

GEOGRAPHY AND EARTH SCIENCES

Department of Earth, Environment, and Physics

Geography is a science that examines physical and social processes and their interrelationships through the integrative concept of space. Earth systems science analyzes the systems and processes that shape the earth's surface including weather, climate, landforms, and hydrology. Human geography analyzes social processes such as globalization, demographics, urbanization, and construction of cultural identities. Environmental geography examines the interactions between social and physical systems. Geographers explore these processes using such tools as maps, geographic information systems, and remote sensing techniques.

Membership in Gamma Theta Upsilon, the international geography honor society, is available to distinguished students. Prospective members must have completed a minimum of 3 geography or earth science courses, have a GPA of at least 3.3 overall in those courses, and have completed at least 3 semesters of college course work. A prospective member is not required to be a geography major or minor.

Requirements for a Major

Minimum requirement for the major is completion of a six-course (20 credit) core curriculum and one of five concentrations. Students will declare a concentration in either General Geography, Environmental Studies, Geographic Information Systems, Earth System Science, or Earth Science Education. Study Away/Study Abroad is strongly encouraged for geography majors.

- Geography Honors Program
- Geography Major: Earth Science Education Concentration
- Geography Major: Earth System Science Concentration
- Geography Major: Environmental Studies Concentration
- Geography Major: General Geography Concentration
- Geography Major: Geographic Information Systems Concentration
- Geography Minor

Faculty

Allison Dunn, Professor (2007), B.A. Oberlin College; M.A., Ph.D. Harvard University

William J. Hansen, Professor (2005), B.A. State University of New York Albany; M.A. Hunter College; Ph.D. City University of New York Graduate Center

Douglas E. Kowalewski, Department Chair, Associate Professor (2012), B.S. Virginia Polytechnic Institute; Ph.D. Boston University

Laura C. Reynolds, Assistant Professor (2020), B.A. Dartmouth College; Ph.D. University of California

Alexander R. Tarr, Assistant Professor (2016), B.A. University of Southern California; Ph.D. University of California Berkeley

Courses

GE-102 Human Geography

LASC Categories: GP, HBS

Introduction to human geography, emphasizing globalization, human-environment relations, and spatial patterns of population, development, economics, politics, urbanization and culture.

Fall and Spring and every year. 3 Credits

GE-110 World Regional Geography I

LASC Categories: GP, HBS

This survey examines characteristics of land and peoples of Europe and Asia.

Every year. 3 Credits

GE-111 World Regional Geography II

LASC Categories: GP, HBS

This survey examines characteristics of land and peoples of Africa, Australia, Oceania and the Americas.

Every year. 3 Credits

GE-130 Introduction to Energy Studies

Foundation concepts in energy studies. Overview of environmental and societal implications of energy systems - past, present and future.

Every year. 3 Credits

GE-193 Special Topics in Geography for First- Year Students

LASC Categories: FYS

Introductory level course covering topics of special interest to first-year students. Offered only as a First-Year Seminar.

Every year. 3 Credits

GE-195 Special Topics

Introductory course to be offered on a trial basis. Topic to be announced in advance.

Every 2-3 years. 1-6 Credits

GE-200 Geography Literature Seminar

Prerequisites: GE-102 and GS-101 and GS-140 and GS-165

Geography majors will attend research seminars, conduct literature searches; identify relevant primary literature; read and take notes on primary literature; compile annotated bibliographies; create written syntheses.

Every year. 1 Credit

GE-210 Geography of North America

Prerequisites: one GE/GL-102, GE/GL-111, HI-111, HI-112, SO-100, UR-101.

Analysis of the physical and human geography of North America Other or on demand. 3 Credits

GE-214 Critical Cartographies: Digital Mapping and Spatial Data Visualization

Prerequisites: one course from the following: GE-102, GS-165, CM-100, CM-106, PO-130, SO-100, SO-193, SO-200, UR-101, UR-193, UR-201 GS-165.

This course introduces the fundamental theories, art and science of map making using web-based platforms. It provides an interdisciplinary approach for students to learn both practical and conceptual skills to collect, interpret and present data in the form of online, interactive maps and data visualizations.

Fall only and every 2-3 years. 3 Credits

GE-240 Energy Conservation

Concepts, technologies and policies for energy conservation.

Inefficiencies of current systems; technical and social changes for energy efficiency.

Every year. 3 Credits

GE-250 Urban Geography**LASC Categories:** HBS**Prerequisites:** GE-102 or GL/GE-102 or UR-101

World urbanization, location, and central place concepts, economy of cities, land use patterns, urban, physical, and societal environmental problems.

Every 2-3 years. 3 Credits

GE-255 Geography of Africa**LASC Categories:** DAC, GP**Prerequisites:** GE-102 or GE-111 or GL/GE-102 or GL/GE-111 or GL-150 or SO-100 or SO-110 or UR-101

Analysis of the physical and human geography of Africa.
3 Credits

GE-258 Global Environmental Change**Prerequisites:** GE-102 or GL/GE-102 or GS-101 or GL-150 or EV-150 or UR-101 or CH-106

An introduction to the science, political economy and ethics of global environmental change.

3 Credits

GE-285 Sustainable Communities**LASC Categories:** HBS, USW**Prerequisites:** GE-102 or GL/GE-102 or GL-150 or EC-110 or EC-120.

Exploration of changes in U.S. and global economic landscape, 1970 to present. Approaches to sustainable economic development.

Every 2-3 years. 3 Credits

GE-299 Special Topics

Intermediate level course to be offered on a trial basis. Topic to be announced in advance.

1-6 Credits

GE-307 American Public Lands: Environmental Issues**Prerequisites:** GE-258 or permission of instructor.

Exploration of the environmental management issues on U.S. public lands such as national parks, national forests BLM lands.

Every year. 3 Credits

GE-308 Environment and Development**Prerequisites:** GE-258

The global ecology of rich and poor environmental implications of poverty, economic development, mass consumption, globalization and demographic change.

3 Credits

GE-312 Sustainable Food Systems**Prerequisites:** GE-102 or a 200 level GE, GS, SO or UR course.

Overview of the structure, evolution, costs and benefits of the global food system. Exploration of local and global alternatives.

3 Credits

GE-341 Fundamentals of Renewable Energy**Prerequisites:** GE-130 or GE-240

Analysis of renewable energy concepts, policy and politics. Technologies and methods for renewable energy capture, storage and distribution.

Every year. 3 Credits

GE-342 Sustainable Housing And Techniques**Prerequisites:** GE-130 or GE-240

Principles of green design with an emphasis on building construction. Material and energy flows, choice of materials, designing for sustainability.

Every year. 3 Credits

GE-360 Middle East: Changing Environ

The Middle East: geography, society, economics and political structure. Other or on demand. 3 Credits

GE-400 Geography Seminar**LASC Categories:** CAP**Prerequisites:** GE-102, GS-101, GS-140, GS-216, and GE-212 or GE-315

Capstone course for geography majors. Students prepare a comprehensive term paper and present on the topic. Course includes portfolio and career development.

Every year. 3 Credits

GE-408 Directed Study: Geography

Directed study offers students the opportunity to complete an existing course with an established syllabus under the direction and with the agreement of a faculty member.

3 Credits

GE-410 Independent Study: Geography

Opportunity for advanced students to pursue a topic of special interest involving extensive reading, experimentation, and research.

Every year. 1-6 Credits

GE-420 Advanced Geoscience Research and Fieldwork

Lab and or field-based research on a specific geoscience topic under supervision of a faculty member. [Permission of instructor.]

Fall and Spring and every year. 1-6 Credits

GE-450 Readings and Directed Research

Directed study on selected topics; open to senior majors.

Fall and Spring and every 2-3 years. 3 Credits

GE-460 Internship: Geography

Students assigned to various government and private agencies under joint supervision of agency and faculty. Major GPA of 3.0 or above required.

Fall and Spring and other or on demand. 1-6 Credits

GE-470 Selected Topics: Geography**Prerequisites:** GE-102 or GL/GE-102

Topic or subject to be announced in advance; topic to be relevant to student needs and interests and availability of professor.

Spring only and every 2-3 years. 1-6 Credits

GS-101 Physical Geography**LASC Categories:** NSP

Geographic principles of location; characteristics of landforms, soil, climate, minerals, water, flora, and fauna. [Formerly GE101.]

Fall and Spring and every year. 3 Credits

GS-110 Meteorology**LASC Categories:** NSP, QAC

Weather elements, frontal storms, air mass characteristics, winds, temperature, precipitation, and pressure patterns throughout the world; weather instruments, forecasting.

Every year. 3 Credits

GS-140 Physical Geology**LASC Categories:** LAB, NSP, QAC

Introduction to geological science: rocks and minerals, internal and external geologic processes, topographic map and air photo analysis, local field study. Three hours lecture and two hours laboratory per week.

Fall and Spring and every year. 4 Credits

GS-150 Humans and the Cold Regions**LASC Categories:** NSP

Winter intersession. Examines earth's cold regions, including physical geography, cryosphere's role in earth systems, human adaptations.

Includes outdoor activity.

Fall and Spring and every year. 3 Credits

GS-165 Geographic Information Systems I**LASC Categories:** NSP, NLL

Introduction to the use of geospatial technologies including geographic information systems and GPS.

Every year. 4 Credits

GS-193 First Year Seminar in Geography**LASC Categories:** FYS

Introductory level course covering topics of special interest to first-year students. Offered only as a First-Year Seminar.

Every year. 3 Credits

GS-195 Special Topics

Introductory course to be offered on a trial basis. Topic to be announced in advance.

Every 2-3 years. 1-6 Credits

GS-210 Geomorphology**LASC Categories:** NLL, QAC**Prerequisites:** GS-101 or GS-140 and an accuplacer score of 3 or one college level Math course.

The study of landforms and the processes that form them. Labs focus on interpretation of maps and aerial photographs. Three hour lecture and two hour laboratory.

Every year. 4 Credits

GS-217 Spatial Data Methods**LASC Categories:** QR**Prerequisites:** GS-165

Introduction to the methods used in GIS programming and quantitative geospatial analysis.

Spring only and every year. 3 Credits

GS-218 Introduction to Remote Sensing**LASC Categories:** NSP**Prerequisites:** GS-101 or GS-140 or EV-150 or BI-101 or BI-140

Introduction to the use and analysis of remotely sensed images such as aerial photographs and satellite imagery.

Every year. 3 Credits

GS-225 Oceanography**LASC Categories:** QAC**Prerequisites:** GS-101 or GS-140 or GS-110 or EV-150

The principles of physical, chemical, biological, and geological oceanography.

Spring only and every year. 3 Credits

GS-230 Biogeography**Prerequisites:** GS-101 or GS-110 or BI-101 or BI-140

The distribution patterns of plants and animals, processes affecting this distribution, and how these patterns change in space and time.

Every 2-3 years. 3 Credits

GS-235 Contemporary Climate Change**Prerequisites:** GS-101 or GS-110 or EV-150 or CH-106.

The global climate system, factors influencing climate, recent climate change and the role of human activity.

Every 2-3 years. 3 Credits

GS-240 Coastal Environments**Prerequisites:** GS-101 or GS-140

Summer session course examining the physical geography of coastal environments including human impacts. Includes field trips.

Every year. 3 Credits

GS-245 Planetary Geology**Prerequisites:** GS-140 or PY-101

Solar system formation and evolution with emphasis on planetary interiors and surface features.

3 Credits

GS-250 Hydrology**Prerequisites:** GS-101 or GS-140 or GS-110 or EV-150

Hydrologic processes, their estimation and measurement. Includes precipitation, evaporation, runoff, groundwater and water resources management.

Other or on demand. 3 Credits

GS-260 Introduction to Soil Science**Prerequisites:** GS-101 or GS-140

The study of the formation, processes, classification and composition of soils with emphasis on environmental applications, including watershed delineation.

Every year. 3 Credits

GS-270 The Sedimentary Record**LASC Categories:** NLL**Prerequisites:** GS-140 and GS-101 or GS-110

Theoretical, laboratory, and field investigations of modern sedimentary processes, depositional environments, the sedimentary record of earth history, principals of stratigraphy. 3 hours lecture and 3 hours lab.

Every 2-3 years. 4 Credits

GS-299 Special Topics

Intermediate level course to be offered on a trial basis. Topic to be announced in advance.

1-6 Credits

GS-318 Geographic Information Systems II**Prerequisites:** GS-165

Advanced production of digital choropleth maps on PCs using a GIS vector oriented software.

Fall and Spring and every year. 3 Credits

GS-328 Digital Landscape Analysis**Prerequisites:** GS 165 and one 200 level GS course.

Computer based methods of representing, storing and analyzing landscape features. Explores technologies such as LiDAR and Unmanned Aerial Vehicles for gathering landscape data and the use of geospatial tools to analyze and represent landscape features. 3 hours of lecture and 2 hours of lab.

Alternating and every year. 4 Credits

GS-335 Hydrogeology**Prerequisites:** GS-140 or GS-250 and a math placement test score of 3, or a college level math course.

Underground water and its movement. Aquifer identification and test; wells, contamination and remediation, ground water as a geologic agent.

Fall only and other or on demand. 3 Credits

GS-338 Atmospheric Sciences

Prerequisites: # GS-101 # Take CH-120 or CH-112;
Atmospheric Science introduces students to the physics and chemistry of the atmosphere, and examines the science behind current issues such as global climate change, air pollution, and reductions in stratospheric ozone. Atmospheric physics includes both weather (clouds, rain, winds) and climate (weather averaged over longer timescales, as well as trends in climate over time). Atmospheric chemistry investigates processes controlling the chemical composition of the atmosphere, including related processes in the and biosphere, as well as anthropogenic pollution (smog, stratospheric ozone loss, etc.)
Every 2-3 years. 3 Credits

GS-340 Special Topics: Advanced Earth Science

Advanced course to be offered on a trial basis. Topic to be announced in advance.
Other or on demand. 1-6 Credits

GS-348 Fundamentals of Earth Data Analytics

LASC Categories: NSP, QR, QAC
Prerequisites: GS-101 Take 1 course; From Subjects GS; From Levels 200;
The theory and practice of data analytics using remote sensing and in-situ earth observations, and communicating the science.
Fall only and every year. 4 Credits

GS-365 Climate Change Over Earth History

LASC Categories: WAC
Prerequisites: EN-102 and either GS-140 or GS-235.
A record of climate change on Earth; methods used to reconstruct past climates; relevance of past changes to the current climate.
Every 2-3 years. 3 Credits

GS-370 Lakes & Environmental Change

LASC Categories: WAC, NLL
Prerequisites: GS-140 Take one earth science course at the 200-level or above.
Modern physical, biogeochemical, and sedimentary processes in lakes. Lake sediments as archives of past climate and environmental change. Includes fieldwork.
4 Credits

GS-400 Senior Seminar

LASC Categories: CAP
Prerequisites: GE-102 GS-101 GS-140 GS-165 and GE-200 and senior standing
Capstone course for geography majors. Students prepare a comprehensive term paper and present on the topic. Course includes portfolio and career development.
Spring only and every year. 3 Credits

GS-408 Directed Study: Geography

Directed study offers students, who because of unusual circumstances may be unable to register for a course when offered, the opportunity to complete an existing course with an established syllabus under the direction and with agreement from a faculty member.
3-4 Credits

GS-410 Independent Study: Geography

Opportunity for advanced students to pursue a topic of special interest involving extensive reading, experimentation, and research.
Every year. 1-4 Credits

GS-420 Advanced Geoscience Research and Fieldwork

Lab and or field-based research on a specific geoscience topic under supervision of a faculty member. [Permission of instructor.]
Fall and Spring and every year. 1-6 Credits

GS-450 Readings and Directed Research

Directed study on selected topics; open to senior majors.
Fall and Spring and every 2-3 years. 3 Credits

GS-460 Internship: Geography

Students assigned to various government and private agencies under joint supervision of agency and faculty. Major GPA of 3.0 or above required.
Fall and Spring and other or on demand. 1-6 Credits

GS-470 Selected Topics: Geography

Prerequisites: GS-101 and one course from GS-210, GS-225, GS-230, GS-235, GS-250, GS-260, GS-290 or GS-310
Topic or subject to be announced in advance; topic to be relevant to student needs and interests and availability of professor.
Spring only and every 2-3 years. 1-6 Credits