GENERAL PHYSICS I

This course explores mechanics and heat. Three lectures and one laboratory period. Prerequisite: MAT 114 or Calculus (may be concurrent). Lab Fee: \$400.00 per semester. This course fulfills the Core Curriculum requirement for a science with a lab. (Fall)

Georgiev/Four credits each semester

PHY 202 GENERAL PHYSICS II

This course explores sound, electricity, magnetism, and light. Three lectures and one laboratory period. Prerequisite: PHY 201 and MAT 114 Elementary Functions or MAT117 Calculus I (may be concurrent). Lab Fee: \$400.00 per semester. This course fulfills the Core Curriculum requirement for a science with a lab. (Spring)

Georgiev/Four credits each semester

PHY 213 INTRODUCTION TO ENGINEERING PROBLEM SOLVING

This introductory course is designed to acquaint students with the variety of engineering disciplines, as well as provide students with the basics of the engineering mindset. The ability to develop and resolve solutions to applied problems is a necessary skill for a multitude of disciplines. The structure of the course emphasizes group projects and the use of computers to create models to solve problems. Prerequisite: Mat117/131 and Mat118/132 (can be taken concurrently). (Spring)

Hauri/Three credits.

PHY 275 APPLIED OPTICS

The course investigates the general methods and applications of optics within the natural sciences. We will consider the optics of waves, the electromagnetic nature of light, reflection and refraction, interference and diffraction, polarization and geometrical optics, and optical instruments widely used in the natural sciences. Lab Fee \$400.00. Prerequisites: PHY 201, PHY 202 and MAT 114 or MAT117.

Georgiev/Three credits

PHY 301 MECHANICS I: STATICS

The goal will be to endow students with a fundamental understanding of the engineering mechanics of static objects and fluids. Students will emerge proficient in problem solving, application of physical mechanical principles and critical thinking skills. This will be the first course in a year-long sequence on engineering mechanics. Topics to be covered include: Vector Algebra/Calculus, Vector forces and moments in 2-D and 3-D systems, Equivalent systems of forces, Equilibrium of rigid bodies, Centroids, centers of gravity, and distributed forces, Trusses, frames, machines: two-force and multi-force members, Beams: internal forces, shear and bending moment diagrams, Dry friction, Wedges and screws, Moments of inertia, Fluid Statics, Virtual work mechanics essentials.

PHY 302 MECHANICS II: DYNAMICS

This course is a 3 credits course, the second in a year-long sequence on engineering mechanics, the first being statics, a required sequence for most engineering tracks. Students will explore the fundamentals of physical-mechanical principles and apply them to the dynamics of objects and fluids. Topics to be covered include: friction forces and spring forces, power, work, and energy, momenta, impulses, and collisions, dynamics of systems of particles, kinetics of a rigid body, fluids. This course is only offered in the spring, every other year. There is no lab requirement for this course.

PHY 480 SEMINAR IN PHYSICS

The student researches specified areas of physics under the guidance of faculty members for oral presentation and defense before the class. Written papers are submitted for final review. Offered upon sufficient demand. Prerequisites: Six courses in physics and chemistry. (Spring)

Staff/Three credits

PHY 491–492 INDEPENDENT STUDY

Directed study in an area of Physics. The course is open to students who have completed a minimum of six science courses and have a GPA of 3.0 or higher. Offered by arrangement. (Fall, Spring)

Staff/Three credits