flooded. How do these disasters happen? What are the secondary global effects on societal infrastructure, on public health, international trade? How do societal differences cause varied local responses and affect the global impact? This course focuses on evaluating the global effects of several recent geological disasters. Scientific and popular news sources are used to explore the underlying natural phenomena and the nature and global distribution of the effects from geologic, economic, and public health perspectives.  
**Prerequisite:** High school chemistry and biology

**GEO 105: Energy Resources for the 21st Century**

Today we are faced with the challenge of driving the economies of modern civilization with new energy resources. This course looks at the current energy sources to assess their long-term sustainability. In particular, this course examines fossil fuels, from the geologic processes that create them through their utilization. This course evaluates the impact on the global environment and the finiteness of each resource. Nuclear, geothermal, solar, wind, hydro, tidal, and other energy sources will be evaluated. This course projects forward to anticipate needs and evaluate future resources for time scales of 10, 20, 50, and 100 years. It identifies the technical advances that are required to meet the future energy needs. The emphasis of the course is to provide a vision of the current global energy setting. It develops tools that enable critical thinking on issues that interface society and science. Homework assignments will use the internet for accessing relevant information and spreadsheets (such as Excel) and Google Earth to evaluate this information.

**DEC:** E  
**SBC:** SNW  
3 credits

**GEO 107: Natural Hazards**

An introduction to the concepts, techniques, and scientific methods used in the Earth sciences. The natural hazards posed by earthquakes and volcanic eruptions are used as a focus. These phenomena are examined in the context of the theory of plate tectonics to determine their cause, destructive potential, and the possibility of predicting and controlling their occurrence. Elementary probability methods are introduced in the treatment of approaches to prediction. Societal responses to forecasts are also considered.

**DEC:** E  
**SBC:** SNW  
3 credits

**GEO 112: Physical Geology Laboratory**

Rock and mineral identification, introduction to topographic and geologic maps. Not for credit in addition to GEO 122.

**Pre- or Corequisite:** GEO 102  
1 credit

**GEO 113: Historical Geology Laboratory**

An introduction to basic techniques used for interpreting geological history. Topics include interpretation of topographic and geological maps and cross sections, introduction to fossils, and basic stratigraphic techniques. One three-hour laboratory per week.

**Pre- or Corequisite:** GEO 103  
1 credit

**GEO 115: Making the Invisible Visible: Polarized light microscopy**

Light interacts with crystals and through this interaction reveals information on the composition of the crystals and their internal atomic arrangement. This course provides a hands-on exploration of the construction of the polarized light microscope, its use in investigating the behavior of polarized visible light passing through crystals, and how the observed behavior can be used to identify natural and synthetic crystalline materials. The scientific material covered is of particular relevance to students interested in chemistry, physics, materials science, and planetary and geological science. Two 80-min lectures and
GEOLOGY (GEO) - COURSES

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one three-hour laboratory per week for a 4-week period.
Prerequisite: AP Chemistry with a score of 4 or 5 or CHE 131 or equivalent
SBC:  TECH
1 credit

GEO 121: Principles of Geology
Course offered in conjunction with Sayville High School.
4 credits

GEO 122: Physical Geology
The nature of the earth and of the processes that shape it: the earth's external and internal energy; minerals and rocks; external processes and the evolution of the landscape; internal processes and the structure of the earth; the earth compared with other planets; sources of materials and energy. Laboratory includes study of minerals and rocks; landforms as shown on topographical maps and aerial photographs; geologic structures inferred from maps and block diagrams; problem sets. Two lectures and one three-hour laboratory and recitation per week. Not for credit in addition to GEO 102/112.
Advisory Prerequisite: high school chemistry and high school physics
DEC: E
SBC: SNW
3 credits

GEO 287: Introductory Research in Geology
Independent research, under the supervision of a faculty member, at a level appropriate to lower-division students. May be repeated once.
Prerequisites: U1 or U2 standing; one GEO course; permission of instructor and departmental research coordinator
SBC: ESI
0-3 credits, S/U grading

GEO 303: Sedimentary Geology and Geochronology (with emphasis on the Turkana Basin)
Field course that applies fundamental geological concepts to the sediments and rock units in the Turkana Basin, Kenya, to provide a foundation for the chronology and context for recorded events in human evolution. Emphasis is given to sedimentation, stratigraphy, volcanism, and tectonics, as they apply to local geology, including training in field methods. Modern terrestrial processes and landscape evolution are examined using features present in the Turkana Basin. Consideration is also given to broader geologic events spanning the Oligocene to the present. Geologic concepts are linked to modern and ancient environments, archaeology, and paleoanthropology in northern Kenya.
Prerequisite: Permission of the instructor/Study Abroad office
Advisory Prerequisite: GEO 103 and GEO 113
DEC: E
SBC: SNW
3 credits

A survey of the origin, distribution, and importance to modern civilization of the fuels and minerals won from the earth. Geology of mineral resources and problems of finding, extracting, and supplying fossil fuels, metallic ores, water, and non-metallic commodities to industry and community as well as the ultimate limits of their abundances. Environmental concerns related to the exploitation of mineral resources with review of legislation and other steps being taken to minimize environmental damage.
Prerequisite: one D.E.C. E or SNW course
DEC: H
SBC: STAS
3 credits

GEO 305: Field Geology
Geological field studies on and near the Stony Brook campus. Labs emphasize mapping techniques and field studies of glacial and environmental geology, and include geophysical and hydrological analyses and mapping. Course consists of two three-hour sessions per week, divided between lecture and outdoor labs.
Prerequisites: GEO 102/112 or GEO 112 and 103 and 113 or GEO 112 and 101 and 111
SBC: EXP+
3 credits

GEO 306: Mineralogy
Topics include basic crystallography, crystal chemistry, and identification of the important rock-forming and ore minerals. Included are the fundamentals of optical crystallography: indices of refraction, isotropic, uniaxial, and biaxial minerals; optical indicatrix theory and interference figures. Three hours of lecture per week. The laboratory component, GEO 366, must be taken concurrently; a common grade for both courses will be assigned.
Prerequisites: GEO 102 and 112; CHE 131
Corequisite: GEO 366
3 credits

GEO 307: 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.
Prerequisites: SBC 111, or SBC 113, or ENS 101, or GEO 101, or GEO 102; ENV 115 or CHE 131
DEC: H
SBC: STAS
3 credits

GEO 309: Structural Geology
Principles of structural geology, including classification, criteria for recognition, and mechanics of formation of crustal structural features. Elementary concepts of rock mechanics. Discussion of important tectonic features of the continents and oceans. Three hours of lecture per week. A two-day weekend field trip visits "classic" structural localities in the East. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information. The laboratory component, GEO 369, must be taken concurrently; a common grade for both courses will be assigned.
Prerequisites: GEO 122, or GEO 102 and 112; one semester of calculus; PHY 131/133 or 141 and 133 or PHY 125 and 126 and 133
Corequisite: GEO 369
3 credits

GEO 310: Introduction to Geophysics
An introduction to theoretical and applied geophysics. Topics in global geophysics include seismology, gravity, geomagnetics and heat flow, with applications to the structure and dynamics of the earth's interior. Students conduct computer-based analysis of geophysical data, some of which they collect using techniques of geophysical exploration and environmental geology. Three hours of lecture per week, plus group field experiments and analysis.
Prerequisites: MAT 127 or 132 or 142 or 171 or AMS 161; GEO 122, or GEO 102 and 112; PHY 133; PHY 134 or CHE 133; PHY 132 or PHY 126 and 127 or PHY 142
3 credits

Stony Brook University: www.stonybrook.edu/ugbulletin
GEO 311: Geoscience and Global Concerns
An exploration of how technologically-based problems facing the United States and the world are related to the basic scientific principles that explain the properties of the lithosphere, hydrosphere, and atmosphere. The set of issues include such geoscience-based topics as global warming, fossil fuel resources, nuclear waste disposal, and earthquake prediction and preparedness.
Prerequisite: Any 3 or 4 credit 100-level GEO course
DEC: H
SBC: STAS
3 credits

GEO 312: Structure and Properties of Materials
This course will explore materials from the viewpoint of their structure and chemistry and how these affect applications. We will discuss different states matter (crystals, quasicrystals, glasses, liquids) and their similarities and differences, focusing on the crystalline state. Nanomaterials and their peculiarities in terms of structure and properties will also be considered. Particular attention will be paid to (1) Materials for energy and environment applications, (2) materials for technological applications, and (3) Earth- and planet-forming materials.
Advisory Prerequisite: CHE 131 or PHY 131
3 credits

GEO 313: Understanding Water Resources for the 21st Century
A survey of the world's water resources and the fundamental processes and concepts that govern their distribution and resupply. Topics to be covered include processes in the hydrologic cycle, water resource supply and demand, water quality, and societal aspects relating to drinking water, and industrial and agricultural water usage. Consideration is given to global water shortages, projected impacts of climate change, water-based conflict, water resource management, and conservation practices. Detail will be devoted to pollution sources, water quality standards, drinking water treatment, and government regulation. Local water issues will also be addressed.
Prerequisite: one D.E.C. E or SNW course
DEC: H
SBC: ESI, STAS
3 credits

GEO 314: The Geology of Long Island
Overview of the geology of Long Island. The formation and development of Long Island, its geologic history, and the long term processes of sea-level change will be covered. The fundamental principles of geology and tools of interpretation will be introduced. This course corresponds to the content of GEO 306.
Prerequisite: GEO 102 or GEO 122 or GEO 106
SBC: ESI
3 credits

GEO 315: Groundwater Hydrology
Physical and chemical principles of geohydrology. Concepts of groundwater geology. Introduction to quantitative models of regional fluid flow and groundwater contamination. Groundwater and geologic processes, with examples from tectonics, petroleum geology, geothermics, and economic mineralization.
Prerequisites: GEO 102 or GEO 122; MAT 127 or MAT 132 or MAT 142 or MAT 171 or AMS 161
3 credits

GEO 316: Geochemistry of Surficial Processes
Chemical principles used in the study of surface and near-surface water, rocks, and soils. Application of equilibrium concepts and reaction rates to reactions involving gases, fluids, and minerals in nature. Consideration of soil properties and processes.
Prerequisites: GEO 122, or 102 and 112; CHE 132 or 142
4 credits

GEO 317: Introduction to Geophysics
Fundamental concepts in geophysics, particularly relating to the development of regional fluid flow and groundwater contamination. Groundwater and geologic processes, with examples from tectonics, petroleum geology, geothermics, and economic mineralization.
Prerequisites: GEO 102 or GEO 122; MAT 127 or MAT 132 or MAT 142 or MAT 171 or AMS 161
3 credits

GEO 318: Engineering Geology and Coastal Processes
Fundamental concepts of soil, sediment, and rock mechanics and the physics of surficial processes. Application is made to problems of geotechnical and coastal engineering. Topics include consolidation, loose boundary hydraulics, slope stability, underground excavations and beach and tidal inlet stability, and channel sedimentation. This course is offered as both GEO 318 and MAR 318.
Prerequisites: GEO 122 or GEO 102 and 112; CHE 132 or 142
SBC: STEM+
3 credits

GEO 319: Geodynamics
Theoretical and observational aspects of plate tectonics. Development of the scientific basis of plate tectonics. Development and applications of the theory of plate tectonics. Topics include plate tectonics and Earth. Discussion of past and future spacecraft missions to Mars.
Prerequisite: GEO 102 or GEO 122 or GEO 106
Advisory Prerequisite: GEO 112
SBC: ESI
3 credits

GEO 347: Remote Sensing
An introduction to the fundamental principles of remote sensing, with emphasis on geological and environmental applications. Discussion of the physical basis for remote sensing techniques. Survey of commonly used sensors and image analysis methods in earth sciences. Participants gain practical experience in geologic and environmental analysis using satellite imagery.
Prerequisite: GEO 102 or GEO 106 or GEO 122
3 credits

GEO 366: Mineralogy Laboratory
Three hours of laboratory per week that corresponds to the content of GEO 306. Laboratory exercises involve work with crystallographic models, mineral samples, refraction oils and the polarizing light microscope. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.
Corequisite: GEO 306
SBC: TECH
1 credit

GEO 369: Structural Geology Laboratory
Three hours of laboratory per week that corresponds to the content of GEO 309. Laboratory exercises cover map interpretation and algebraic and graphical solutions of structural problems. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.
Corequisite: GEO 309
1 credit

GEO 403: Sedimentation and Stratigraphy
The history and practice of defining units of layered rocks and interpreting their spatial relationships. Topics include the basis for the geologic time scale, lithostratigraphic versus chronostratigraphic units, biostratigraphy, magnetostratigraphy, facies patterns and Walther's Law, subsurface stratigraphy, and the application of stratigraphy to geological problems. This course has an associated fee.
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

GEO 447: Senior Tutorial in Geology

Independent readings in advanced topics. May be repeated once.

Prerequisites: Permission of instructor and chairperson

1-3 credits

GEO 448: Geosciences Colloquium

Every semester, the Department of Geosciences hosts a colloquium series. The series features weekly lectures covering a wide variety of geosciences research topics. The purpose of this course is to expose upper division geoscience students to current research being performed at Stony Brook University and elsewhere. May be repeated up to a limit of 3 credits.

Prerequisite: U3 or U4 status as a GEO or ESS major; Permission of Instructor

1 credit

GEO 458: Speak Effectively Before an Audience

A zero credit course that may be taken in conjuction with any GEO course that provides opportunity to achieve the learning outcomes of the Stony Brook Curriculum's SPK learning objective.

Pre- or corequisite: WRT 102 or equivalent; permission of the instructor

SBC: SPK

0 credit, S/U grading

GEO 459: Write Effectively in Geology

A zero credit course that may be taken in conjunction with any 300 or 400 level geosciences course, with permission of the instructor. The course satisfies Stony Brook Curriculum's WRTD requirement.

Prerequisite: taken in conjunction with a 300- or 400-level Geosciences course; permission of the instructor

SBC: WRTD

0 credit, S/U grading

GEO 463: Sedimentation and Stratigraphy Laboratory

Three hours of laboratory per week that corresponds to the content of GEO 403. The course emphasizes practical techniques in stratigraphy. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Corequisite: GEO 403

1 credit

GEO 467: Igneous and Metamorphic Petrology Laboratory

Three hours of laboratory per week that corresponds to the content of GEO 407. This course has an associated fee. Please see www.stonybrook.edu/coursefees for more information.

Corequisite: GEO 407

SBC: STEM+

1 credit

GEO 475: Undergraduate Teaching Practicum I

Work with a faculty member as an assistant in one of the faculty member's regularly scheduled classes. The student is required to attend all the classes, do all the regularly assigned work, and meet with the faculty member at regularly scheduled times to discuss the intellectual and pedagogical matters relating to the course.

Prerequisite: U4 standing; previous preparation in subject field; interview; permission of instructor

SBC: EXP+

3 credits, S/U grading

GEO 476: Undergraduate Teaching Practicum II

Work with a faculty member as an assistant in one of the faculty member's regularly scheduled classes. Students assume greater responsibility in such areas as leading discussions and analyzing results of tests that have already been graded. Students may not serve as teaching assistants in the same course twice.

Prerequisite: GEO 475; previous preparation in subject field; interview; permission of instructor and department
GEO 487: Senior Research in Geology
Under the supervision of a faculty member, a major in the department may conduct research for academic credit.
Prerequisites: Permission of instructor and chairperson
SBC: ESI, EXP+
0-6 credits

GEO 488: Internship
Participation in local, state, or national private enterprises, public agencies, or nonprofit institutions. May be repeated to a limit of 6 credits.
Prerequisites: Permission of instructor and department
SBC: EXP+
0-6 credits, S/U grading

GEO 496: Research and Synthesize Scientific Literature in Geoscience
An introduction to writing a scientific literature review in the field of geosciences. Students will gain experience using scientific journal article databases, selecting relevant research articles from the peer-reviewed literature, and summarizing information effectively in written form. This course is to be taken in conjunction with any 300- or 400-level GEO course. Successful completion of this course satisfies the SBC categories WRTD and ESI.
Prerequisite: GEO 102
Corequisite: GEO 497 and any other 300- or 400-level GEO course
SBC: ESI, WRTD
1 credit, S/U grading

GEO 497: Research Communication in Geoscience
An introduction to ethics in scientific research and research communication in Geoscience. Topics from the NIH Ethics training course will be discussed with a focus on the student's current and future research and the ethical aspects of scientific communication. Discussions of clarity in scientific communication as a means of effecting ethical dissemination of scientific results will involve exposure to best practices in oral and written presentation. Students will give oral presentations of their written work (based on the co-requisite course GEO 496) and be involved in peer assessment of presentations. Successful completion of this course satisfies the SBC categories CER and SPK.
Prerequisite: GEO 102 and GEO 112
Corequisite: GEO 496
SBC: CER, SPK
1 credit, S/U grading