GEO - GEOSCIENCE (GEO)

*Course Fees are Per Credit Hour

GEO 102. Global Environments and Societies. (3 Credits)
The geographic method of inquiry is used to examine, describe, explain, and analyze the human and physical environments of the major regions of the world. (Fall, Spring, Summer)
Course Fees: $75

GEO 111. Physical Geography: Weather and Climate. (4 Credits)
Study of the physical features of the earth's environment pertaining to weather, climate, biomes, and major water bodies with an emphasis on the interrelated processes that shape these features and the resulting distributions and global patterns that occur. Three class periods; one 2-hour laboratory period per week. Field trips may be a part of laboratory activities. (Fall, Spring, Summer)
Course Fees: $75

GEO 111H. Honors Physical Geography: Weather and Climate. (4 Credits)
In-depth study and analysis of the physical features of the earth's environment pertaining to weather, climate, biomes, and major water bodies with an emphasis on the interrelated processes that shape these features and the resulting distributions and global patterns that occur. Three class periods; one 2-hour laboratory period per week. Field trips may be a part of laboratory activities. (Fall, Spring, Summer)
Course Fees: $75

GEO 112. Physical Geography: Landforms. (4 Credits)
Study of the physical features of the earth's environment pertaining to landforms, physiographic regions, and soils with an emphasis on the interrelated processes that shape these features and the resulting distributions and global patterns that occur. Three class periods; one 2-hour laboratory period per week. Field trips may be a part of laboratory activities. (Fall, Spring, Summer)
Course Fees: $75

GEO 112H. Honors Physical Geography: Landforms. (4 Credits)
In-depth study and analysis of the physical features of the earth's environment pertaining to landforms, physiographic regions, and soils with an emphasis on the interrelated processes that shape these features and the resulting distributions and global patterns that occur. Three class periods; one 2-hour laboratory period per week. Field trips may be a part of laboratory activities. (Fall, Spring, Summer)
Course Fees: $75

GEO 131. Physical Geology. (4 Credits)
Basic principles governing the dynamic Earth including plate tectonics,volcanism, earthquakes, geologic time, rocks, minerals, weathering and erosion. Three class periods; one 2-hour laboratory period per week. Field trips and/or term projects may be required. (Fall, Spring)
Course Fees: $75

GEO 131H. Honors Physical Geology. (4 Credits)
Basic principles governing the dynamic Earth including plate tectonics, volcanism, earthquakes geologic time rocks, minerals, weathering and erosion. Students will demonstrate understanding through a series of written assignments. presentations, and laboratory exercises designed to promote critical thinking through analysis of assigned readings drawn from scientific journals and textbooks internet reading assignments, construction of animations and other visualizations for presentation interactive software and research reports. Open to students in the Honors College or by permission of the Department of Physics and Earth Science. Three class periods· one two-hour laboratory period per week Field trips and/or term projects may be required. (Fall, Spring)
Course Fees: $75

GEO 132. Historical Geology. (4 Credits)
The development of the earth as deduced from the examination and interpretation of rocks. Special attention given to the identification and significance of fossils. Three class periods; one 2-hour laboratory period per week. Field trips and/or term projects may be required. Prerequisites: GEO 131, or departmental approval. (Spring)
Course Fees: $75

GEO 133. Earth Science/Earth Systems. (4 Credits)
Major concepts of meteorology, oceanography,and astronomy with an emphasis on systems or interrelationships with plate tectonics, geology, weather and climate impacts, biology, minerals, space, exploration of space. Three class periods; one 2-hour laboratory period per week. Field trips and/or term projects may be required. (Fall, Spring)
Course Fees: $75

GEO 146. Sustainable Earth. (4 Credits)
This course explores historical and contemporary environmental issues in Earth science with an emphasis on human-environmental relationships and their influences on sustainability. Inquiry into regional and global environmental issues in geoscience allows students to identify causes, effects, and potential solutions to problems. The course supports the development of geoscience literacy, informed by current scientific understanding of Earth, which is critical to the promotion of good stewardship, sound policy development, and the understanding of diverse perspectives, behaviors and outcomes. Three class periods; one 2-hour laboratory period per week. (Fall, Spring)
Course Fees: $75

GEO 184. Digital Earth. (3 Credits)
This class is designed to introduce students to innovative geospatial technologies and applications. Hands-on experience will be used to explore how computer-based tools and techniques are used to capture, store, process, visualize, and display the Earth. Using specialized computer software and web-based platforms, students will examine how insights provided by digital analysis of spatial data are used to solve local, regional, national, and global problems and make sound decisions. Previous technical experience is not necessary, only basic Windows operating system familiarity is required. (Fall, Spring, Summer)
Course Fees: $75

GEO 200. People, Place, and Culture. (3 Credits)
A conceptual approach to the study of humans, their distribution, economic systems, behavior patterns, value systems, and environmental perceptions, with emphasis given to the resulting patterns of cultural landscapes that characterize the earth. (Fall, Spring, Summer)
Course Fees: $75

GEO 220. Field Methods in Geoscience. (3 Credits)
This course will prepare students for upper division classes by providing instruction in research methodology; field work design; data collection; analysis of field data; and data presentation and presentation methods. (Fall)
Course Fees: $75

GEO 225. Maps and Map Interpretation. (3 Credits)
A study of the history of maps and mapping; types and uses; chief sources; reading and interpretation; care and handling. (Fall, Spring)
Course Fees: $75

GEO 230. Climate Change. (4 Credits)
This course examines the science of climate change, including how the climate system operates, the factors that cause climate change across different time scales, how those factors interact, how climate has changed in the past, how scientists use models, observations and theory to make predictions about future climate, and the possible consequences of climate change for our planet. The course explores evidence for changes in ocean temperature, sea level and acidity due to global warming and looks at how climate change today is different from past climate cycles. Finally, the course looks at the connection between human activity and the current warming trend and considers some of the potential social, economic and environmental consequences of climate change. Three class periods; one 2-hour laboratory period per week. (Every other semester)
Course Fees: $75

GEO 250. Sustainable Ecosystems. (3 Credits)
This course explores the basic principles of ecology, with a particular emphasis on biological and environmental relationships and their influences on sustainable ecosystems. Inquiry into regional and global issues allows students to identify causes, effects, and potential solutions to ecological challenges facing us today and in the future. Topics include energy flow, nutrient cycling, population structure and dynamics, species interaction, succession, and applications to current environmental management issues. (Spring on sufficient demand)
Course Fees: $75

GEO 300W. Geographic Exploration. (3 Credits)
This course explores the history of the discipline of geography from ancient times to the present, examining geography in Classical, Medieval, and Modern periods, with a concentration on recent developments in the field. The course also covers the history of exploration and the role of geographers in this process, as well as helping students to explore their own career paths. (Fall, Summer)
Course Fees: $75

GEO 310. Geography of the South. (3 Credits)
The interrelationship between the southern environment and its people. (Offered upon sufficient demand)
Course Fees: $75

GEO 311. Geography of Europe. (3 Credits)
Major European countries as types of the entire region. (Offered upon sufficient demand)
Course Fees: $75

GEO 312. Geography of Russia and Associated States. (3 Credits)
The character of and basis for the regional diversity of physical resources, population, economic, cultural, and political resources in Russia, the Ukraine, Belarus, Moldova, Georgia, and Armenia. (Offered upon sufficient demand)
Course Fees: $75

GEO 313. Geography of Asia. (3 Credits)
An analysis of the distribution of resources and peoples of Asia relationships to each other and to the rest of the world. (Offered upon sufficient demand)
Course Fees: $75

GEO 314. Geography of the United States and Canada. (3 Credits)
The geographic factors of North America; the regional characteristics and regional interdependence. The goals of this course are to increase and better integrate knowledge of geographic patterns in the U.S. and Canada, and understand the regional variations and spatial differentiation in the U.S. and Canada. (Offered upon sufficient demand)
Course Fees: $75

GEO 315. Geography of Africa. (3 Credits)
A study of the physical and cultural resources of Africa, with emphasis on the problems of developing nations. (Offered upon sufficient demand)
Course Fees: $75

GEO 316. Geography of the Middle East. (3 Credits)
An analysis of the distribution of resources and peoples of the Middle East, their relationships to each other and to the rest of the world. (Offered upon sufficient demand)
Course Fees: $75

GEO 317. Geography of Latin America. (3 Credits)
The geographic factors of Latin America; emphasis on certain regions and areas as a basis of comparison with other regions in Latin America and with North America. (Offered upon sufficient demand)
Course Fees: $75

GEO 320. Economic Geography. (3 Credits)
A study of the basic concept of natural resources, their relationship to world economies with the emphasis on primary production. (Fall)
Course Fees: $75

GEO 322. Urban Geography. (3 Credits)
This course is concerned with cities and neighborhoods with a particular focus on form and function. The course explores aspects that make American cities and neighborhoods distinctive and how these distinctive identities evolve. After exploring the evolution of cities in the US, students learn about the internal spatial structure of and the functional linkages within and between American cities. At the end of the course, students can identify and explain political, economic, social, cultural and technological forces that cause American cities to prosper, stagnate or decline. (Spring)
Course Fees: $75

GEO 324. Cultural Geography. (3 Credits)
A conceptual approach to the study of human-environment systems within the frame-works of cultural geography including cultural landscape, ecological perspectives, environmental perception and behavior, and environmental stress. Prerequisite: GEO 102 or departmental approval. (Offered upon sufficient demand)
Course Fees: $75

GEO 331. Water Resources. (3 Credits)
How much water does the world need to support growing human populations? What are the potential effects of climate change on the world's water resources? Water and water resources are critical issues for the sustenance of nearly every society. This course examines the occurrence, use, management, and conservation of water and water resources in the U.S. and around the world. It further discusses the environmental, economic, and social implications of floods, droughts, dams, and water usage as well as current issues in water quality, water pollution, and water resource regulation. Students will gain an understanding of the environmental, societal, and political impacts of water, water resources, and changes in water supply and availability, and they will be introduced to current and emerging trends in water resource issues, development, and technology. (Fall on sufficient demand)
Course Fees: $75

GEO 332. Energy. (3 Credits)
This course provides an introduction to energy systems and energy resources. The class will explore society's present needs and future energy demands, examine conventional energy sources and systems, including fossil fuels and nuclear energy, and then focus on alternate, renewable energy sources such as solar, biomass (conversions), wind power, geothermal, and hydro. Energy conservation methods will be emphasized. (Spring on sufficient demand)
Course Fees: $75

GEO 333. Sustainable Food and Agriculture. (3 Credits)
In this course, we will examine the social, economic and environmental dimensions of agriculture, the emerging global challenges revolving climate change, resource depletion, and various movements within agriculture including the Green Revolution, integrated crop management, conservation agriculture, organic, sustainable, regenerative, permaculture, and "climate smart" agriculture. We will explore the concept of food security in all of its dimensions including production, storage, distribution, access and stability. We will place special emphasis on challenges to global food security, constraints on the modern "conventional" farming system, and sustainable strategies to increase global food production. (Even-numbered years, Spring on sufficient demand)
Course Fees: $75

GEO 334. Waste. (3 Credits)
Exploration of the relationships among consumption, waste, pollution, and environmental sustainability. Students will examine challenges involving management of various kinds of waste streams (municipal, hazardous, toxic, and wastewater); assess consumption trends past and present; and explore the connection of waste production and disposal. Through activities such as measuring their own waste stream and assessing community-level waste management (landfilling, recycling and composting), students critically evaluate the economic, political, and ecological impacts of linear vs. circular waste stream practices. (Spring on sufficient demand)
Course Fees: $75

GEO 340W. Environmental Justice. (3 Credits)
This course examines the fundamentals of environmental justice - the idea that all people and communities have the right to equal environmental protection under the law, and the right to live, work and play in communities that are safe, healthy and free of life-threatening conditions. It explores current and emerging issues, as well as the application of environmental justice to environmental policy and planning. While this course focuses mainly on the United States, international issues and perspectives are also considered. (Spring on sufficient demand)
Course Fees: $75

GEO 341. Environmental Systems. (4 Credits)
This course introduces methods of modeling dynamic systems, with particular emphasis on environmental systems which are foundational to interdisciplinary perspectives of sustainability, A focus in understanding sustainability is placed on predicting the behavior of systems through time. Three class periods; one 2-hour laboratory period meets each week. Prerequisite: GEO 131 or GEO 133. (Fall, Spring)
Course Fees: $75

GEO 350. Introduction to Geophysics. (4 Credits)
A geophysics course in which principles of physics are applied to studies of Earth structure and dynamics from crust to core. The study includes exploring geophysical tools like seismology, gravity, magnetism, heat flow, and geodesy which are used to understand the age, whole-earth and near-surface structure, and to quantify the kinematics and dynamics of plate tectonics. Three class periods; one 2-hour laboratory per week. Prerequisites: PH 251 and MA 125. (Fall)
Course Fees: $75

GEO 370. Remote Sensing. (4 Credits)
Course is designed to introduce students to remote sensing science and technology Course focuses on concepts and technologies such as principles of remote sensing. remote sensing platforms and sensors, and remote sensing applications for urban and natural environments. classification and accuracy assessment Through a series of hands-on computer-based lab exercises, students develop an understanding of the tools and techniques used to acquire. display, process, and analyze remotely sensed data Three class periods, one 2-hour laboratory period per week. Prerequisite: GEO 184 . (Fall)
Course Fees: $75

GEO 380. Cartography and Visualization. (4 Credits)
This course is designed to introduce the elements of cartography and visualization with emphasis on map design, effective visualization of geographic data, phenomena, patterns and processes. Prerequisite: GEO 184 or departmental approval. (Spring)
Course Fees: $75

GEO 384. Geographic Information Systems. (4 Credits)
The study and application of concepts and technologies in geographic information systems and geographic information science including data conceptualization, database design and management, analysis operations, spatial problem solving, and professional system management. Analysis will be conducted in a commercial state-of-the-art Geographic Information Systems software suite. Three class periods; one 2-hour laboratory period per week. Prerequisite: GEO 184. (Fall, Summer)
Course Fees: $75

GEO 398. Special Course. (1-6 Credits)
Course number reserved for special courses offered from time to time in response to special circumstances. The courses are discipline specific with variable credit and when offered, they are identified by department content and credit. (Offered upon sufficient demand)
Course Fees: $75

GEO 399. Special Course. (1-6 Credits)
Course number reserved for special courses offered from time to time in response to special circumstances. The courses are discipline specific with variable credit and when offered, they are identified by department content and credit. (Offered upon sufficient demand)
Course Fees: $75

GEO 402. Geopolitics. (3 Credits)
Geopolitics examines the intersection of geography, international relations, and politics and explores the geographic factors that explain foreign relations, state behavior, and transnational and global issues such as military conflict, terrorism, international crime, food, and water security, energy security, and environmental degradation. Students are trained in negotiation and policy-making skills, and participate in a multi-day simulation exercise. (Fall, Even-numbered years)
Course Fees: $75

GEO 403. Nature and Society Interactions. (3 Credits)
This course involves a global analysis of human-environment issues including human's impact on the environment and the environment's impact on humans. Topics addressed may include, but are not limited to global warming, overpopulation, environmental degradation, environmental hazards and disasters, and effective natural resource use. One field trip required. (Spring)
Course Fees: $75

GEO 404. Environmental Hazards. (3 Credits)
Natural and technological events continue to impact people and places across the globe. This course draws upon hazard and disaster experiences to address the nature, impact and social responses to environmental hazards. Course focus is on the relationship between nature, society, and technology and analyzes how people and places experience, cope with, and recover from environmental hazards. (Fall)
Course Fees: $75

GEO 415. Quantitative Methods in Geoscience. (3 Credits)
Course provides an introduction to quantitative methods used in the field of geoscience to analyze and interpret geographic data and solve geographic problems. Topics include descriptive statistics, hypothesis formulation and testing, sampling strategies, correlation, regression, and spatial pattern analysis. Examples will be drawn from temporal and spatial relationships in the geosciences, as well as physical and human geography. (Fall)
Course Fees: $75

GEO 420. Urban and Regional Planning. (3 Credits)
This course introduces planning both as a profession and also as an important element of city, county, and regional government. Focusing on American planning experience, this course covers the fundamentals of spatial decision-making at various levels of government. Substantive areas covered in the course include: the legal basis of planning, organizational structure of planning agencies in the US, comprehensive planning, social issues in planning, tools of land use regulation, growth management techniques, smart growth, transportation planning, environmental planning and urban design. (Offered upon sufficient demand)
Course Fees: $75

GEO 422. Biogeography. (3 Credits)
Science of documenting and understanding spatial patterns of biological diversity. This course will introduce student to concepts used in understanding historical, ecological, and geological processes that contribute to past and present biological distributions including the historical development of biogeographic concepts, plate tectonics, evolution, phytogeography, the fossil record, niche theory, and patterns of disjunction. Applications of biogeography to contemporary issues will also be discussed including global climate change, conservation, invasive species, and human population growth. A field trip is required. Prerequisite: GEO 112 or BI 112. (Offered upon sufficient demand)
Course Fees: $75

GEO 425. Geomorphology. (3 Credits)
Field-based exploration of the landforms and features. Focus is on the examination and understanding of various landforms and the processes that shape these features. Course may require travel. Other travel expenses may be required. (Offered upon sufficient demand)
Course Fees: $75

GEO 427. Historical Geography of the United States. (3 Credits)
The role of geographic conditions in the settlement and subsequent development of the United States. Also listed as HI 472 but creditable only in field for which registered. (Offered upon sufficient demand)
Course Fees: $75

GEO 428. Geography of Beer, Wine, and Spirits. (3 Credits)
Course examines geographic factors that account for the historical development and regional variation of beer, wine, and spirits. Students are introduced to the practices of viticulture, hop and grain cultivation, enology, brewing, and distilling. The major cultural, economic, political, and environmental aspects of beer, wine, and spirits in major world regions are analyzed. No class activities will involve alcohol consumption and/or tasting. (Spring, Odd-numbered years)
Course Fees: $75

GEO 430. Tectonics. (3 Credits)
Plate tectonics is the fundamental theory in geology that illuminates dynamic Earth processes. The theory explains volcanoes, earthquakes, mountains, and the oceans. Students will investigate topics such as historical continental drift, earthquakes, subduction zones, the creation and destruction of the ocean floor, and mountain building and interpret data related to these. Three class periods; one 2-hour laboratory period per week. Prerequisite: GEO 131 or GEO 133. (Fall)
Course Fees: $75

GEO 440. Seismology. (4 Credits)
This course provides an introduction to concepts in seismology. Studies include wave propagation in the Earth as well as constraints on Earth structure and earthquake theory, development of the wave equation, source theory, and array seismic tomography. Techniques will be introduced in single wave propagation, array seismology with large data sets, seismic tomography, seismic anisotropy, introduction to inverse theory, signal processing, and reflection seismology. Applications and seismic image analysis relevant to plate tectonics, earthquakes, and the Earth's interior will be discussed. Three class periods: one 2-hour laboratory per week. Prerequisites: GEO 131, GEO 350 or department approval. (Spring)
Course Fees: $75

GEO 455W. Paleobiology. (4 Credits)
Fundamental biological problems, including speciation, systematics, evolution, extinction, functional morphology, paleoecology, and biogeography will be addressed from the perspective of the fossil record. Three class periods; one 2-hour laboratory per week. Field trips and/or term projects may be required. Also listed as BI 455W, but creditable only in the field for which registered. Prerequisite: GEO 132 or departmental approval. (Fall, Even-numbered years)
Course Fees: $75

GEO 470. Advanced Remote Sensing. (3 Credits)
This course is designed to introduce advanced concepts, applications and technologies of Remote Sensing. Instruction includes major remote sensing systems, applications, advanced digital image processing techniques. Prerequisites: GEO 184 and GEO 370. (Spring)
Course Fees: $75

GEO 475. Remote Sensing Applications. (3 Credits)
This course is designed to introduce advanced concepts, applications and technologies in Remote Sensing. These emphases include UAVs / drones, LiDAR, and hazards studies. The course may be modified according to students' interests. Prerequisites: GEO 184, GEO 370. (Spring)
Course Fees: $75

GEO 482. Web GIS. (3 Credits)
Combining the power of the internet and GIS has increased applications of GIS in e-business, e-government, e-science, and daily life. GE 474 introduces students to the basic knowledge of, and advances in, Internet/ Web GIS. The course focuses on the principles, methods, applications and state-of-the-art Web GIS techniques and platforms. Using a hands on approach, students perform GIS data operations, query maps, analyze spatial data via the internet, and ultimately develop Web GIS apps for diverse audiences. Prerequisite: GEO 384 or departmental approval. (Spring)
Course Fees: $75

GEO 484. Advanced GIS. (3 Credits)
These course focuses on advanced topics in geographic information science (GIS) including surface analysis, location analysis, network analysis, geo-computation methods and modeling, and big data analytics. Through a series of hands-on self-paced GIS lab exercises, students are introduced to 64-bit ERSI Desktop GIS Platform - ArcGIS Pro. The ultimate goal is to equip upperclassmen with industry-level advanced analytical and practical skills in GIS and spatial analysis. Prerequisites: GEO 184 and GEO 384. (Spring)
Course Fees: $75

GEO 485. GIS Applications. (3 Credits)
This course builds on the core concepts and techniques covered in the course Geographic Information Systems (GIS) to provide an advanced skill set in a number of application areas of GIS. Using a hands-on approach, students use specialized GIS software to complete projects which focus on GIS applications in business, marketing, local government, urban planning and community development, environmental management, resource planning, hazards, federal government, logistics, and other fields. Topical area(s) are determined by the instructor of record. Prerequisite: GEO 384 or departmental approval. (Fall)
Course Fees: $75

GEO 486. GIS Programming. (3 Credits)
Geographic Information Systems (GIS) are powerful computational tools for solving spatial problems. GIS programming serves the purpose of customizing GIS applications and streamlining spatial analysis by assembling functions provided by the underlying GIS platforms. This course introduces students to Model Builder and Geoprocessing script programming with Python in ArcGIS. Topics include GIS programming environment, programming syntax and styles, interface customization and a variety of GIS routines and functions that can be assembled through programming. Prerequisite: GEO 384. (Fall)
Course Fees: $75

GEO 490. Geoscience Capstone. (3 Credits)
The objective of the course is to allow the student to design and execute a research project with a geographic, geologic, sustainability or geospatial theme. Students will formulate a research question, acquire and analyze data and providing a comprehensive presentation of results. Offered primarily to seniors under the direction of a geoscience professor. The activities of the student, the timeline for completion, and evaluation for the research agenda will be determined by consultation with the professor of record for the course. (Fall, Spring, Summer)
Course Fees: $75

GEO 494. Geoscience Internship. (1-3 Credits)
Open to majors or minors in geoscience. Provides for special field experience by working in cooperation with a public or private agency for a minimum average of ten hours per week. In addition, weekly seminars will be held to evaluate the student's progress. The student will be required to maintain a daily journal regarding their work assignments, accomplishments and daily experiences. A written report must be provided to the departmental faculty at the end of the semester. Departmental approval required. International students must receive approval from the Office of International Affairs prior to course registration. (Fall, Spring, Summer)
Course Fees: $75

GEO 495. Geoscience Internship. (1-3 Credits)
Open to majors or minors in geoscience. Provides for special field experience by working in cooperation with a public or private agency for a minimum average of ten hours per week. In addition, weekly seminars will be held to evaluate the student's progress. The student will be required to maintain a daily journal regarding their work assignments, accomplishments and daily experiences. A written report must be provided to the departmental faculty at the end of the semester. Departmental approval required. International students must receive approval from the Office of International Affairs prior to course registration. (Fall, Spring, Summer)
Course Fees: $75

GEO 496W. Special Topics. (1-4 Credits)
Topics will be selected from astronomy, environmental science, geology, marine geology, meteorology, and oceanography. Departmental approval required. (Offered upon sufficient demand)
Course Fees: $75

GEO 497. Special Topics. (1-4 Credits)
A study of one or more selected topics in applied geography. Topics vary according to the needs of the student and the current professional environment. (Fall, Spring, Summer)
Course Fees: $75

GEO 498. Special Topics. (1-4 Credits)
Topics will be selected from astronomy, environmental science, geology, marine geology, meteorology, and oceanography. Departmental approval required. (Offered upon sufficient demand)
Course Fees: $75

GEO 499. Independent Study/Directed Research. (3 Credits)
Open to senior majors on approval of the department head. Provides for independent study and research under departmental determination, supervision, and evaluation. (Fall, Spring, Summer)
Course Fees: $75