

## DEPARTMENT OF GEOGRAPHY AND GEOSCIENCES

### OVERVIEW

<https://www.uvm.edu/cas/geography> (<https://www.uvm.edu/cas/geography/>)

Undergraduate and graduate students in the Department of Geography & Geosciences are travelers of the world, lovers of the outdoors, appreciators of diverse cultures, and close observers of our environs. Students and faculty have an insatiable curiosity for human behavior, the natural world, and their interconnectivity. The work of students and faculty in the department spans the physical, social, and human sciences, and Geography & Geosciences students pursue careers in fields as diverse as their passions.

Graduates go on to be scientists and scholars, humanitarians and government officials, environmental organizers and activists, innovators and business leaders. They are working around the globe today, tackling urgent challenges like climate change, biodiversity, natural disaster, human migration, and geopolitical conflict. Some are getting their hands dirty in the field and others are crafting public policy in the halls of Congress.

### MAJORS

#### GEOGRAPHY AND GEOSCIENCES MAJOR

Geography B.A. (<http://catalogue.uvm.edu/undergraduate/artsandsciences/geo/geoba/>)

### MINORS

#### GEOGRAPHY AND GEOSCIENCES MINORS

Geography Minor (<http://catalogue.uvm.edu/undergraduate/artsandsciences/geo/geominor/>)

Geospatial Technologies Minor (<http://catalogue.uvm.edu/undergraduate/artsandsciences/geo/geospatialtechnologiesminor/>)

### GRADUATE

Geology M.S.

See the online Graduate Catalogue (<http://catalogue.uvm.edu/graduate/>) for more information

#### Geography Courses

##### **GEOG 040. Weather, Climate & Landscapes. 0 or 3 Credits.**

Introduction to the fundamentals of weather, climate, landform evolution, and plant distribution using a systems approach. Focus on variation in processes over space and time.

##### **GEOG 050. D2:SU:Global Envmnts& Cultures. 3 Credits.**

Introduction to Geography from global, place-based, cultural, and socio-environmental perspectives.

##### **GEOG 060. D1:Geography/Race&Ethnic in US. 3 Credits.**

Examination of the ways in which spatial and locational processes shape and are shaped by ethnic and racial identities, struggles, and relationships.

##### **GEOG 061. Place, Lndscape, Environment VT. 3 Credits.**

Introduction to Vermont's physical geographies, environmental histories, and socio-environmental problems. The course also considers Vermont's global and regional connections.

##### **GEOG 070. SU: Society, Place, and Power. 3 Credits.**

An introduction to human geography: a spatial perspective on the study of population and migration, globalization, uneven economic development, geopolitics, cities and rural spaces, cultural meanings of place, and struggles for spatial justice.

##### **GEOG 081. Geospatial Cncpt&Visualization. 0 or 3 Credits.**

Introduction to the quantitative and qualitative geospatial concepts and tools used in Cartography, Geographic Information Science (GISci), Remote Sensing, and geographic research. Data creation, analysis, and map design using existing digital map resources, topographic/satellite data, and alternative mapping methodologies.

##### **GEOG 085. Imaging the Earth. 3 Credits.**

Geographic analysis and evaluation of aerial imagery produced by remote sensors (satellites, airplanes, drones) and its relationship to environmental problems in the social and physical sciences.

##### **GEOG 091. Internship. 1-3 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

##### **GEOG 095. Special Topics in Geography. 1-18 Credits.**

See Schedule of Courses for specific titles.

##### **GEOG 096. Special Topics in Geography. 1-18 Credits.**

See Schedule of Courses for specific titles.

##### **GEOG 097. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

##### **GEOG 099. First-Year Seminar. 3 Credits.**

Seminar for first-year students.

##### **GEOG 140. Biogeography. 3 Credits.**

Examines geographic distribution of organisms, emphasizing the biotic and abiotic factors that explain temporal and spatial patterns of species, population, and community distributions. Prerequisite: GEOG 040.

##### **GEOG 143. Climatology: Concepts & Tools. 3 Credits.**

Quantitative analysis of the atmospheric-land-water processes that determine climate variability and change at the local to global scales. Historical and near real-time data manipulation via statistics, weather map interpretation, climate indices, modeling and remote sensing. Prerequisite: GEOG 040.

**GEOG 144. Geomorphology. 0 or 4 Credits.**

Examines, using lectures, labs, and field-based independent study research projects, processes which change Earth's surface and the history of landscape development. Considers fundamental geologic constraints on environmental problems. Prerequisite: GEOL 001, GEOL 005, GEOL 007, or GEOL 055. Cross-listed with: GEOL 151.

**GEOG 145. SU: Geography of Water. 3 Credits.**

Examination of the spatial dimensions of water distribution from local to global scales, and the social, political, and economic dimensions of its use. Same as NR 102.

**GEOG 148. Global Environmental Change. 3 Credits.**

Explores changes in natural processes and anthropogenic activities that influence the atmosphere, hydrosphere, and biosphere individually and through interactions and feedbacks from a distinctly spatial perspective employed by physical geographers. Prerequisite: GEOG 040 or ENSC 001. Cross-listed with: ENSC 148.

**GEOG 150. Geography of Africa. 3 Credits.**

The character and development of the contemporary cultural, economic, and political patterns of the area against the background of its physical and resource base. Prerequisite: GEOG 050 or GEOG 070.

**GEOG 153. The Circumpolar Arctic. 3 Credits.**

Examines the physical and human geography of the circumpolar Arctic. Prerequisite: GEOG 040 or GEOG 050.

**GEOG 160. The US: Place, Power, Politics. 3 Credits.**

Study of the United States through diverse perspectives in Human Geography. Examines how race, class, and gender relations shape social and political landscapes in historical and contemporary contexts. Emphasizes social/environmental justice and geographic approaches to thinking about political power. Prerequisite: GEOG 050 or GEOG 070.

**GEOG 170. Historical Geography. 3 Credits.**

Examination of the tools, techniques, and perspectives used in studying the historic development of places and landscapes. Vermont and other North American case studies. Prerequisite: GEOG 050 or GEOG 070 or HST 012. Cross-listed with: HST 170.

**GEOG 173. Political Ecology. 3 Credits.**

Human-environment interactions under globalization. The politics of using particular ideas of 'nature' for the benefit of some and to the detriment of others in spaces from local backyards to global contexts. Environmental movements and livelihoods. Prerequisites: GEOG 050 or GEOG 070 or ENVS 002; and ENSC 001 or ENVS 001 or GEOG 040 or GEOL 001 or GEOL 007 or GEOL 055 or NR 103. Cross-listed with: ENVS 143.

**GEOG 174. Rural Geography. 3 Credits.**

Global, national and local scale study of rural landscapes, cultures, social issues, and environmental concerns. Prerequisite: GEOG 050 or GEOG 070.

**GEOG 175. Urban Geography. 3 Credits.**

Analysis of the morphology, function and social structure of cities. Consideration of the nature, history and theories of urban growth and development. Prerequisite: GEOG 050 or GEOG 070.

**GEOG 178. Gender, Space & Environment. 3 Credits.**

Examination of the ways in which human relationships to both the built and the natural environment are mediated by gender. Prerequisite: Six hours in Geography or Gender, Sexuality, & Women's Studies. Cross-listed with: GSWS 170.

**GEOG 184. Geog Info: Cncpts & Applic. 0 or 3 Credits.**

Systematic approach to important geographical concepts (including distance, shape, scale dispersion) structured around the use of Geographical Information Systems (GIS) as an analytical tool. May not be taken for credit concurrently with, or following receipt of, credit for NR 143. Prerequisite: Minimum Sophomore standing.

**GEOG 185. Remote Sensing. 0 or 3 Credits.**

Examinations of the earth's surface from aerial photographs and satellite imagery. Emphasis is on image interpretation, classification, change detection, multivariate analysis (e.g. principal components analysis). Prerequisite: Sophomore standing. Cross-listed with: FOR 146, NR 146.

**GEOG 186. Qualitative Research Methods. 3 Credits.**

Covers data collection, analysis, and representation techniques for qualitative data with emphasis on critical perspectives and cutting-edge practices, such as participatory mapping and mixed-methods approaches. Prerequisite: Sophomore standing.

**GEOG 190. International Field Studies. 3 Credits.**

Field course abroad. Intensive study of the geography of a country or region, with attention to related issues. Prerequisite: Minimum Sophomore standing.

**GEOG 191. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion. Prerequisite: Minimum Junior standing.

**GEOG 195. Intermediate Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GEOG 196. Intermediate Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GEOG 197. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GEOG 198. Undergraduate Research. 1-18 Credits.**

Undergraduate student work on individual or small research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GEOG 199. Teaching Assistantship. 1-3 Credits.**

Undergraduate student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion.

**GEOG 244. Adv Top: Global Change. 3 Credits.**

Advanced offerings on topics related to past, present and future changes in the environment, including natural and human-induced changes in the atmosphere, hydrosphere and biosphere. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Vary with course content; Minimum Junior standing.

**GEOG 245. Adv Top: Human Env Interactions. 3 Credits.**

Advanced offerings on various manifestations of social-environmental relationships. Possible topics include sustainable development, environmental justice, and urban ecology. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisites: Vary with course content; Minimum Junior standing.

**GEOG 246. Adv Top: Climate & Water Resource. 3 Credits.**

Analysis of regional climatology, paleoclimatology, hydroclimatological hazards, or fluvial geomorphology. Topics include droughts, severe weather, climate change, floods and floodplain management, mountain and lowland rivers. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisites: Vary with course content; minimum Junior standing.

**GEOG 272. Adv Top: Space, Power, Identity. 3 Credits.**

Advanced offerings on topics related to the spatial regulation and geographic construction of social identity, paying particular attention to race, gender, and sexuality. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisites: Vary with course content; minimum Junior standing.

**GEOG 274. Adv Top: Critical Urban & Soc Geo. 3 Credits.**

Advanced offerings in urban and critical social geography. Possible topics include social justice and the city, human rights, geographies of social control. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisites: Vary with course content; minimum Junior standing.

**GEOG 281. Advanced Topics: Remote Sensing. 3 Credits.**

Applied, capstone course; remote sensing techniques will be applied to atmospheric issues at varying temporal and spatial scales, as well as to quantifying the influence of topography, vegetation, and land-water boundaries. May be repeated for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisites: GEOG 040; GEOG 143, GEOG 185, or NR 146 recommended.

**GEOG 287. Spatial Analysis. 3 Credits.**

Analysis of spatial pattern and interaction through quantitative statistical models; application of GIS to statistical modeling. Prerequisite: GEOG 081 or GEOG 184 or NR 143 or ENSC 130 or GEOL 185.

**GEOG 291. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**GEOG 295. Advanced Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GEOG 296. Advanced Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GEOG 297. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GEOG 298. Undergraduate Research. 1-18 Credits.**

Undergraduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GEOG 299. Teaching Assistantship. 1-3 Credits.**

Undergraduate student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion.

**Geology Courses****GEOL 001. Earth System Science. 0 or 4 Credits.**

Introduction to the earth as a closed system, the cycling of materials and energy within it, and its interactions with the hydrosphere and atmosphere. No credit for GEOL 001 and either GEOL 005, GEOL 006, GEOL 008, or GEOL 011.

**GEOL 005. Mt - Lake: Geol Lake Chmpln Bsn. 4 Credits.**

Scientific principles applied to the geology and geologic history of the Lake Champlain Basin. Credit not given for both GEOL 005 and either GEOL 001, GEOL 006, GEOL 008, or GEOL 011.

**GEOL 006. SU: How the Earth Works. 3 Credits.**

Introduces how the Earth works through examination of interactions between geosphere, hydrosphere, atmosphere and biosphere that produce Earth's climates and environments. Credit not given for both GEOL 006 and either GEOL 001, GEOL 005, GEOL 008, or GEOL 011.

**GEOL 007. SU: Earth Hazards. 0 or 3 Credits.**

Understand geological and societal causes of death and destruction by earthquakes, landslides, floods, volcanoes, storms, and avalanches around the world.

**GEOL 011. Geology Using Google Earth. 3 Credits.**

An illustration of dynamic processes that have shaped our planet, and views the results of those processes using Google Earth. Credit not given for both GEOL 011 and either GEOL 001, GEOL 005, GEOL 006, or GEOL 008.



**GEOL 055. Environmental Geology. 0 or 4 Credits.**

Introduction to geologic processes and materials pertinent to environmental problems: ground water movement, supply, and contamination, waste disposal, flooding, subsidence, and landslides. Local field trips. Designed for intended Natural Science majors.

**GEOL 090. Internship. 1-3 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**GEOL 095. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GEOL 096. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GEOL 097. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GEOL 101. Field Geology. 4 Credits.**

Geological evolution of western Vermont as seen through actual field mapping in the Burlington area. Specifically designed for sophomores majoring or minoring in Geology or related sciences. Prerequisite: GEOL 001 or GEOL 005 or GEOL 055.

**GEOL 110. SU: Earth Materials. 0 or 4 Credits.**

Exploration of the building blocks of the Earth (elements, minerals, and rocks) and their connection to the Earth's past, present, and possible sustainable future. Prerequisite: GEOL 001 or GEOL 005 or GEOL 055.

**GEOL 116. Glacial Geology. 4 Credits.**

Examines the Dynamics of glacier flow and landforms glaciers produce. Lectures, labs, and field trips emphasize processes in both modern and ancient glaciers. Prerequisite: GEOL 001, GEOL 005, or GEOL 055.

**GEOL 135. Environmental Geochemistry. 4 Credits.**

Application of many basic principles of chemistry to selected environmental problems in geosciences (e.g. acid mine drainage, carbon dynamics, weathering, and contaminant metal mobility). Prerequisite: CHEM 031.

**GEOL 151. Geomorphology. 0 or 4 Credits.**

Examines, using lectures, labs, and field-based independent study research projects, processes which change Earth's surface and the history of landscape development. Considers fundamental geologic constraints on environmental problems. Prerequisite: GEOL 001, GEOL 005, GEOL 007, OR GEOL 055. Cross-listed with: GEOG 144.

**GEOL 185. Geocomputing. 3 Credits.**

Introduction to a variety of computing tools commonly used in sciences and geosciences in particular. Hands-on experience is at the heart of the teaching of this class; real data are used to resolve specific problems. Prerequisite: Sophomore standing.

**GEOL 190. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**GEOL 191. Teaching Assistantship. 1-3 Credits.**

Undergraduate student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion.

**GEOL 195. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GEOL 196. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GEOL 197. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GEOL 198. Undergraduate Research. 1-18 Credits.**

Undergraduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GEOL 201. Advanced Field Geology. 3 Credits.**

Advanced field mapping techniques, analysis of field data, preparation of geological maps and reports. Prerequisite: GEOL 101.

**GEOL 231. Petrology. 4 Credits.**

The course covers the scope and methods of igneous, sedimentary and metamorphic petrology, and the geologic environments and processes relevant to the major rock types. Prerequisite: GEOL 110.

**GEOL 234. Global Biogeochemical Cycles. 3 Credits.**

Integrated perspective on biogeochemical cycles describing the transformation and movement of chemical substances in the natural environment, as seen on the global context. Prerequisite: CHEM 031.

**GEOL 235. Geochemistry of Natural Waters. 3 Credits.**

Basic concepts of chemical equilibria applied to natural waters, including thermodynamics, pH, oxidation-reduction, weathering, and solution equilibria. Prerequisite: Prerequisite: CHEM 032.

**GEOL 240. Tectonics. 3 Credits.**

Applications of igneous and metamorphic petrology to problems in tectonophysics, including petrochemistry of the earth's crust and upper mantle and the internal structure of orogenic belts. Prerequisites: GEOL 101, GEOL 110.

**GEOL 246. X-ray Diffractometry. 3 Credits.**

This course focuses on identification and characterization of materials using X-ray diffractometry. The course will include exercises using a modern powder diffractometer. Prerequisite: CHEM 032.

**GEOL 249. Crystal Chemistry. 3 Credits.**

A hands-on course involving crystal structure solutions, wherein grading will be based on various class projects, not examinations. Students will gain a deep understanding of how Nature arranges matter on Earth, and how to determine the atomic arrangement of compounds using X-ray diffractometry. Prerequisites: GEOL 110 or GEOL 246; or Chemistry, Physics, or Material Science major and minimum Junior standing; or graduate standing in Chemistry, Physics, or Material Science.

**GEOL 260. Structural Geology. 0 or 4 Credits.**

Examines processes and problems concerning the mechanical behavior of the Earth's crust and surface. Includes rock deformation stress, strain, and the interpretation of geological structures.

Prerequisites: GEOL 101, GEOL 110.

**GEOL 263. Geochronology. 3 Credits.**

This course will survey the basic concepts of radioactive decay, mass spectrometry, and isotopic systems commonly used to quantify the timing of geologic events. Prerequisite: GEOL 110.

**GEOL 290. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**GEOL 291. Capstone: Fall Geol Seminars. 1 Credit.**

Seminar on current topics in the geosciences, including attendance at weekly departmental visiting speaker series, reading and analysis of related scholarly publications, oral/written reports. Prerequisite: Geology majors and Geology minors only.

**GEOL 292. Capstone: Spring Geol Seminars. 1 Credit.**

Seminar on current topics in the geosciences, including attendance at weekly departmental visiting speaker series, reading and analysis of related scholarly publications, oral/written reports. Prerequisite: Geology majors and Geology minors only.

**GEOL 293. Teaching Assistantship. 1-3 Credits.**

Undergraduate student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion.

**GEOL 295. Advanced Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GEOL 296. Advanced Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GEOL 297. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GEOL 298. Undergraduate Research. 1-18 Credits.**

Undergraduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.