ENV
Environmental Science

ENV 115: Chemistry, Life, and Environment
This survey course introduces chemical principles by emphasizing the role chemistry plays in everyday life, the natural environment, the built environment, energy production, and in processes leading to environmental degradation. In addition, the role of chemistry in the development of alternative energy sources, remediation technologies, and eco-friendly products is discussed. This course for non-science majors introduces chemical principles using mostly qualitative approaches rather than quantitative approaches. Interactive tools and interactive visualization tools are extensively used to illustrate concepts, reactions, and processes. This course is offered as both CHE 115 and ENV 115.

DEC: E
SBC: SNW
3 credits

ENV 301: Sustainability of the Long Island Pine Barrens
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.

Prerequisites: U3 or U4 status and one of the following: BIO 201, CHE 131, ECO 108, ESG 100, ESG 198, GEO 101, GEO 102, MAR 104, SBC 113

DEC: H
SBC: STAS
3 credits

ENV 304: Global Environmental Change
An analysis of the physical, chemical, and biological processes in the atmosphere, hydrosphere, lithosphere, and biosphere that are susceptible to change either from natural or anthropogenic causes. In addition to focusing on the processes, this course will examine the spatial/temporal scales of environmental changes, their consequences to systems including our economic, political, and social systems, and will consider our responsibility and capability in managing systems in a sustainable way. This course is offered as both ENV 304 and GEO 307.

Prerequisite: one of the following courses: SBC 111, SBC 113, ENS 101, GEO 101, GEO 102, ENV 115, CHE 131

ENV 3010: Sustainability and Renewable Energy - Costa Rica
Hands on experience in Costa Rica to learn and see the countries efforts for environmental sustainability and renewable energy. Students will spend 12 days in Costa Rica to participate in site visits to five renewable energy facilities and four environmental sustainability efforts. This in-depth experience is supported with topic-specific lectures, online readings and assignments, and work on an interdisciplinary capstone project. Students will also collaborate with local engineers on a community service project to provide the local communities with accessible water or other sustainability initiatives.

Prerequisite: Permission of the instructor

DEC: H
SBC: STAS
4 credits

ENV 310: Principles and Applications of Groundwater Hydrology
Principles of groundwater hydrology. Aquifer geology, with an emphasis on coastal ground water systems and Long Island in particular. Introduction to quantitative numerical methods to simulate regional groundwater flow and contaminant transport in aquifers. Development and management of freshwater aquifers as drinking water resources.

Prerequisites: MAT 126 or MAT 131; ENS 119 or GEO 102 or SBC 113

DEC: H
SBC: STAS
3 credits

ENV 315: Coastal Zone Management
Coastal zones are dynamic environments shaped by natural forces as well as human intervention. Developing management strategies is critical and requires an understanding of the coastal zones environments, the threats to these environments, as well as the applicable laws and policies. This course examines past and present coastal zone management strategies at the national, regional, and local level. Coastal zone management on Long Island will be extensively reviewed and discussed.

Prerequisite: ENS 101 or SBC 111 or SBC 113 or GEO 102 or POL 102 or MAR 104; U3 or U4 status

ENV 310: Sustainability and Renewable Energy - Costa Rica
Hands on experience in Costa Rica to learn and see the countries efforts for environmental sustainability and renewable energy. Students will spend 12 days in Costa Rica to participate in site visits to five renewable energy facilities and four environmental sustainability efforts. This in-depth experience is supported with topic-specific lectures, online readings and assignments, and work on an interdisciplinary capstone project. Students will also collaborate with local engineers on a community service project to provide the local communities with accessible water or other sustainability initiatives.

Prerequisite: Permission of the instructor

DEC: H
SBC: STAS
4 credits

ENV 317: Ecology of Algae and Plants of Coastal Plains Freshwater Habitats
An introduction to the ecology of algae and aquatic plants of Long Island's freshwater habitats. Specific focus is on the lakes and ponds, rivers and streams, and wetlands (bogs, swamps, and marshes) of the coastal plains. Emphasis is on natural ecology, biodiversity, and water quality. Subject matter includes the major functional groups of algae and aquatic plants, taxonomic identification skills, aquatic field and lab methods, water quality analyses, and data analysis.

Prerequisite: BIO 201; CHE 131 or ENV 115

SBC: STEM+
3 credits

ENV 320: Chemistry for Environmental Scientists
Course designed to provide a firm understanding of the chemical principals and reactions of importance in environmental degradation of natural environments or built environments, remediation and abatement processes, energy production. In addition, the course reviews the chemical processes that control the transport, fate, and bioavailability of common organic pollutants, metals, and metalloids. The course expands on concepts from general chemistry, and introduces concepts from physical chemistry, analytical chemistry, organic chemistry, photochemistry, and geochemistry. Not for credit in addition to CHE 310.

Prerequisite: CHE 132 or CHE 142

DEC: H
SBC: STAS
3 credits

ENV 321: Chemistry for Environmental Scientists-Lab
Laboratory course is designed to illustrate principles, processes, and reactions presented in ENV 320. In addition, the laboratory will focus on the quantitative analysis and identification of common chemical pollutants, including common volatile and semi-volatile organics, metals and metalloids. Some of the laboratory meetings will be in the form of short field trips to practice sampling techniques as well as in situ and on site analysis techniques.

Prerequisite: CHE 133
Pre- or corequisite: ENV 320 or CHE 310
1 credit

ENV 339: Economics of Coastal and Marine Ecosystems
This course will view human interactions with coastal and marine ecosystems through the lens of economics. Consideration of the socioeconomic implications of policy decisions involving environmental and natural resources has become increasingly important for ecosystem management. Topics will include the basics of welfare analysis, the concept of ecosystem services, the challenges associated with public goods, methods for economic valuation of non-market goods and services, strategies for sustainable use of coastal and marine resources, and case studies of the application of fundamental principles of environmental economics to national and international policy. This course is offered as both ENS 339 and ENV 339.

Prerequisite: U3/U4 status; ENS 101 or SBC 111 or MAR 104
DEC: H
SBC: STAS
3 credits

ENV 340: Contemporary Topics in Environmental Science
Course explores one or more contemporary environmental science topics in depth. Topic(s) vary by semester. Examples of topics include: formation and fate of Asian Brown Cloud; Arsenic in Drinking water; Acid Rain; Environmental issues related to mining; Environmental impact of burning and mining coal; Pesticides and Herbicides in the Environment. Course may be repeated once.

Prerequisite: U3/U4; ENV 115 or CHE 131
SBC: ESI, STEM+
3 credits

ENV 405: Field Camp
A field course in environmental science of closely related field that may be taken at any one of several approved university programs. Student should plan in consultation with Undergraduate Program Director.

Prerequisite: U3/U4; ENV 115 or CHE 131
SBC: ESI, STEM+
3 credits

ENV 444: Experiential Learning
This course is designed for students who engage in a substantial, structured experiential learning activity in conjunction with another class. Experiential learning occurs when knowledge acquired through formal learning and past experience are applied to a “real-world” setting or problem to create new knowledge through a process of reflection, critical analysis, feedback and synthesis. Beyond-the-classroom experiences that support experiential learning may include: service learning, mentored research, field work, or an internship.

Prerequisite: WRT 102 or equivalent; permission of the instructor and approval of the EXP+ contract (http://sb.cc.stonybrook.edu/bulletin/current/policiesandregulations/degree_requirements/EXPplus.php)
SBC: EXP+
0 credit, S/U grading

ENV 447: Readings in Environmental Sciences
Tutorial readings in the environmental science. May be repeated.
1-2 credits, S/U grading

ENV 487: Research in Environmental Sciences
Qualified advanced undergraduates may carry out individual research projects under the direct supervision of a faculty member. May be repeated.
Prerequisite: Permission of instructor
SBC: EXP+
0-6 credits, S/U grading

ENV 488: Internship in Coastal Environmental Studies
Participation in local, state, and national public and private agencies and organizations. May be repeated to a limit of 12 credits.

Prerequisites: U3/U4 status and permission of the Undergraduate Program Director
SBC: EXP+
0-12 credits, S/U grading

SBC: Sustainability Block Curriculum

SBC 111: Introduction to Sustainability Studies
Survey course introduces concept of sustainability. Sustainability is often defined as the ability to provide for the needs of the world's current population without damaging the ability of future generations to provide for themselves. This course reviews the needs of the current population and future generations, trends that affect our ability to provide those needs, and possible solutions that are environmentally, economically, and socially acceptable.

SBC: SNW
3 credits

SBC 113: Physical Geography Lecture
This study of geosystems examines modern environmental problems through quantitative methods, analysis, and modeling grounded in basic and applied science and research. The goal of the course is to introduce students to the fundamental processes that dominate the atmosphere, hydrosphere, lithosphere, and biosphere, their characteristics and complex interactions, and their impact on human life and society.

DEC: E
SBC: SNW
3 credits

SBC 114: Physical Geography Lab
This laboratory course provides hands on experience in understanding the geosystems, including distribution and interrelationships of climate, vegetation, soils, and landforms.

Pre- or corequisite: SBC 113
1 credit

SBC 115: Introduction to Human Demography
An introductory course on the study of human population. Measurement issues and data in demographic analysis, as well as demographic perspectives on the basis of a review of major sources of information about population studies will be presented. Theories incorporating social, economic and political explanations for influences on human population growth will be considered. Population processes, with focus on fertility, mortality and migration, are reviewed. Population structure and characteristics, the interaction of the population processes and the number of people in a society of a given age, sex, race, ethnicity, socio-economic levels, marital status, and gender, are reviewed. Major issues related to sustainability (such as economic development, food and pollution, urbanization, gender and minority empowerment, and the human relationship and ecology with other organisms and species) are reviewed.

Prerequisite: MAT 125, MAT 131, MAT 132, or level 6 or higher on math placement exam.
SBC: SBS
3 credits

SBC 116: Introduction to Human Geography
Survey course introduces geography as a social science by emphasizing the relevance of geographic concepts to human problems. Course emphasizes globalization and cultural diversity.

DEC: F
SBC: SBS
SBC 117: Design Drawing
This introductory course exposes the student to the fundamental theories and practices employed in visually representing design concepts from observational through technical and speculative drawing. The course content introduces the student to contour drawing, rendering, orthographic projection, and pictorial drawing. Project work engages the student in the application of the above-mentioned drawing techniques and develops skills through the solution of student tailored problems.
DEC: D
SBC: TECH
3 credits

SBC 200: Human Settlement: History and Future
The history of city growth over the millennia as affected by technological change is a basis for understanding the future of human settlement. More than half of the world’s population currently lives in cities and urbanization continues on a global scale. The universality of urban development and resulting patterns will be presented as well as limits on growth of cities. Architectonic and socioeconomic planning theories and strategies for sustainable growth are presented. The development of Long Island, which is a microcosm of national and global patterns, will be discussed in detail.
DEC: F
SBC: SBS
3 credits

SBC 201: Systems and Models
Introduction to the dynamic modeling of complex systems. Students will learn to use simulation software that facilitates the visualization, formulation, and analysis of systems. Students will learn about systems with positive and negative feedbacks, the effects lags on system performance, and the difference between stocks and flows. Systems studied will include ecological models, economic models, chemical models, population models, epidemiological models, and models that include the interactions between population, economic development, and the environment.
Prerequisite: AMS 151 or MAT 125 or MAT 131 or MAT 141
2 credits

SBC 203: Interpretation and Critical Analysis
An introduction to interdisciplinary inquiry and representation in arts, culture, and theory with emphasis on the roles of analysis, argument, and imagination in multiple media. Requires serious engagement with sophisticated texts.
Pre- or corequisite: WRT 102
DEC: G
SBC: CER, HUM, WRTD
3 credits

SBC 204: Population Studies
The course will present basic mathematics of population growth and introduce various approaches for modeling populations, including population viability analysis (PVA). PVA, the quantitative assessment of the extinction risk of rare species or populations, takes biological information (habitat requirements, birth and death rates, population size) and makes predictions about future population sizes. Real examples will be discussed for a range of organisms, from bacteria to plants and mammals. This course will provide also the background for understanding human population growth. The impacts of human population growth in the developed and developing world on the ecology of other organisms, habitats and systems will also be discussed.
Prerequisite: MAT 125
DEC: E
SBC: STEM+
3 credits

SBC 206: Economics and Sustainability
Introduction to the basic economic concepts used in sustainability analysis. Students will learn the basic concepts and how to apply them in various context. Topics include the analysis of situations in which the behavior of individuals indirectly affects the well-being of others, strategic behavior and the environment, and the use of market-oriented policies to help in the stewardship of the environment.
Prerequisite: ECO 108
DEC: F
SBC: SBS+
3 credits

SBC 208: American Environmental Politics
This course will survey the politics of environmental policy-making in the United States. It examines how contrasting political, economic and social interests and values have clashed and contested with one another, and the exerted power, in the environmental policy realm. The course will explore past precedents and roots, but with a view to explain the shape of this realm in the modern United States, including the many actors and institutions: local, regional and national governments, non-governmental organizations and interest groups, as well as the public. It will look at the main patterns by which these groups have defined environmental problems and formulated and implemented solutions. A chief goal is to illuminate how and why solutions of real-world environmental problems, if they are to be effective, differ from those of scientific or engineering puzzles.
Prerequisite: WRT 102
DEC: K & 4
SBC: SBS+, USA
3 credits

SBC 307: American Environmental History
This course provides an overview of the history of how Americans have used, viewed and valued the natural environment. Beginning with the Indians and the early colonists (15th-16th centuries), the course will examine the cultural, social, economic, political, and technological currents that shaped North Americans’ relationships with their environment in early and later industrial eras, after World War II, and finally, in the late 20th and early 21st centuries. Historical snapshots will center on people living in more natural places, such as farms and forests, as well as more built places, such as factories, cities, and suburbs. Events in the northeastern U.S. will provide a geographic focus, but the course will also look at related happenings elsewhere on the North American continent and beyond. Finally, it will examine at the growing array of movements that have identified themselves as ‘environmental,’ at the ‘greenness’ of modern culture, and at the environmental dimensions of a globalizing era.
Prerequisite: WRT 102
DEC: K
SBC: SBS+, USA
3 credits

SBC 309: Global Environmental Politics
This course will explore the politics of environmental policy-making within the international realm. Focused especially on environmental dilemmas that cross national boundaries (i.e., pollution), or that are shared by multiple nations (i.e., global warming) it will look at the ways that such problems have been defined and their solutions sought, both with and without an over-arching state or governance. It will survey the many groups, interests and values that have clashed and competed with one another to exert power and influence international environmental
SBC 312: Environment, Society, and Health
This class examines the interactions between environment, social structures, and institutions. The first part of the class examines the ways in which environmental issues are perceived and constructed by various social actors (lay public, state officials, scientists, activists, media). The second part of the class will examine the differential impact of class, race, and gender on the distribution of hazards and risks (what is commonly known as 'environmental inequality'). In the third part of the class, students will be introduced to different cases of 'contested environmental illnesses' (cancer, lead-poisoning, asthma).
Prerequisite: SBC 111, or ENS 101, or GEO 101; POL 102 or SOC 105
DEC: G
SBC: HFA+, WRTD
3 credits

SBC 321: Ecology and Evolution in American Literature
This course is a review of 19th- and 20th-century American writers who trace the evolution of the US with respect to ecological practices through various multicultural perspectives. Literature covered will include transcendentalist essays, utopian/dystopian novels, ecofeminist fiction, and journalism.
Prerequisite: WRT 102
Advisory Prerequisite: SBC 203
DEC: G
SBC: HFA+, WRTD
3 credits

SBC 325: Environmental Writing and the Media
An examination of multiple genres (including: photo journalism, literary nonfiction, fine art and advertising and documentary film) in order to understand ways in which these genres are utilized to inform and manipulate public opinion regarding the environment. The culmination of the course will be a final project using multiple genres.
Prerequisite: WRT 102
Advisory Prerequisite: SBC 203
DEC: G
SBC: HFA+, WRTD
3 credits

SBC 330: Extreme Events in Literature
A course that examines the depiction of extreme events (both natural and human-related) in literature, journalism, art, and film, with special emphasis paid to the extended political and social issues that are raised by the events in question.
Prerequisite: U3 or U4 status
GSS 105: Introduction to Maps and Mapping

An introduction to the study and design of map formats, symbology, coordinate systems, and how maps record the historical patterns of human behavior. The course will also examine maps as a tool to analyze human activity and societal development, and include important aspects of map data collection, processing, the Global Positioning System (GPS), quantitative mapping, and GIS-based mapping techniques.

DEC: F

SBC: GLO, SBS+
3 credits

GSS 309: GIS and Cartography

Cartography is the knowledge associated with the art, science, and technology of maps. Digital computer cartography still follows the same fundamental principles and still requires a broad understanding of graphicacy as a language (as well as numeracy and literacy). This course will provide an introduction to cartographic principles, concepts, software and hardware necessary to produce good maps, especially in the context (and limitations) of geographic information systems (GIS).
Prerequisite: GEO 102 or GSS 105 or MAR 104 or SBC 113 or instructor consent
3 credits

GSS 313: GIS Design and Application I

Provides the basic concepts underlying modern geographic information science and technology. Emphasis is placed on the principles of GIS for characterizing environmental systems and computer-based techniques for processing and analyzing spatial data. The course is three credit hours of lecture. This lecture course must be taken in the same semester as the associated laboratory, GSS 314. Not for credit in addition to GSS 317.
Prerequisite: MAT 125 or MAT 131 or instructor consent
Corequisite: GSS 314

SBC: TECH
3 credits

GSS 314: GIS Laboratory

Practice using the GIS techniques and tools learned in the lecture (GSS 313), work on exercises, and process and analyze the spatial data for the course project. This laboratory course must be taken in the same semester as GSS 313.
Corequisite: GSS 313
1 credit

GSS 317: Geospatial Narratives: Deep Mapping for Humanities and Social Sciences

Building on formal methods in qualitative reasoning, spatial and temporal representation and geospatial science, this course will explore state-of-the-art methods for humanities and social sciences students to visualize and drill down data. Hands-on exercises of deep mapping will cover how to collect, analyze and visualize quantitative and qualitative data, spatial data, images, video, audio, and other representations of places and artifacts in humanities and social sciences. This course will also discuss models of reasoning about events, actions and changes that are spatially contextualized. Not for credit in addition to GSS 313.
Prerequisite: WRT 102
Advisory Prerequisite: some working knowledge of spreadsheets

SBC: TECH
3 credits

GSS 323: GIS Database and Design

Concepts of geodatabase design and management in geographic information systems (GIS), SQL statements, geographic data types and functions, data entry, techniques of geographic information structure applications. This is a Windows based computer class with the majority of students work involving GIS computer software.
Prerequisite: GSS 313 or GSS 317 or equivalent
3 credits

GSS 325: GIS Design & Applications II

The course builds upon the topics covered in GIS Design and Application I. It emphasizes the applications of GIS in solving real-world problems. Students are expected to gain an understanding of GIS theory, methodology and most importantly application. Students are also expected to demonstrate abilities of spatial thinking, spatial analysis, and be able to solve practical spatial problems utilizing a GIS. Because GIS is both a tool for analysis and the visual communication of these data, students will be required to develop a GIS presentation, much as would be expected in a professional setting. This independent project will constitute a substantial portion of the final grade. This is a Windows based computer class with the majority of students work involving GIS computer software.
Prerequisite: GSS 313 or GSS 317 or equivalent
3 credits

GSS 326: GIS Project Management

The course addresses issues unique to a GIS operation such as implementation issues, decision making procedures, strategies for success, legal issues, involvement of management, marking within an organization, strategic planning, and industry outlook.
Prerequisite: GSS 313 or GSS 317 or equivalent
3 credits

GSS 350: Applied Spatial Data Analysis
An introduction to geospatial statistical analysis that aims to provide students with the background necessary to investigate geographically represented data. The specific focus is on spatial data analysis, such as the analysis of autocorrelation, principles of geostatistics and analysis methods that are relevant in the fields of public health, environmental/earth science and social science. An important aspect of the course is to gain hands-on experience in applying these techniques with GIS and spatial analytical software, and essential methodological and practical issues that are involved in sophisticated spatial analyses.

Prerequisite: AMS 102 or equivalent and GSS 313 or GSS 317 or equivalent
SBC:  STEM+
3 credits

GSS 354: Geospatial Science for the Coastal Zone
The use of spatial data is becoming increasingly critical in the decision management process and planning of the coastal zone. This course will use GIS and Remote sensing tools to collect and analyze data for integrating into the management, planning, and monitoring of the coastal geomorphology and ecosystems.

Prerequisite: GSS 313 or GSS 317 or equivalent
3 credits

GSS 355: Remote Sensing GIS Data
Provides a basic overview of the technology by which aircraft and satellite images of the Earth are produced as well as hands on experience manipulating and interpreting. Students gain practical experience in environmental analysis using satellite imagery and commonly used sensors and analytical methods for the Earth sciences.

Prerequisite: GSS 105 or MAR 104 or GEO 102
SBC:  STEM+
3 credits

GSS 390: Topics in Geospatial Science
Course will present special interest topics or recent software enhancements in the rapidly developing field of Geospatial Science. The course will include a mixture of core geospatial techniques and recently released methodology. Course content will include a diversity of Geospatial topics and include discipline specific topics relevant to majors in physical sciences, social sciences, business and engineering. Repeatable as the topic changes to a maximum of 6 credits.

Prerequisite: U3 or U4 status or permission of the instructor
3 credits

GSS 475: Undergraduate Teaching Practicum
Work with a faculty member as assistant in a regularly scheduled course. The student must attend all classes and carry out all assignments; in addition the student will be assigned a specific role to assist in teaching the course. The student will meet with the instructor on a regular basis to discuss intellectual and pedagogical matters relating to the course.

Prerequisites: Permission of instructor and undergraduate director
SBC:  EXP+
3 credits, S/U grading

GSS 487: Geospatial Science Research
Qualified advanced undergraduates may carry out individual research projects under the direct supervision of a faculty member. Repeatable to a maximum of 3 credits.

Prerequisite: Permission of instructor
0-3 credits, S/U grading

GSS 488: Geospatial Science Internship
The GSS Internship is designed to provide students experience in the real workplace. Interns are expected to function as a GIS/Remote Sensing professional and work within the existing host facility structure or on a free standing project. Interns will complete assigned tasks by hosting facility such as GIS data entry, data retrieval, remote sensing analysis, GPS field work, documentation, or general GIS facility duties. These activities will be monitored by both a representative of the host facility and the instructor. May be repeated to a limit of 12 credits.

Prerequisites: GSS 325; GSS 313 or GSS 317, or instructor consent
SBC:  EXP+
0-12 credits, S/U grading