ESS Earth and Space Sciences

ESS 502: An Earth Systems Perspective on Long Island's Future
Each time this course is offered we will study in great detail the reasons for given earth system constraint and the consequences for Long Island's natural and developed areas. Such a constraint might be peak production of oil, groundwater pollution, global climate change, etc. This evening seminar course is repeatable by permission only.

3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ESS 511: Pine Barrens Sustainability
The ecologically diverse Long Island Pine Barrens region provides a habitat for a large number of rare and endangered species, but faces challenges associated with protection of a natural ecosystem that lies in close proximity to an economically vibrant urban area that exerts intense development pressure. In this course we will consider the interaction of the ecological, developmental and economic factors that impact the Pine Barrens and the effectiveness of decision support systems in promoting sustainability of the Pine Barrens.

3 credits, Letter graded (A, A-, B+, etc.)

ESS 522: The Planets
A general survey of present knowledge of the planets, satellites, interplanetary medium, comets, asteroids, and outer regions of the sun. Begins with a historical introduction and discussion of the methods of science. Emphasizes current NASA deep-space exploration missions and other modern astronomical methods. Research report required. Prerequisites: MAT 123 and PHY 119

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 523: Collisions in the Solar System
A discussion of the evidence that comet and asteroid impacts have played a significant part in the evolution of the Earth, and other planets of the solar system, as well as an assessment of the actual and perceived hazard posed by terrestrial impacts and discussion of what can be done about it. Research report required.

Co-scheduled with AST 301 Collisions in the Solar System Prerequisites: MAT 123 and PHY 119

Offered

ESS 524: The Universe
The origin, evolution, and ultimate fate of the universe. The course begins with a historical approach with emphasis on the evolution of cosmological ideas from geocentric universes to the Big Bang. Consideration of the evolution of the universe from the earliest moments after the Big Bang to the distant future, including the formation of the galaxies, stars, and planets. Research report required.

Co-scheduled with AST 304 The Universe

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 532: Atmospheric Fundamentals
This course considers: the principles of atmospheric thermodynamics to assess adiabatic and saturated adiabatic processes; the concepts of radiative transfer such as blackbody radiation, scattering, absorption, and emission by molecules and particles will be discussed; tropospheric and stratospheric chemistry with its subsequent effects on air pollution and chemical cycles; meteorological physical concepts such as geostrophic and gradient winds, and general circulation; and the microphysics of cloud formation and precipitation. Research report required. Prerequisites: MAT 123 and PHY 119

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 533: Global Change
The course examines the processes governing the global climate and discusses the scientific basis behind questions of global climate change. Topics include evidence and courses of past climatic changes, monsoons and El Nino events, greenhouse gases and the greenhouse effect, analogues with other planets, and the depletion of ozone. The role of ocean circulations, sea ice and glaciers, snow, vegetation and land features in the climate system will be discussed. The course will also consider the basic concepts of global climate models and remaining challenges. Research report required.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 534: Air Pollution and Control
This course provides an overall picture of air pollution caused by gas phase species and airborne particulate matter. The sources of air pollution and the transport of air pollutants will be discussed. We will study the underlying chemical processes which can lead to the formation of secondary air pollutants. Their effect on an urban, regional, and global scale and on human health will be assessed. National and international air quality policy regulations will be discussed. The causes and consequences of the stratospheric ozone hole will be outlined. The international efforts in form of policy protocols to stop stratospheric ozone depletion will be discussed. The natural greenhouse effect will be introduced and our current understanding of global warming will be presented. Research report required. Prerequisites: CHE 123/131, MAT 123 and PHY 119

Offered
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 536: Principles of Weather Analysis and Forecasting
This course explores the fundamental physical processes associated with various weather phenomena: tropical cyclones, extratropical cyclones, fronts, convective storms, and local air-sea and mountain flows. The latest analysis techniques, datasets, and tools will be used to understand the climatology and structural evolution of these weather phenomena. Basic forecasting techniques will be applied using observations and numerical model output. Research report required. Prerequisite: ESS 532

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 541: Earth's Surficial Environment
The course examines: (1) earth-surface processes, the study of landforms, and the processes that produce and modify them; (2) the significant events in the evolutionary history of plants and animals through geological time; (3) dating approaches used to depict earth's history; and (4) the origin, dispersal, and deposition of sediments. Instruction will include lectures and laboratory exercises. Research report required. Four hours per week.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 542: Tectonic Environment
Determining positions on earth, including use of maps; recognition, description and origin of structural features of the earth's crust and interior; using seismic data to locate earthquakes and describe the earth material through which seismic waves travel; and understanding the role of plate tectonics in the earth's geologic evolution. Instruction will include lectures and laboratory exercises. Research report required. Four hours per week.

Offered
ESS 543: Rocks and Minerals
Identification, properties, formation and occurrence of rock-forming minerals: characterizing igneous, sedimentary and metamorphic rocks including the diverse geologic settings in which they occur with emphasis on their occurrence in the Metropolitan New York area. Instruction will include lectures and laboratory exercises. Research report required. Four hours per week.

Offered
Fall, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 544: Geology of New York
The course will explore: (1) the development of the geological terranes during the Grenville, Taconian, Acadian and Alleghenian orogenies; (2) the effects of late Proterozoic and Mesozoic rifting; and (3) Pleistocene glaciation. These will be considered in the context of plate tectonics and global geology. Instruction will include lectures, two full-day field trips. Research report required. Three hours per week.

Offered
Spring, 3 credits, Letter graded (A, A-, B+, etc.)

ESS 585: Directed Studies
Special studies directed by various faculty members to be taken for variable and repetitive credit.

Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ESS 589: Research for Earth Science Teachers
This course is intended to provide science teachers or graduate students in the Science Education program an opportunity to obtain research experience. A written report is required.

Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

ESS 600: Practicum in Teaching
For MAT Earth Science students
Fall, 0-3 credits, S/U grading

ESS 601: Topics in Earth and Space Sciences
Fall, 1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.