PHYSICS AND EARTH SCIENCES

Chair: Kriston Chon

Assistant Professor: Kristin Chon, Vandana Singh

College Planetarium
Coordinating Director: Kristin Chon

The College Planetarium is located in Hemenway Annex. The fully automated planetarium theater is equipped with a Spitz 512 prime sky projector capable of showing the 2500 brightest stars found in the night sky, digital multimedia, and Dolby surround sound. The planetarium sky is a hemisphere 30 feet in diameter, with seating beneath the dome accommodating 49 students.

PRE-ENGINEERING PROGRAM (PEN)

This program, in cooperation with the University of Massachusetts-Lowell, University of Massachusetts-Amherst, and University of Massachusetts-Dartmouth, establishes a freshman and sophomore curriculum leading to a B.S. degree in one of the engineering disciplines: civil, chemical, electrical, mechanical, nuclear, or plastics at the University of Massachusetts-Lowell; chemical, civil, computer systems, electrical, industrial, or mechanical at the University of Massachusetts-Amherst; civil, computer, electrical, or mechanical at University of Massachusetts-Dartmouth. A typical student accepted into this program will study for two years at Framingham State and complete the program at one of the universities, earning the degree from that institution. Pre-engineering students who complete the program with a "B" average (CQPA = 3.0 or better) are guaranteed admission into the engineering program at each university. Those students with a "C" average will probably be accepted, but their transfer cannot be guaranteed. Other students may choose to remain at Framingham and complete their program of studies in a major such as Biology, Chemistry, or Computer Science.

Each student who enters the program will be assigned a Physics or Chemistry Department faculty advisor. Students are not required to designate a specific engineering major until the end of the freshman year, and those students continuing at one of the universities should plan to spend three years with a reduced academic load to complete their degree work. It will be necessary for transfer students to schedule summer session coursework if they wish to complete all degree requirements over a four year period.

The program of study during the two years at Framingham State College is shown below. Each incoming student must pass the mathematics placement examination in order to register for a credit-bearing mathematics course. Students must do well on this examination to begin the mathematics sequence with Calculus I. Students who do not place into the Calculus I course are required to take additional mathematics prior to taking Calculus I. Courses to be taken during the sophomore year of the program depend, to some extent, on the choice of engineering concentration.

Freshman Year: (common to all engineering options)

Fall Semester

43.219 Calculus I
33.107 Principles of Chemistry
21.110 Expository Writing
12.102 Principles of Microeconomics

Spring Semester

43.220 Calculus II
33.108 Principles of Chemistry and Quantitative Analysis
_____ A literature course
63.152 Computer Science I Using Java

Sophomore Year

Fall Semester

43.221 Calculus III
53.211 Principles of Physics I
63.252 Computer Science II Using Java
_____ Elective*

Spring Semester

53.212 Principles of Physics II
63.321 Digital Electronics or science elective
_____ Elective*
_____ Elective*

*Electives (suggested):

33.207 Organic Chemistry I
33.208 Organic Chemistry II
23.160 Introduction to Organismal Biology
23.161 Introduction to Cell and Molecular Biology
43.222 Differential Equations
12.101 Principles of Macroeconomics

MINOR IN PHYSICS (4 COURSES)

53.211 Principles of Physics I
53.212 Principles of Physics II
33.303 Physical Chemistry I

and one (1) of the following courses:

33.304 Physical Chemistry II
33.321 Instrumental Analysis
63.321 Digital Electronics

MINOR IN GEOLOGY (4 COURSES)

73.231 Physical Geology
73.232 Historical Geology
73.233 Environmental Geology for Town and Regional Planning
73.331 Regional Field Geology

MINOR IN EARTH SCIENCES (5 COURSES)

53.241 Introduction to Meteorology
53.251 Introduction to Astronomy
73.231 Physical Geology
73.232 Historical Geology
73.246 Oceanography

PROGRAM IN EDUCATION

The Department sponsors the Interdisciplinary Major in Natural Sciences for students planning to become licensed teachers at either the early childhood or elementary level. More specific information on the secondary education minor and Interdisciplinary major is found in the Education section of the catalog.

PHYSICS AND EARTH SCIENCES COURSES APPROPRIATE FOR GENERAL EDUCATION (GEN. ED.)

Physics Courses		**Goal(s)**
53.109	Introduction to Physical Science	6, Lab
53.201	Introductory Physics	6, Lab
53.211	Principles of Physics I	6, Lab
53.241	Introduction to Meteorology	6
53.251	Introduction to Astronomy	6

Earth Sciences Courses		**Goal(s)**
73.131	Conversations with the Earth -An Introduction to Geology	6
73.231	Physical Geology	6, Lab
73.232	Historical Geology	6, Lab
73.246	Oceanography	6

PHYSICS COURSE DESCRIPTIONS

53.109 Introduction to Physical Science (Gen. Ed. Goal 6, Lab)
An introduction to the fundamental behavior of matter and energy. Topics include the nature of scientific investigation, properties of matter, motion, energy conservation, heat, wave motion, magnetism and static electricity, nuclear fission and fusion, and the relationships among the different areas of physical science. This course is intended for nonscience majors and includes a weekly two-hour laboratory component. Students will not receive credit for this course after having taken 53.201 Introductory Physics or 53.211 Principles of Physics I.

53.201 Introductory Physics (Gen. Ed. Goal 6, Lab)
An introduction to those concepts of physics of particular relevance to the life and earth sciences. The topics covered, all at a non-calculus level, include motion, scaling, energy and its conservation, fluids, wave motion, electrostatic force, electrical currents, nuclear radiation and its effects and uses. The course includes a weekly three-hour laboratory component.
Prerequisite: 43.200 Precalculus.

53.211 Principles of Physics I (Gen. Ed. Goal 6, Lab)
The study of motion, Newton's Laws, work and energy, momentum, gravitation, and the rotation of rigid bodies. Designed for students majoring in the sciences, mathematics, and pre-engineering. Includes a weekly, three-hour laboratory component.
Prerequisite: 43.219 Calculus I (may be taken concurrently).

53.212 Principles of Physics II
A continuation of Principles of Physics I, involving the study of wave motion, sound, electricity and magnetism, d.c. circuits, and electromagnetic waves. Designed for students majoring in the sciences, mathematics, and pre-engineering. Includes a weekly, three-hour laboratory component.
Prerequisite: 52.211 Principles of Physics I.

53.241 Introduction to Meteorology (Gen. Ed. Goal 6)
A focus on the acquisition of an understanding of the phenomenon of weather and the behavior of the earth's atmosphere. The underlying physical principles required as the foundation for this understanding are introduced as needed. Topics that are covered include the origin and composition of the earth's atmosphere, the ozone problem, global warming, cloud and precipitation formation, types of fog, causes of winds, air mass and frontal weather, air pollution and acid rain, thunderstorms, tornadoes, hurricanes, and weather forecasting.

53.251 Introduction to Astronomy (Gen. Ed. Goal 6)
An exploration of the bodies in the night sky including visible planets, stars, unusual stars, constellations, nebulas, and galaxies. An understanding of these celestial bodies is gained through selected readings, planetarium presentations, telescopic observations, and class discussion on astronomy as it relates to current events.

EARTH SCIENCES COURSE DESCRIPTIONS

73.131 Conversations with the Earth: An Introduction to Geology (Gen. Ed. Goal 6)
Designed for non-science students wishing an introduction to the study of the earth. The course includes a discussion of the theories on the formation and evolution of the Earth including the theory of plate tectonics and seafloor spreading which is revolutionizing the way we interpret the Earth's history. Also covered are the development of landscapes, our human relationship to the Earth with respect to needed resources and geological hazards, the formation and importance of fossils, and how all this information is collected and evaluated by earth scientists. Note: Credit cannot be received for the course if preceded by 73.231 Physical Geology or 73.232 Historical Geology.

73.231 Physical Geology (Gen. Ed. Goal 6, Lab)
A study of the nature and origin of the minerals and rocks composing the earth; the geologic evolution of surface features (scenery) taking into account the underlying rock types and structures as well as the surface effects of glaciers, oceans, rivers, volcanoes, and earthquakes; introduction to geologic aspects of environmental issues; and the geology of the solar system. Numerous field trips supplement the lectures and labs. Designed for any students wanting to learn more about the formation of landscapes and the limitations of earth resources.

73.232 Historical Geology (Gen. Ed. Goal 6, Lab)
A study of the principles and techniques used in interpreting the geologic time and the evolution of the geologic time scale. Other topics include: the origin and evolution of the Earth and its conti-

nents and ocean basins, and the nature of fossils and their use in studies of biological evolution, resources, and evolution of North America. This course has numerous field trips and is designed for students in any major.
Prerequisite: 73.231 Physical Geology.

73.233 Environmental Geology for Town and Regional Planning
A focus on the nature and structure of local bedrock and surficial deposits, the distribution and dynamics of surface and ground water, waste disposal and treatment, and coastal processes. Local geologic hazards such as flooding, mass movements of unconsolidated surface deposits, subsidence, ground water contamination and coastal erosion are considered. Students become familiar with resources, tools, and new approaches through geology to environmental planning and impact analysis. Local case studies and field trips supplement the lectures.

73.246 Oceanography (Gen. Ed. Goal 6)
An introduction to the structure and origin of ocean basins; the origin and chemistry of seawater; the physical dynamics of the sea including oceanic circulation, waves, and tides; geology of coastal areas; some marine ecology; management practices for coastal and oceanic environments. Several field trips supplement lectures. This course is designed for all students interested in the oceans and their preservation.

73.331 Regional Field Geology
A course with two major purposes. First, it is an introduction to the techniques of geological field investigation and involves practice in the recognition and description of rock types, rock structures, and landforms. Using data collected during field work, students prepare and interpret geologic maps and cross-sections and summarize their findings in written reports. Second, students acquire a knowledge of the regional geology of selected areas with special emphasis on New England. Students are expected to attend one out of the two or three day field trips. This course is designed for students in any major who desire practical experience in reading the landscape.
Prerequisite: 73.231 Physical Geology and 73.232 Historical Geology.

73.495 Independent Study in Earth Sciences
An opportunity to continue to study a topic in greater depth or to explore topics or problems in the earth sciences that are new to the student. Admission to this course is open only to juniors and seniors who are Earth Science minors and who have an overall QPA of 2.7. Admission must be approved by the supervising faculty member and the department chair.