# Geography

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Students who major in geography develop skills in understanding the complex social, economic, political, and environmental processes that shape places around the world. The Department of Geography offers courses that span a broad array of subjects, such as food systems, tourism, the role of borders, climate change, river systems, and invasive species. The geographic perspective provides a critical look at social, environmental, and policy issues relevant in today's world. Students may also develop skills in geographic information systems (GIS), cartography, and spatial analysis that provide them with in-demand tools to apply in their postgraduate career.

Geography provides for varied perspectives about places to help students develop into critical thinkers, efficient communicators, and problem-solvers. Geography can often enhance other fields, including spatial data science and technology, history, public policy and management, earth sciences, political science, sociology, and environmental studies. For more information, visit https://geography.uoregon.edu/.

## InfoGraphics Lab

**James E. Meacham, Executive Director**
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infographics.uoregon.edu

The InfoGraphics Lab is a mapping and geospatial technologies facility located in the Department of Geography (http://geography.uoregon.edu). The laboratory works on a variety of supported projects with faculty members, researchers, and government agencies. The application of cartographic design and geographic information science is its focus. It supports research, instruction, and public service activities at the university. Graduate and undergraduate students may be employed on lab projects.

## Faculty

Patrick J. Bartlein, professor (climatology, paleoclimatology, data analysis and visualization). BA, 1972, MS, 1975, PhD, 1978, Wisconsin, Madison. (1982)

Daniel P. Buck, associate professor (political economy, food geographies, East Asia). BA, 1987, California State, Chico; MA, 1996, PhD, 2002, California, Berkeley. (2008)

Shaul E. Cohen, associate professor (political, environmental, cultural; Middle East). BA, 1983, Clark; MA, 1987, PhD, 1991, Chicago. (1996)

Mark Fonstad, associate professor (geomorphology, remote sensing, hydrology). BA, 1995, Wisconsin, Madison; MA, 1997, Ohio; PhD, 2000, Arizona State. (2011)

Daniel Gavin, professor (biogeography, paleoecology, climate change). BA, 1992, Dartmouth College; MS, 1997, PhD, 2000, Washington (Seattle). (2006)

Donald G. Holtgrieve, adjunct assistant professor (environmental planning, resource management, watershed issues). BA, 1963, San Diego State; MA, 1970, California State; PhD, 1972, Oregon (2002)

Leigh Johnson, courtesy assistant professor (political ecology, development, economic geography). BA, 2003, Columbia; PhD, 2011, California, Berkeley. (2016)

Nicholas P. Kohler, instructor (geographic information systems, cartography, human-environmental relations). BA, 1989, Princeton; MA, 1997, PhD, 2005, Oregon. (2006)

Amy K. Lobben, professor (geographic information system science, behavioral geography, data visualization). BA, 1991, MA, 1996, Georgia State; PhD, 1999, Michigan State. (2004)

W. Andrew Marcus, professor (hydrology, fluvial geomorphology, remote sensing); Tykeson Dean of Arts and Sciences. BS, 1978, Stanford; MA, 1983, Arizona State; PhD, 1987, Colorado. (2001)

Patricia F. McDowell, professor (geomorphology, river management and restoration, Quaternary environments). BA, 1971, MA, 1977, Illinois Institute of Technology; PhD, 1980, Wisconsin, Madison. (1982)

Leslie McLees, instructor (urban geography, urban agriculture, Africa); undergraduate advisor. BS, 1999, Washington State; MA, 2004, Hawaii, PhD, 2012, Oregon. (2014)

James E. Meacham, senior research associate (geographic information systems, cartography, atlas design and production); executive director, InfoGraphics Lab. BS, 1984, MA, 1992, Oregon. (1992)

Katharine Meehan, associate professor (urban political ecology, water policy, Mexico). BA, 1999, Oregon; MS, 2005, Oxford; PhD, 2010, Arizona. (2010)

Joanna Merson, research assistant (cartography, data-visualization, GIS). BSc, 2009, Victoria; MA, 2013, Arizona State. (2017)

Alexander B. Murphy, professor (political and cultural geography, Europe, law and geography); James F. and Shirley K. Rippey Chair in Liberal Arts and Sciences. BA, 1977, Yale; JD, 1981, Columbia; PhD, 1987, Chicago. (1987)

Laura Pulido, professor (critical ethnic studies, environmental justice, Chicano studies). See **Ethnic Studies**.

Hedda R. Schmidtke, assistant professor (geographic information science, scale). BS, 1999, PhD, 2005, Hamburg. (2015)

Lucas Silva, assistant professor (terrestrial ecology, biogeochemistry, biogeography). See **Environmental Studies**.

Lynn Songer, courtesy instructor (geography education). BS, 1993, MS, 1998, PhD, 2007, Oregon. (2007)

Alethea Y. Steingisser, research assistant (cartography and graphic design, geographic information systems); cartographic project manager, InfoGraphics Lab. BS, 2002, California State, Northridge; MS, 2006, Oregon. (2006)

Xiaobo Su, associate professor (cultural politics, tourism and urban conservation, China). BArch, 2000, Southeast University (Nanjing); MSc, 2003, Sun Yat-sen University; PhD, 2007, National University of Singapore. (2007)

Peter A. Walker, professor (cultural and political ecology, US West, Africa). BA, 1986, California, Berkeley; MS, 1990, Harvard; PhD, 1997, California, Berkeley. (1997)

## Emeriti

Stanton A. Cook, professor emeritus. AB, 1951, Harvard; PhD, 1960, California, Berkeley. (1960)

Carl L. Johannessen, professor emeritus. BA, 1950, MA, 1953, PhD, 1959, California, Berkeley. (1959)

Alvin W. Urquhart, professor emeritus. AB, 1953, MA, 1958, PhD, 1962, California, Berkeley. (1960)

Ronald Wixman, professor emeritus. BA, 1968, Hunter; MA, 1972, Columbia; PhD, 1978, Chicago. (1975)

*The date in parentheses at the end of each entry is the first year on the University of Oregon faculty.*

- **Bachelor of Arts in Geography**
- **Bachelor of Science in Geography**
- **Bachelor of Arts in Spatial Data Science and Technology**
- **Bachelor of Science in Spatial Data Science and Technology**
- **Minor in Geography**

# Undergraduate Studies

The Department of Geography offers bachelor of arts and bachelor of science degrees with majors in geography and spatial data science and technology. Undergraduate students in the geography major develop an awareness of the natural and cultural landscapes of several regions of the world and investigate the processes that form them; students in the spatial data science and technology major develop skills in data sciences and geospatial technologies. Lower-division courses are open to any student at the university. For students transferring to the university in their third year, preparation in introductory college geography courses is desirable.

## Geography

An undergraduate major in geography follows a broadly based general degree program. Both bachelor of arts (BA) and bachelor of science (BS) degrees are offered in the department. To achieve depth in a particular subfield of geography, electives are chosen from one of six specializations:

1. environment, economy, and sustainability
2. geographic education
3. water science and policy
4. culture, politics, and place
5. environmental systems
6. geographic information system science

Although a degree in geography is a liberal arts degree, many graduates have found related vocational opportunities in government or private employment, principally in planning, environmental research, cartography, or geographic information system science.

## Bachelor of Arts in Geography: Degree Requirements

| Code | Title | Credits |
|---|---|---|
| **Fundamentals: Introductory Core** | | |
| GEOG 141 | The Natural Environment | 4 |
| GEOG 142 | Human Geography | 4 |
| GEOG 181 | Our Digital Earth | 4 |
| **Fundamentals: Advanced Core** | | |
| GEOG 391 | Social Science Inquiry and Research | 4 |
| Select one of the following: | | 4 |
| GEOG 201 | World Regional Geography | |
| GEOG 202 | Geography of Europe | |
| GEOG 204 | Geography of Russia and Neighbors | |
| GEOG 205 | Geography of Pacific Asia | |
| GEOG 208 | Geography of the United States and Canada | |
| GEOG 209 | Geography of the Middle East and North Africa | |
| GEOG 214 | Geography of Latin America | |
| GEOG 281 | The World and Big Data | |
| GEOG 471 | North American Historical Landscapes | |
| GEOG 475 | Advanced Geography of Non-European-American Regions: [Topic] | |
| **Breadth Requirements: Geographic Information System Science** | | 4 |
| Select one of the following: | | |
| GEOG 481 | GIScience I | |
| GEOG 482 | GIScience II | |
| GEOG 485 | Remote Sensing I | |
| GEOG 486 | Remote Sensing II | |
| GEOG 490 | GIScience: [Topic] | |
| GEOG 491 | Advanced Geographic Information Systems | |
| GEOG 493 | Advanced Cartography | |
| GEOG 494 | Spatial Analysis | |
| GEOG 495 | Geographic Data Analysis | |
| GEOG 496 | Location-Aware Systems | |
| GEOG 497 | Qualitative Methods in Geography | |
| GEOG 498 | Geospatial Project Design | |
| **Breadth Requirements: Biophysical Geography** | | 4 |
| Select one of the following: | | |
| GEOG 321 | Climatology | |
| GEOG 322 | Geomorphology | |
| GEOG 323 | Biogeography | |
| GEOG 360 | Watershed Science and Policy | |
| GEOG 361 | Global Environmental Change | |
| GEOG 421 | Advanced Climatology: [Topic] | |
| GEOG 423 | Advanced Biogeography: [Topic] | |
| GEOG 425 | Hydrology and Water Resources | |
| GEOG 427 | Fluvial Geomorphology | |
| GEOG 430 | Long-Term Environmental Change | |

| | | |
|---|---|---|
| GEOG 433 | Fire and Natural Disturbances | |
| ENVS 477 | Soil Science [1] | |
| **Breadth Requirements: Human Geography** | | 4 |
| Select one of the following: | | |
| GEOG 341 | Population and Environment | |
| GEOG 342 | Geography of Globalization | |
| GEOG 343 | Society, Culture, and Place | |
| ASIA 425 | Asian Foodways [1] | |
| GEOG 441 | Political Geography | |
| GEOG 442 | Urban Geography | |
| GEOG 444 | Cultural Geography | |
| GEOG 448 | Tourism and Development | |
| ENVS 450 | Political Ecology [1] | |
| ENVS 455 | Sustainability [1] | |
| GEOG 461 | Environmental Alteration | |
| GEOG 463 | Geography, Law, and the Environment | |
| GEOG 465 | Environment and Development | |
| GEOG 467 | International Water Policy | |
| GEOG 468 | Contemporary Food Systems | |
| GEOG 471 | North American Historical Landscapes | |
| GEOG 475 | Advanced Geography of Non-European-American Regions: [Topic] | |
| ASIA 480 | Chinese Economy: Transition, Development, Globalization [1] | |
| **Electives** | | |
| Three courses from one specialization (see specialization lists) [2] | | 12 |
| **Additional Requirements** | | 2 |
| GEOG 401 | Research: [Topic] | |
| GEOG 403 | Thesis | |
| GEOG 406 | Field Studies: [Topic] | |
| GEOG 409 | Practicum: [Topic] | |
| GEOG 419 | Professional Geographer | |
| Total Credits | | 46 |

[1] If taught by Peter Walker, Dan Buck, or Lucas Silva.

[2] Seminar: [Topic] (GEOG 407), Experimental Course: [Topic] (GEOG 410), and other upper-division courses approved by an advisor may be used to satisfy the elective requirement.

## Environment, Economy, and Sustainability

| Code | Title | Credits |
|---|---|---|
| Select three of the following: | | |
| GEOG 321 | Climatology | 4 |
| GEOG 322 | Geomorphology | 4 |
| GEOG 323 | Biogeography | 4 |
| GEOG 341 | Population and Environment | 4 |
| GEOG 342 | Geography of Globalization | 4 |
| GEOG 360 | Watershed Science and Policy | 4 |
| GEOG 361 | Global Environmental Change | 4 |
| GEOG 421 | Advanced Climatology: [Topic] | 4 |
| GEOG 423 | Advanced Biogeography: [Topic] | 4 |
| ASIA 425 | Asian Foodways [1] | 4 |
| GEOG 425 | Hydrology and Water Resources | 4 |
| GEOG 427 | Fluvial Geomorphology | 4 |
| GEOG 430 | Long-Term Environmental Change | 4 |
| GEOG 433 | Fire and Natural Disturbances | 4 |
| ENVS 450 | Political Ecology [1] | 4 |
| ENVS 455 | Sustainability [1] | 4 |
| GEOG 461 | Environmental Alteration | 4 |
| GEOG 463 | Geography, Law, and the Environment | 4 |
| GEOG 465 | Environment and Development | 4 |
| GEOG 467 | International Water Policy | 4 |
| GEOG 468 | Contemporary Food Systems | 4 |
| ENVS 477 | Soil Science | 4 |

## Geographic Education

| Code | Title | Credits |
|---|---|---|
| Select three of the following: | | |
| GEOG 341 | Population and Environment | 4 |
| GEOG 342 | Geography of Globalization | 4 |
| GEOG 343 | Society, Culture, and Place | 4 |
| GEOG 441 | Political Geography | 4 |
| GEOG 442 | Urban Geography | 4 |
| GEOG 444 | Cultural Geography | 4 |
| GEOG 471 | North American Historical Landscapes | 4 |
| GEOG 475 | Advanced Geography of Non-European-American Regions: [Topic] | 4 |
| Upper-division courses in geography (GEOG) [1] | | 4 |

[1] With approval of advisor.

## Water Science and Policy

| Code | Title | Credits |
|---|---|---|
| Select three of the following: | | |
| GEOG 322 | Geomorphology | 4 |
| GEOG 360 | Watershed Science and Policy | 4 |
| GEOG 361 | Global Environmental Change | 4 |
| GEOG 425 | Hydrology and Water Resources | 4 |
| GEOG 427 | Fluvial Geomorphology | 4 |
| GEOG 467 | International Water Policy | 4 |

## Culture, Politics, and Place

| Code | Title | Credits |
|---|---|---|
| GEOG 341 | Population and Environment | 4 |
| GEOG 342 | Geography of Globalization | 4 |
| GEOG 343 | Society, Culture, and Place | 4 |
| ASIA 425 | Asian Foodways [1] | 4 |
| GEOG 441 | Political Geography | 4 |
| GEOG 442 | Urban Geography | 4 |
| GEOG 444 | Cultural Geography | 4 |
| GEOG 448 | Tourism and Development | 4 |
| ENVS 450 | Political Ecology [1] | 4 |
| ENVS 455 | Sustainability [1] | 4 |
| GEOG 461 | Environmental Alteration | 4 |
| GEOG 463 | Geography, Law, and the Environment | 4 |

| | | |
|---|---|---|
| GEOG 465 | Environment and Development | 4 |
| GEOG 467 | International Water Policy | 4 |
| GEOG 468 | Contemporary Food Systems | 4 |
| GEOG 471 | North American Historical Landscapes | 4 |
| GEOG 475 | Advanced Geography of Non-European-American Regions: [Topic] | 4 |
| ASIA 480 | Chinese Economy: Transition, Development, Globalization [1] | 4 |

At least eight geography courses must be taken for a letter grade. A grade of C– or better or P (pass) is required in each course, and a GPA of 2.25 or better is required in courses used to satisfy major requirements.

Geography majors seeking a BA degree must demonstrate proficiency in a second language by passing the third term of a second-year university language course with a grade of C– or better or by examination indicating an equivalent level of proficiency.

## Bachelor of Science in Geography: Degree Requirements

| Code | Title | Credits |
|---|---|---|
| **Fundamentals: Introductory Core** | | |
| GEOG 141 | The Natural Environment | 4 |
| GEOG 142 | Human Geography | 4 |
| GEOG 181 | Our Digital Earth | 4 |
| **Fundamentals: Advanced Core** | | |
| GEOG 391 | Social Science Inquiry and Research | 4 |
| Select one of the following: | | 4 |
| GEOG 201 | World Regional Geography | |
| GEOG 202 | Geography of Europe | |
| GEOG 204 | Geography of Russia and Neighbors | |
| GEOG 205 | Geography of Pacific Asia | |
| GEOG 208 | Geography of the United States and Canada | |
| GEOG 209 | Geography of the Middle East and North Africa | |
| GEOG 214 | Geography of Latin America | |
| GEOG 281 | The World and Big Data | |
| GEOG 471 | North American Historical Landscapes | |
| GEOG 475 | Advanced Geography of Non-European-American Regions: [Topic] | |
| **Breadth Requirements: Geographic Information System Science** | | 4 |
| Select one of the following: | | |
| GEOG 481 | GIScience I | |
| GEOG 482 | GIScience II | |
| GEOG 485 | Remote Sensing I | |
| GEOG 486 | Remote Sensing II | |
| GEOG 490 | GIScience: [Topic] | |
| GEOG 491 | Advanced Geographic Information Systems | |
| GEOG 493 | Advanced Cartography | |
| GEOG 494 | Spatial Analysis | |
| GEOG 495 | Geographic Data Analysis | |
| GEOG 496 | Location-Aware Systems | |
| GEOG 497 | Qualitative Methods in Geography | |
| GEOG 498 | Geospatial Project Design | |
| **Breadth Requirements: Biophysical Geography** | | 4 |
| Select one of the following: | | |
| GEOG 321 | Climatology | |
| GEOG 322 | Geomorphology | |
| GEOG 323 | Biogeography | |
| GEOG 360 | Watershed Science and Policy | |
| GEOG 361 | Global Environmental Change | |
| GEOG 421 | Advanced Climatology: [Topic] | |
| GEOG 423 | Advanced Biogeography: [Topic] | |
| GEOG 425 | Hydrology and Water Resources | |
| GEOG 427 | Fluvial Geomorphology | |
| GEOG 430 | Long-Term Environmental Change | |
| GEOG 433 | Fire and Natural Disturbances | |
| ENVS 477 | Soil Science [1] | |
| **Breadth Requirements: Human Geography** | | 4 |
| Select one of the following: | | |
| GEOG 341 | Population and Environment | |
| GEOG 342 | Geography of Globalization | |
| GEOG 343 | Society, Culture, and Place | |
| ASIA 425 | Asian Foodways [1] | |
| GEOG 441 | Political Geography | |
| GEOG 442 | Urban Geography | |
| GEOG 444 | Cultural Geography | |
| GEOG 448 | Tourism and Development | |
| ENVS 450 | Political Ecology [1] | |
| ENVS 455 | Sustainability [1] | |
| GEOG 461 | Environmental Alteration | |
| GEOG 463 | Geography, Law, and the Environment | |
| GEOG 465 | Environment and Development | |
| GEOG 467 | International Water Policy | |
| GEOG 468 | Contemporary Food Systems | |
| GEOG 471 | North American Historical Landscapes | |
| GEOG 475 | Advanced Geography of Non-European-American Regions: [Topic] | |
| ASIA 480 | Chinese Economy: Transition, Development, Globalization [1] | |
| **Electives** | | |
| Three courses from one specialization (see specialization lists) [2] | | 12 |
| **Additional Requirements** | | 2 |
| GEOG 401 | Research: [Topic] | |
| GEOG 403 | Thesis | |
| GEOG 406 | Field Studies: [Topic] | |
| GEOG 409 | Practicum: [Topic] | |
| GEOG 419 | Professional Geographer | |
| Total Credits | | 46 |

1 If taught by Peter Walker, Dan Buck, or Lucas Silva.

2 Seminar: [Topic] (GEOG 407), Experimental Course: [Topic] (GEOG 410), and other upper-division courses approved by an advisor may be used to satisfy the elective requirement.

## Environment, Economy, and Sustainability

| Code | Title | Credits |
|---|---|---|
| Select three of the following: | | |
| GEOG 321 | Climatology | 4 |
| GEOG 322 | Geomorphology | 4 |
| GEOG 323 | Biogeography | 4 |
| GEOG 341 | Population and Environment | 4 |
| GEOG 342 | Geography of Globalization | 4 |
| GEOG 360 | Watershed Science and Policy | 4 |
| GEOG 361 | Global Environmental Change | 4 |
| GEOG 421 | Advanced Climatology: [Topic] | 4 |
| GEOG 423 | Advanced Biogeography: [Topic] | 4 |
| ASIA 425 | Asian Foodways [1] | 4 |
| GEOG 425 | Hydrology and Water Resources | 4 |
| GEOG 427 | Fluvial Geomorphology | 4 |
| GEOG 430 | Long-Term Environmental Change | 4 |
| GEOG 433 | Fire and Natural Disturbances | 4 |
| ENVS 450 | Political Ecology [1] | 4 |
| ENVS 455 | Sustainability [1] | 4 |
| GEOG 461 | Environmental Alteration | 4 |
| GEOG 463 | Geography, Law, and the Environment | 4 |
| GEOG 465 | Environment and Development | 4 |
| GEOG 467 | International Water Policy | 4 |
| GEOG 468 | Contemporary Food Systems | 4 |
| ENVS 477 | Soil Science | 4 |

## Geographic Education

| Code | Title | Credits |
|---|---|---|
| Select three of the following: | | |
| GEOG 341 | Population and Environment | 4 |
| GEOG 342 | Geography of Globalization | 4 |
| GEOG 343 | Society, Culture, and Place | 4 |
| GEOG 441 | Political Geography | 4 |
| GEOG 442 | Urban Geography | 4 |
| GEOG 444 | Cultural Geography | 4 |
| GEOG 471 | North American Historical Landscapes | 4 |
| GEOG 475 | Advanced Geography of Non-European-American Regions: [Topic] | 4 |
| Upper-division courses in geography (GEOG) [1] | | 4 |

[1] With approval of advisor.

## Water Science and Policy

| Code | Title | Credits |
|---|---|---|
| Select three of the following: | | |
| GEOG 322 | Geomorphology | 4 |
| GEOG 360 | Watershed Science and Policy | 4 |
| GEOG 361 | Global Environmental Change | 4 |
| GEOG 425 | Hydrology and Water Resources | 4 |
| GEOG 427 | Fluvial Geomorphology | 4 |
| GEOG 467 | International Water Policy | 4 |

## Environmental Systems

| Code | Title | Credits |
|---|---|---|
| GEOG 321 | Climatology | 4 |
| GEOG 322 | Geomorphology | 4 |
| GEOG 323 | Biogeography | 4 |
| GEOG 360 | Watershed Science and Policy | 4 |
| GEOG 361 | Global Environmental Change | 4 |
| GEOG 421 | Advanced Climatology: [Topic] | 4 |
| GEOG 423 | Advanced Biogeography: [Topic] | 4 |
| GEOG 425 | Hydrology and Water Resources | 4 |
| GEOG 427 | Fluvial Geomorphology | 4 |
| GEOG 430 | Long-Term Environmental Change | 4 |
| GEOG 433 | Fire and Natural Disturbances | 4 |

## Geographic Information System Science

| Code | Title | Credits |
|---|---|---|
| GEOG 481 | GIScience I | 4 |
| GEOG 482 | GIScience II | 4 |
| GEOG 485 | Remote Sensing I | 4 |
| GEOG 486 | Remote Sensing II | 4 |
| GEOG 490 | GIScience: [Topic] | 4 |
| GEOG 491 | Advanced Geographic Information Systems | 4 |
| GEOG 493 | Advanced Cartography | 4 |
| GEOG 495 | Geographic Data Analysis | 4 |
| GEOG 496 | Location-Aware Systems | 4 |
| GEOG 497 | Qualitative Methods in Geography | 4 |
| GEOG 498 | Geospatial Project Design | 4 |

Geography majors seeking a BS degree must complete a mathematics sequence that satisfies the university's mathematics requirement for a BS degree. Mathematics courses must be passed with a grade of at least C– or P. The optimal courses for the university's mathematics requirement depend on one's track and focus; consult with an advisor.

Students considering graduate school should complete both the mathematics and language requirements.

# Spatial Data Science and Technology

The spatial data science and technology major requires a minimum of 48 credits, drawing on courses in geography and computer information science. The major requires four compulsory courses (16 credits) that provide foundational skills, concepts, and critical thinking abilities. An additional eight elective courses (32 credits) are required. Upon declaring the major, students meet with the geography undergraduate advisor to tailor a series of elective courses best suited to individual student needs and employment aspirations. At least nine courses used for the major must be taken for a letter grade. A grade of C– or better and a GPA of 2.25 or better is required in courses applied to the major.

For more information, e-mail the undergraduate advisor, Leslie McLees, at geogadvr@uoregon.edu, or schedule an advising appointment at https://geography.uoregon.edu/undergrad/advising/.

# Bachelor of Arts in Spatial Data Science and Technology: Degree Requirements

Core courses provide foundational skills, concepts, and critical thinking abilities. Some of the introductory courses, such as GIScience I

(GEOG 481), are prerequisites for more advanced courses. Students are not required to complete these before moving to elective courses (except where prerequisites are required).

**Electives.** Rather than adopting a series of specializations, the electives component will remain flexible. Upon declaring the major, students should meet with the undergraduate advisor to work out a series of courses that best fit student needs and employment aspirations. A full list of elective courses can be found on the major page (https://geography.uoregon.edu/sdst) on the department website.

| Code | Title | Credits |
|---|---|---|
| **Core Courses** | | |
| GEOG 181 | Our Digital Earth | 4 |
| GEOG 281 | The World and Big Data | 4 |
| GEOG 481 | GIScience I | 4 |
| CIS 122 | Introduction to Programming and Problem Solving | 4 |
| **Elective Courses** | | |
| Choose courses totaling 32 credits from the following: | | 32 |
| GEOG 403 | Thesis | |
| GEOG 482 | GIScience II | |
| GEOG 485 | Remote Sensing I | |
| GEOG 490 | GIScience: [Topic] [1] | |
| GEOG 491 | Advanced Geographic Information Systems | |
| GEOG 493 | Advanced Cartography | |
| GEOG 494 | Spatial Analysis | |
| GEOG 495 | Geographic Data Analysis | |
| GEOG 496 | Location-Aware Systems | |
| GEOG 498 | Geospatial Project Design | |
| CIS 210 | Computer Science I | |
| CIS 211 | Computer Science II | |
| 300- or 400-level course with a GEOG subject code not listed above | | |
| 400-level course with a CIS subject code not listed above | | |
| Total Credits | | 48 |

[1] Special topics include courses that are offered less frequently, but also qualify for credit when offered under the course number GIScience: [Topic] (GEOG 490). Topics include Web Mapping, Server GIS, Qualitative Spatial Reasoning, and Spatial Simulation.

## Bachelor of Science in Spatial Data Science and Technology: Degree Requirements

| Code | Title | Credits |
|---|---|---|
| **Core Courses** | | |
| GEOG 181 | Our Digital Earth | 4 |
| GEOG 281 | The World and Big Data | 4 |
| GEOG 481 | GIScience I | 4 |
| CIS 122 | Introduction to Programming and Problem Solving | 4 |
| **Elective Courses** | | |
| Choose courses totaling 32 credits from the following: | | 32 |
| GEOG 403 | Thesis | |
| GEOG 482 | GIScience II | |
| GEOG 485 | Remote Sensing I | |
| GEOG 490 | GIScience: [Topic] [1] | |
| GEOG 491 | Advanced Geographic Information Systems | |
| GEOG 493 | Advanced Cartography | |
| GEOG 494 | Spatial Analysis | |
| GEOG 495 | Geographic Data Analysis | |
| GEOG 496 | Location-Aware Systems | |
| GEOG 498 | Geospatial Project Design | |
| CIS 210 | Computer Science I | |
| CIS 211 | Computer Science II | |
| 300- or 400-level course with a GEOG subject code not listed above | | |
| 400-level course with a CIS subject code not listed above | | |
| Total Credits | | 48 |

[1] Special topics include courses that are offered less frequently, but also qualify for credit when offered under the course number GIScience: [Topic] (GEOG 490). Topics include Web Mapping, Server GIS, Qualitative Spatial Reasoning, and Spatial Simulation.

## Honors Programs

The Department of Geography offers an honors option for its majors. More information is available on the department website (https://geography.uoregon.edu/undergrad/honors) or by contacting the undergraduate advisor, geogadvr@uoregon.edu.

## Minor in Geography

### Requirements

| Code | Title | Credits |
|---|---|---|
| Upper-division GIScience course | | 4 |
| Upper-division biophysical geography course | | 4 |
| Upper-division human geography course | | 4 |
| Three geography courses | | 12 |
| Total Credits | | 24 |

At least 16 credits must be taken for a letter grade and 12 credits must be upper division. Grades of C– or better or P must be earned in all geography courses applied to the minor.

## Second Majors

Geography majors may also complete a second major in any field of the student's choice. Two of the most common are environmental studies or environmental science—an excellent combination with geography because they offer grounding in the physical and human systems within which environmental issues are situated in a larger global context. For details about adding a second major, visit the department's website.

## Internships in Geography

Internships are unpaid off-campus work experiences. Students receive one credit for each three hours of participation as an intern; internships may be extended to a second term with prior departmental approval. Interns apply geographic concepts in the service of government, private industry, or nongovernmental organizations. Internships are initiated by students or may come at the suggestion of a faculty member or the request of an employer. Past interns have worked in the Eugene Planning and Development Department, the US Department of

Agriculture Forest Service, Lane County Soil Conservation District, and many other organizations and agencies.

## Four-Year Degree Plan

*The degree plan shown is only a sample of how students may complete their degrees in four years. There are alternative ways. Students should consult their advisor to determine the best path for them.*

## Bachelor of Arts in Geography

| Course | Title | Credits | Milestones |
|---|---|---|---|
| **First Year** | | | |
| **Fall** | | | |
| GEOG 142 | Human Geography | 4 | Multicultural course in international cultures |
| WR 121 | College Composition I | 4 | |
| Group-satisfying course in arts and letters | | 4 | |
| First term of first-year second-language sequence | | 5 | |
| | Credits | 17 | |
| **Winter** | | | |
| GEOG 141 | The Natural Environment | 4 | Group-satisfying course in science |
| WR 122 | College Composition II | 4 | |
| Group-satisfying course in science | | 4 | |
| Second term of first-year second-language sequence | | 5 | |
| | Credits | 17 | |
| **Spring** | | | |
| GEOG 181 | Our Digital Earth | 4 | Fundamentals sequence is complete |
| Group-satisfying course in social science | | 4 | |
| Group-satisfying course in arts and letters | | 4 | |
| Third term of first-year second-language sequence | | 5 | |
| | Credits | 17 | |
| | Total Credits | 51 | |

| Course | Title | Credits | Milestones |
|---|---|---|---|
| **Second Year** | | | |
| **Fall** | | | |
| Geography advanced core elective (201–214) | | 4 | |
| Group-satisfying course in arts and letters | | 4 | |
| Group-satisfying course in social science that also satisfies multicultural requirement in American cultures or identity, pluralism, and tolerance | | 4 | |
| First term of second-year second-language sequence | | 5 | |
| | Credits | 17 | |
| **Winter** | | | |
| Human geography breadth course | | 4 | |
| Group-satisfying course in science | | 4 | |
| Group-satisfying course in arts and letters | | 4 | |
| Second term of second-year second-language sequence | | 5 | Consider studying abroad in third year (optional) |
| | Credits | 17 | |
| **Spring** | | | |
| Biophysical geography breadth course | | 4 | |
| Group-satisfying course in social science | | 4 | |
| Third term of second-year second-language sequence | | 5 | |
| Elective course | | 4 | |
| | Credits | 17 | |
| | Total Credits | 51 | |

| Course | Title | Credits | Milestones |
|---|---|---|---|
| **Third Year** | | | |
| **Fall** | | | |
| GEOG 481 | GIScience I | 4 | Geographic information system science breadth course; complete in junior year to complete the GIScience concentration on time |
| Group-satisfying course in social science | | 4 | |
| Upper-division elective courses | | 8 | |
| | Credits | 16 | |
| **Winter** | | | |
| GEOG 391 | Social Science Inquiry and Research | 4 | Advanced core complete |
| GEOG 419 | Professional Geographer | 2 | Launchpad requiremer take junior year so remaining courses toward professiona developme can be taken |
| Upper-division course with GEOG subject code | | 4 | |
| Upper-division elective course | | 4 | Investigate summer internships (optional) |
| | Credits | 14 | |
| **Spring** | | | |
| Upper-division courses with GEOG subject code | | 8 | |

| | | | |
|---|---|---|---|
| Upper-division elective courses | | | 8 |
| | Credits | | 16 |
| | Total Credits | | 46 |

| Course | Title | Credits | Milestones |
|---|---|---|---|
| **Fourth Year** | | | |
| **Fall** | | | |
| Upper-division courses with GEOG subject code | | | 8 |
| Upper-division elective courses | | | 8 |
| | Credits | | 16 |
| **Winter** | | | |
| Upper-division courses with GEOG subject code | | | Apply for graduation on DuckWeb 8 |
| Upper-division elective course | | | 4 |
| Elective course | | | Start a job search with geography academic career advisor 4 |
| | Credits | | 16 |
| **Spring** | | | |
| Upper-division courses with GEOG subject code | | | 8 |
| Upper-division elective courses | | | 8 |
| | Credits | | 16 |
| | Total Credits | | 48 |

## Bachelor of Science in Geography

| Course | Title | Credits | Milestones |
|---|---|---|---|
| **First Year** | | | |
| **Fall** | | | |
| GEOG 142 | Human Geography | | Multicultural course in international cultures 4 |
| WR 121 | College Composition I | | 4 |
| Group-satisfying course in arts and letters | | | 4 |
| Group-satisfying course in science | | | 4 |
| | Credits | | 16 |
| **Winter** | | | |
| GEOG 141 | The Natural Environment | | 4 |
| WR 122 | College Composition II | | 4 |
| Mathematics course | | | 4 |
| Group-satisfying course in science | | | 4 |
| | Credits | | 16 |
| **Spring** | | | |
| GEOG 181 | Our Digital Earth | | Group-satisfying course in social science; fundamentals sequence is complete 4 |
| Mathematics course | | | 4 |
| Group-satisfying course in social science | | | 4 |
| Group-satisfying course in arts and letters | | | 4 |
| | Credits | | 16 |
| | Total Credits | | 48 |

| Course | Title | Credits | Milestones |
|---|---|---|---|
| **Second Year** | | | |
| **Fall** | | | |
| Geography advanced core elective (201–214) | | | 4 |
| Mathematics course | | | 4 |
| Group-satisfying course in social science that also satisfies multicultural requirement in American cultures or identity, pluralism, and tolerance | | | 4 |
| Elective course | | | 4 |
| | Credits | | 16 |
| **Winter** | | | |
| Physical geography breadth course | | | 4 |
| Group-satisfying course in social science | | | 4 |
| Group-satisfying course in arts and letters | | | 4 |
| Elective course | | | Consider studying abroad in third year (optional) 4 |
| | Credits | | 16 |
| **Spring** | | | |
| Human geography breadth course | | | |
| Group-satisfying courses in science | | | 8 |
| Elective course | | | 4 |
| | Credits | | 12 |
| | Total Credits | | 44 |

| Course | Title | | Credits |
|---|---|---|---|
| **Third Year** | | | |
| **Fall** | | | |
| GEOG 481 | GIScience I | Geographic information system science breadth course; complete in junior year to complete the GIScience concentration on time | 4 |
| Upper-division course with GEOG subject code | | | 4 |
| Upper-division elective course | | | 4 |
| Elective course | | | 4 |
| | Credits | | 16 |
| **Winter** | | | |
| GEOG 391 | Social Science Inquiry and Research | Advanced core complete | 4 |
| GEOG 419 | Professional Geographer | Launchpad requirement: take junior year so remaining courses toward professional development can be taken | 2 |
| Upper-division course with GEOG subject code | | | 4 |
| Elective course | | Investigate summer internships (optional) | 4 |
| | Credits | | 14 |
| **Spring** | | | |
| Upper-division course with GEOG subject code | | | 4 |
| Upper-division elective courses | | | 8 |
| Elective course | | | 4 |
| | Credits | | 16 |
| | Total Credits | | 46 |

| Course | Title | | Credits |
|---|---|---|---|
| **Fourth Year** | | | |
| **Fall** | | | |
| Upper-division courses with GEOG subject code | | | 8 |
| Upper-division elective courses | | | 8 |
| | Credits | | 16 |
| **Winter** | | | |
| Upper-division coursed with GEOG subject code | | Apply for graduation on DuckWeb | 8 |
| Upper-division elective course | | | 4 |
| Elective course | | Start a job search with geography academic career advisor | 4 |
| | Credits | | 16 |
| **Spring** | | | |
| Upper-division course with GEOG subject code | | | 4 |
| Upper-division elective courses | | | 8 |
| Elective course | | | 4 |
| | Credits | | 16 |
| | Total Credits | | 48 |

## Bachelor of Arts in Spatial Data Science and Technology

| Course | Title | | Credits |
|---|---|---|---|
| **First Year** | | | |
| **Fall** | | | |
| GEOG 181 | Our Digital Earth | Suggested: first-year interest group associated with GEOG 181 | 4 |
| WR 121 | College Composition I | | 4 |
| General-education course in arts and letters that also satisfies multicultural requirement | | | 4 |
| First term of first-year second-language sequence | | | 5 |
| | Credits | | 17 |
| **Winter** | | | |
| GEOG 281 | The World and Big Data | | 4 |
| WR 122 | College Composition II | | 4 |
| Group-satisfying course in social science | | | 4 |
| Second term of first-year second-language sequence | | | 5 |
| | Credits | | 17 |
| **Spring** | | | |
| CIS 122 | Introduction to Programming and Problem Solving | General-education course in science | 4 |
| Group-satisfying course in arts and letters | | | 4 |
| General-education course in social science that also satisfies multicultural requirement | | | 4 |

| | | | |
|---|---|---|---|
| Third term of first-year second-language sequence | | | 5 |
| | Credits | | 17 |
| | Total Credits | | 51 |

| Course | Title | | Credits | Milestones |
|---|---|---|---|---|
| **Second Year** | | | | |
| **Fall** | | | | |
| GEOG 481 | GIScience I | | 4 | |
| General-education course in arts and letters | | | 4 | |
| General-education course in science | | | 4 | |
| First term of second-year second-language sequence | | | 5 | |
| | Credits | | 17 | |
| **Winter** | | | | |
| General-education course in arts and letters | | | 4 | |
| Elective coursee in spatial data science and technology | | Example: GEOG 482 GIScience II | 8 | |
| Second term of second-year second-language sequence | | Consider studying abroad in third year (optional) | 5 | |
| | Credits | | 17 | |
| **Spring** | | | | |
| Elective course in spatial data science and technology | | Example: GEOG 496 Location-Aware Systems | 4 | |
| Elective courses | | Should complete GEOG 481 by end of the second year | 8 | |
| Third term of second-year second-language sequence | | | 5 | |
| | Credits | | 17 | |
| | Total Credits | | 51 | |

| Course | Title | | Credits | Milestones |
|---|---|---|---|---|
| **Third Year** | | | | |
| **Fall** | | | | |
| Elective course in spatial data science and technology | | Example: Upper-division course with Example: Upper-division course with GEOG subject code | 4 | |
| Group-satisfying course in science | | | 4 | |
| Upper-division elective courses | | | 8 | |
| | Credits | | 16 | |
| **Winter** | | | | |
| Elective course in spatial data science and technology | | Example: GEOG 495 Geographic Data Analysis | 4 | |
| General-education course in social science | | | 4 | |
| General-education course in science | | Investigate summer internships (optional) | 4 | |
| Upper-division elective course | | Consider GEOG 419 Profession Geographe target remaining courses toward professiona developme | 4 | |
| | Credits | | 16 | |
| **Spring** | | | | |
| Elective course in spatial data science and technology | | Example: GEOG 486 Remote Sensing II | 4 | |
| Upper-division elective course | | | 4 | |
| Multicultural course | | | 4 | |
| Elective course | | | 4 | |
| | Credits | | 16 | |
| | Total Credits | | 48 | |

| Course | Title | | Credits | Milestones |
|---|---|---|---|---|
| **Fourth Year** | | | | |
| **Fall** | | | | |
| Elective course in spatial data science and technology | | Example: GEOG 490 GIScience: [Topic] (Web Mapping) | 4 | |
| Upper-division elective courses | | | 8 | |
| Multicultural course | | | 4 | |
| | Credits | | 16 | |
| **Winter** | | | | |
| Elective course in spatial data science and technology | | Example: GEOG 493 Advanced Cartography | 4 | |
| Upper-division elective course | | Apply for graduation on DuckWeb | 4 | |
| Elective course | | Start a job search with geography academic career advisor | 4 | |
| | Credits | | 12 | |
| **Spring** | | | | |
| Upper-division elective course | | | 4 | |
| Elective courses | | | 8 | |
| | Credits | | 12 | |
| | Total Credits | | 40 | |

## Bachelor of Science in Spatial Data Science and Technology

| Course | Title | | Credits | Milestones |
|---|---|---|---|---|
| **First Year** | | | | |
| **Fall** | | | | |
| GEOG 181 | Our Digital Earth | Suggested: first-year interest group associated with GEOG 181 | 4 | |
| WR 121 | College Composition I | | 4 | |
| General-education course in arts and letters that also satisfies multicultural requirement | | | 4 | |
| Mathematics course | | Suggested MATH 111 | 4 | |
| | Credits | | 16 | |
| **Winter** | | | | |
| GEOG 281 | The World and Big Data | | 4 | |
| WR 122 | College Composition II | | 4 | |
| Group-satisfying course in social science | | | 4 | |
| Mathematics course | | Suggested: MATH 112 | 4 | |
| | Credits | | 16 | |
| **Spring** | | | | |
| CIS 122 | Introduction to Programming and Problem Solving | General-education course in science | 4 | |
| Group-satisfying course in arts and letters | | | 4 | |
| General-education course in social science that also satisfies multicultural requirement | | | 4 | |
| Mathematics course | | Suggested MATH 243 or CIS course | 4 | |
| | Credits | | 16 | |
| | Total Credits | | 48 | |

| Course | Title | | Credits | Milestones |
|---|---|---|---|---|
| **Second Year** | | | | |
| **Fall** | | | | |
| GEOG 481 | GIScience I | | 4 | |
| General-education course in arts and letters | | | 4 | |
| General-education course in social science | | | 4 | |
| General-education course in science | | | 4 | |
| | Credits | | 16 | |
| **Winter** | | | | |
| Elective courses in spatial data science and technology | | Example: GEOG 482 GIScience II | 8 | |
| General-education course in arts and letters | | | 4 | |
| General-education course in social science | | | 4 | |
| | Credits | | 16 | |
| **Spring** | | | | |
| Elective course in spatial data science and technology | | Example: GEOG 496 Location-Aware Systems | 4 | |
| General-education course in social science | | | 4 | |
| General-education course in science | | | 4 | |

| | | | |
|---|---|---|---|
| Elective course | | Should complete GEOG 481 by end of the second year | 4 |
| | Credits | | 16 |
| | Total Credits | | 48 |

| Course | Title | | Credits | Milestones |
|---|---|---|---|---|
| **Third Year** | | | | |
| **Fall** | | | | |
| Elective course in spatial data science and technology | | Example: Upper-division course with GEOG subject code | 4 | |
| Group-satisfying course in science | | | 4 | |
| Upper-division elective courses | | | 8 | |
| | Credits | | 16 | |
| **Winter** | | | | |
| Elective course in spatial data science and technology | | Example: GEOG 495 Geographic Data Analysis | 4 | |
| General-education course in social science | | | 4 | |
| General-education course in science | | Investigate summer internships (optional) | 4 | |
| Upper-division elective course | | Consider GEOG 419 Profession Geographe target remaining courses toward professiona developme | 4 | |
| | Credits | | 16 | |
| **Spring** | | | | |
| Elective course in spatial data science and technology | | Example: CIS 210 Computer Science I | 4 | |
| Upper-division elective course | | | 4 | |
| Multicultural course | | | 4 | |
| Elective course | | | 4 | |
| | Credits | | 16 | |
| | Total Credits | | 48 | |

| Course | Title | | Credits | Milestones |
|---|---|---|---|---|
| **Fourth Year** | | | | |
| **Fall** | | | | |
| Elective course in spatial data science and technology | | Example: GEOG 490 GIScience: [Topic] (Web Mapping) | 4 | |
| Upper-division elective courses | | | 8 | |
| Multicultural course | | | 4 | |
| | Credits | | 16 | |
| **Winter** | | | | |
| Elective course in spatial data science and technology | | Example: GEOG 493 Advanced Cartography | 4 | |
| Upper-division elective course | | Apply for graduation on DuckWeb | 4 | |
| Elective course | | Start a job search with geography academic career advisor | 4 | |
| | Credits | | 12 | |
| **Spring** | | | | |
| Upper-division elective course | | | 4 | |
| Elective courses | | | 8 | |
| | Credits | | 12 | |
| | Total Credits | | 40 | |

- **Master of Arts**
- **Master of Science**
- **Doctor of Philosophy**

## Graduate Studies

Graduate work leading to the master of arts (MA), master of science (MS), and doctor of philosophy (PhD) degrees is offered.

The department's graduate programs emphasize the natural environment; the interactions of environment and society; culture, politics, and space; geographic information system science; and geographic education. The master's and PhD programs closely follow the research interests of the geography faculty. Students follow an individualized program that includes courses and seminars in related disciplines.

Although the department requires knowledge of the fundamentals of geography, it welcomes students whose undergraduate work has been in other disciplines and who can apply their training to geographic problems.

## Admission

The Department of Geography only accepts applications for admission fall term. Application materials should arrive by January 15 to be considered the following fall term. The department notifies applicants of the admission decision around April 1. Graduate teaching fellowships typically are awarded once a year, in April.

The department's website has online application materials and information about the application process.

Applicants must submit scores from the Graduate Record Examinations general test. There is no minimum requirement for GRE scores.

International students whose native language is not English must submit results from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) examination from within five years of the application date. The Department of Geography requires a minimum score of 575 (paper-based) or 88 (Internet-based) for the TOEFL. The minimum overall band score on the academic module of the IELTS is 7.0. For more information about the TOEFL and IELTS examination, visit their respective websites.

For more information about the geography department graduate application process, visit geography.uoregon.edu/graduate/admissions.

## General Requirements

In both the master's and the doctoral programs, students are expected to develop a broad background in the discipline of geography, in-depth knowledge in an area of emphasis, and the ability to conduct and report independent research, including the use of appropriate geographic techniques. The area of emphasis may combine more than one traditional subfield of geography. The PhD requires development of more in-depth knowledge in the area of emphasis and a substantial independent research project resulting in a dissertation.

| Area of Emphasis | Course Topics |
|---|---|
| The Natural Environment | • Advanced biogeography<br>• Advanced climatology<br>• Advanced geomorphology<br>• Hydrology and water resources<br>• Fluvial geomorphology<br>• Long-term environmental change<br>• Climatological aspects of global change<br>• Fire and natural disturbances |
| Environment and Society | • Environmental alteration<br>• Geography, law, and the environment<br>• Environment and development<br>• Gender and environment<br>• International water policy<br>• North American historical landscapes<br>• Political ecology |
| Culture, Politics, and Place | • Political geography<br>• Urban geography<br>• Global migration<br>• Cultural geography<br>• Tourism and development |
| Geographic Information System Science | • Geographic information system science<br>• Remote sensing<br>• Advanced geographic information systems<br>• Advanced cartography<br>• Geographic data analysis |
| Geographic Education | • Research in geographic education<br>• Preparing to teach Advanced Placement human geography<br>• Geospatial technology for educators<br>• Geography education assessment |

The department also offers course work and faculty expertise in the American West, Europe (both West and East), the Middle East, Latin America, Asia, and Africa.

## Master's Degree Program

The master's degree in geography (MA or MS) emphasizes broad understanding of physical and human geography and basic geographic techniques. Students develop specialized research skills during work on the thesis.

The master of arts degree requires second-year university-level proficiency in a second language. Competency may be demonstrated by a standardized test or with adequate undergraduate course work. Competency in a foreign language or a computer language may be used to meet the departmental language requirement for the master of science degree.

The master's degree option in geographic education is designed for teachers who have K–12 teaching licensure or are working toward their initial or continuing licensure. Most graduate students who take the geographic education option also have several years of teaching experience.

A committee of two geography faculty members supervises the research and writing of a master's thesis that shows evidence of original research and writing.

## Master of Arts in Geography

| Code | Title | Credits |
|---|---|---|
| **Core Courses** [1] | | |
| GEOG 595 | Geographic Data Analysis | 4 |
| GEOG 608 | Workshop: [Topic] (Thesis Writing) [2] | 2-16 |
| GEOG 611–612 & GEOG 613 | Theory and Practice of Geography I-II and Research Design [3] | 12 |
| **Breadth Requirement** | | |
| Five upper-division courses, with at least one and no more than two in each area of emphasis (physical geography, human geography, GIS science) | | 20 |
| Total Credits | | 38-52 |

1. Core courses or their equivalents must be completed either during the program or prior to entering.
2. Must take course for 1 credit every winter and spring term the student is in residence.
3. Must be taken during the first year the graduate student is in residence.

| Code | Title | Credits |
|---|---|---|
| **Additional Master's Required Courses** | | |
| GEOG 507 | Seminar: [Topic] | 1-5 |
| or GEOG 607 | Seminar: [Topic] | |
| GEOG 507 | Seminar: [Topic] | 1-5 |
| or GEOG 607 | Seminar: [Topic] | |
| GEOG 503 | Thesis [1] | 9 |
| Total Credits | | 11-19 |

1. At least 3 credits must be taken during the term the degree is granted. Every master's thesis must be presented at a public lecture.

## Master of Science in Geography

| Code | Title | Credits |
|---|---|---|
| **Core Courses** [1] | | |
| GEOG 595 | Geographic Data Analysis | 4 |
| GEOG 608 | Workshop: [Topic] (Thesis Writing) [2] | 2-16 |
| GEOG 611–612 & GEOG 613 | Theory and Practice of Geography I-II and Research Design [3] | 12 |
| **Breadth Requirement** | | |
| Five upper-division courses, with at least one and no more than two in each area of emphasis (physical geography, human geography, GIS science) | | 20 |
| Total Credits | | 38-52 |

1. Core courses or their equivalents must be completed either during the program or prior to entering.
2. Must take course for 1 credit every winter and spring term the student is in residence.
3. Must be taken during the first year the graduate student is in residence.

| Code | Title | Credits |
|---|---|---|
| **Additional Master's Required Courses** | | |
| GEOG 507 | Seminar: [Topic] | 1-5 |
| or GEOG 607 | Seminar: [Topic] | |
| GEOG 507 | Seminar: [Topic] | 1-5 |
| or GEOG 607 | Seminar: [Topic] | |
| GEOG 503 | Thesis [1] | 9 |
| Total Credits | | 11-19 |

1. At least 3 credits must be taken during the term the degree is granted. Every master's thesis must be presented at a public lecture.

## Doctoral Degree Program

The PhD program requires competent understanding of one of the systematic fields of geography and a broad understanding of geographic topics that enables the student to address and synthesize problems that cross the various fields of geography. While this program is designed to suit each individual's background and interests, prospective candidates should pay attention to the systematic specialization and regional interests of the department's faculty members before applying for admission.

The candidate may use Research: [Topic] (GEOG 601) and Reading and Conference: [Topic] (GEOG 605) to follow specific interests with individual members of the faculty. The PhD program, planned with faculty committee approval, is measured by achievement of the stated goals rather than by any specific number of credits.

## PhD Requirements

| Code | Title | Credits |
|---|---|---|
| **Core Courses** [1] | | |
| GEOG 595 | Geographic Data Analysis | 4 |
| GEOG 608 | Workshop: [Topic] (Thesis Writing) [2] | 2-16 |
| GEOG 611–612 & GEOG 613 | Theory and Practice of Geography I-II and Research Design [3] | 12 |
| **Breadth Requirement** | | |
| Five upper-division courses, with at least one and no more than two in each area of emphasis (physical geography, human geography, GIS science) | | 20 |
| Total Credits | | 38-52 |

1. Core courses or their equivalents must be completed either during the program or prior to entering.
2. Must take course for 1 credit every winter and spring term the student is in residence.
3. Must be taken during the first year the graduate student is in residence.

| Code | Title | Credits |
|---|---|---|
| **Additional Doctoral Required Courses** | | |
| GEOG 607 | Seminar: [Topic] | 1-5 |
| GEOG 607 | Seminar: [Topic] | 1-5 |
| GEOG 603 | Dissertation [1] | 1-16 |

1. At least 3 credits must be taken during the term the degree is granted. Every doctoral dissertation must be presented at a public lecture.

In addition, PhD students must complete a foreign language, programming, or skills requirement that entails completion of the foreign language or programming requirement for the master's degree in addition to one of the following:

1. Advanced knowledge of the foreign language used for the master's requirement as demonstrated by successful completion of a third-year, university-level course sequence in that language that deals with composition and conversation, or passing an approved test of third-year language skills (such as the New York University School of Professional Studies Foreign Language Proficiency Exam)
2. proficiency in a second foreign language at the level required for the master's degree
3. computer programming skills at the level required for the master's degree
4. completion of a research skills package typically consisting of four to five courses that cover a body of related methods and techniques useful in geographic research

PhD students must also complete a preparation in fields of specialization requirement that entails completion of courses and seminars recommended by the advisor or committee members.

After completing the appropriate course work, graduate seminars, and language or technical skills requirement, advancement to candidacy is achieved by passing a comprehensive written examination. The comprehensive exam is an opportunity to demonstrate that the student

- can articulate core areas of expertise and situate the student's overall research agenda in relation to these areas of expertise
- understands and can defend major theoretical and methodological issues in these core research and teaching areas
- has a sense of where those theories and methods stand in relation to major themes in contemporary and interdisciplinary scholarship

PhD students develop their own questions. These questions should focus on the three areas of expertise as identified in consultation between the student and advisor. At least three questions should be developed for each of the three areas. The committee may ask for more than three. At this point, the committee selects four examination questions. The committee may constrain, expand, or otherwise edit any of the student-written questions. The student has two weeks to write the responses (four to five pages to each question). Approximately one to three weeks after turning in the written responses, the student defends the responses orally. Please see the geography department's *Graduate Program Handbook* for additional details.

Within nine months of completing the comprehensive examination, the student must present a dissertation proposal for approval by the student's dissertation committee. The completed dissertation, the capstone of the doctoral program, presents the results of substantive and original research on a significant geographic problem. It is defended in a public oral presentation.

## Courses

**GEOG 141. The Natural Environment. 4 Credits.**
The earth's physical landscapes, vegetation patterns, weather, and climate; emphasis on the dynamic interactions among climate, landforms, vegetation, and soils.

**GEOG 142. Human Geography. 4 Credits.**
The spatial organization of humans and their activities on Earth's surface. Cultural, political, and economic influences shaping places and their interconnections.

**GEOG 181. Our Digital Earth. 4 Credits.**
Exploring the emergence of geospatial data and technologies that are pervasive in our everyday lives and how they are shaping society.

**GEOG 196. Field Studies: [Topic]. 1-2 Credits.**
Repeatable.

**GEOG 199. Special Studies: [Topic]. 1-5 Credits.**
Repeatable.

**GEOG 201. World Regional Geography. 4 Credits.**
Introduction to the world's cultural regions. Study of the cultural and environmental factors that make different parts of the world distinct.

**GEOG 202. Geography of Europe. 4 Credits.**
Physical and cultural processes that have shaped the rural and urban landscapes of Europe.

**GEOG 204. Geography of Russia and Neighbors. 4 Credits.**
Natural regions, major population groups, and the economic development of the former Union of Soviet Socialist Republics.

**GEOG 205. Geography of Pacific Asia. 4 Credits.**
Physical, cultural, and economic processes that have shaped the rural and urban landscapes of Pacific Asia.

**GEOG 208. Geography of the United States and Canada. 4 Credits.**
Historical and geographical analysis of the physical and human geography of the U.S. and Canada. Topics include physical regions, settlement patterns, economic development, and urbanization. Offered alternate years.

**GEOG 209. Geography of the Middle East and North Africa. 4 Credits.**
Physical and cultural processes that have shaped the rural and urban landscapes of the Middle East and North Africa.

**GEOG 214. Geography of Latin America. 4 Credits.**
Physical, cultural, and economic processes that have shaped the rural and urban character of Latin America.

**GEOG 281. The World and Big Data. 4 Credits.**
Explores technical foundations and social and economic applications of big data along the "5V" dimensions of volume, variety, velocity, veracity, and visualization.

**GEOG 285. Mapping With Drones. 4 Credits.**
Understanding and applying the technologies, theories, and skills needed to acquire and convert drone photography into mapping applications.

**GEOG 321. Climatology. 4 Credits.**
Energy and moisture in the atmosphere, atmospheric circulation, controls of regional and microclimates, applied climatology, climatic variations, past and future climates.
Prereq: GEOG 141.

**GEOG 322. Geomorphology. 4 Credits.**
Landforming processes with emphasis on mass movements, rivers, eolian, glacial, and coastal processes. Special fee.
Prereq: GEOG 141 or GEOL 102 or 202.

**GEOG 323. Biogeography. 4 Credits.**
Relation of plants and animals to the environment, distribution of individual species, historical changes in plant distribution.
Prereq: one from GEOG 141, GEOL 103, 203, BI 370.

**GEOG 341. Population and Environment. 4 Credits.**
Patterns of population growth over history and place, current policies and programs, and impacts and trends in United States and international contexts. Includes method and theory.

**GEOG 342. Geography of Globalization. 4 Credits.**
Historical and geographical dimensions of globalization; emphasizes economic and social factors. Topics include multinationals, trade agreements, sustainability, global inequalities, and racial and gender divisions of labor.

**GEOG 343. Society, Culture, and Place. 4 Credits.**
Examines ways in which geographical context reflects and shapes cultural and social processes. Importance of place and territory in human affairs.

**GEOG 360. Watershed Science and Policy. 4 Credits.**
Physical and biological processes of watersheds; problems of land use, water quality, riparian zones, aquatic ecology; scientific basis of watershed management and policy. Special fee.
Prereq: GEOG 141, or GEOL 102 or 202, or BI 130 or 213.

**GEOG 361. Global Environmental Change. 4 Credits.**
Natural and human-induced environmental changes and their impact on different environmental systems. Not available to those who have taken GEOG 143.
Prereq: GEOG 141.

**GEOG 391. Social Science Inquiry and Research. 4 Credits.**
Understanding scientific inquiry, the scientific method and learning to critique social science research. Readings and discussion focus on the questions, methods, conclusions and outcomes of research.

**GEOG 399. Special Studies: [Topic]. 1-5 Credits.**
Repeatable.

**GEOG 401. Research: [Topic]. 1-21 Credits.**
Repeatable.

**GEOG 403. Thesis. 1-12 Credits.**
Repeatable.

**GEOG 405. Reading and Conference: [Topic]. 1-21 Credits.**
Repeatable.

**GEOG 406. Field Studies: [Topic]. 1-6 Credits.**
Repeatable.

**GEOG 407. Seminar: [Topic]. 1-5 Credits.**
Repeatable.

**GEOG 408. Workshop: [Topic]. 1-16 Credits.**
Repeatable.

**GEOG 409. Practicum: [Topic]. 1-21 Credits.**
Repeatable.

**GEOG 410. Experimental Course: [Topic]. 1-4 Credits.**
Repeatable. Topics are listed in the class schedule each term.

**GEOG 419. Professional Geographer. 2 Credits.**
Explores the geographical perspective on world cultures and global issues, and prepares students how to articulate a spatial perspective and effectively communicate geographic training and skills to broader audiences.

**GEOG 421. Advanced Climatology: [Topic]. 4 Credits.**
Topics in climatology, including physical climatology, dynamic and synoptic climatology, and paleoclimatology. Repeatable when topic changes.
Prereq: GEOG 321.

**GEOG 423. Advanced Biogeography: [Topic]. 4 Credits.**
Selected topics in biogeography including relation of plants and animals to their environment, historical changes in plant distribution, and palynological analysis. Special fee. Repeatable when topic changes.
Prereq: GEOG 323.

**GEOG 425. Hydrology and Water Resources. 4 Credits.**
Emphasis on surface water including precipitation, evapotranspiration, surface runoff, and stream flow. Understanding and analysis of processes. Management for water supply and quality. Special fee.
Prereq: GEOG 321 or 322; MATH 111.

**GEOG 427. Fluvial Geomorphology. 4 Credits.**
Hydraulics and hydrology of stream channels; channel morphology and processes; drainage network development; fluvial deposits and landforms; field and analytical methods. Required field trips. Special fee.
Prereq: MATH 112; one from GEOG 322, GEOG 425, GEOL 334.

**GEOG 430. Long-Term Environmental Change. 4 Credits.**
Evolution of the physical landscape during the Quaternary period. Elements of paleoclimatology, paleoecology, and geomorphology. Required field trips. Special fee.
Prereq: GEOG 321, 322, or 323.

**GEOG 433. Fire and Natural Disturbances. 4 Credits.**
Wildfire and other landscape disturbance processes, historical and current patterns of fire, use and management of fire. Offered alternate years.
Prereq: BI 307 or GEOG 323 or BI 370.

**GEOG 441. Political Geography. 4 Credits.**
Spatial perspectives on global political patterns and processes. Relationship of political territories to resources, ethnic patterns, and ideological communities. Impact of political arrangements on landscapes.
Prereq: Junior standing.

**GEOG 442. Urban Geography. 4 Credits.**
Urbanization throughout the world, the structure of urban settlements; cities as regional centers, physical places, and homes for people; geographic problems in major urban environments.
Prereq: Junior standing.

**GEOG 444. Cultural Geography. 4 Credits.**
Patterns of culture as a force in human affairs. Dynamics of identity, place, and power. The creation of culture at different scales.

**GEOG 445. Culture, Ethnicity, and Nationalism. 4 Credits.**
Relationship of ethnic groups and nationality to landscapes, perception, and cultural geographic phenomena. Distribution of ethnic and national groups. Junior standing required.

**GEOG 448. Tourism and Development. 4 Credits.**
Tourism-related concepts and practices associated with tourism planning, development, marketing, and impacts in different geographic contexts.

**GEOG 461. Environmental Alteration. 4 Credits.**
Human alterations of the earth's major ecosystems. Consequences of human activity at different times and places with respect to soils, atmosphere, vegetation, landforms, and water.
Prereq: Junior standing.

**GEOG 463. Geography, Law, and the Environment. 4 Credits.**
Values underlying American legal approaches to environmental issues; the role of laws in reflecting and shaping human understanding and use of the environment. Special fee.
Prereq: Junior standing.

**GEOG 465. Environment and Development. 4 Credits.**
Critical analysis of development concepts. Economic activity and environmental impacts. Sustainable development. Development projects and landscapes in the industrializing world.
Prereq: Junior standing.

**GEOG 467. International Water Policy. 4 Credits.**
Examines problems in water policy and governance in a global context. Draws on interdisciplinary perspectives, compares case studies, and analyzes institutions.

**GEOG 468. Contemporary Food Systems. 4 Credits.**
Explores contemporary food systems at local, national, and global scales. Emphasis on the political economy and sociocultural dynamics linking agriculture, food industries, and consumption.

**GEOG 471. North American Historical Landscapes. 4 Credits.**
Examines the origin and evolution of cultural landscapes in North America through historical and contemporary sources, and draws upon the local region for student projects.
Prereq: Junior standing.

**GEOG 475. Advanced Geography of Non-European-American Regions: [Topic]. 4 Credits.**
Repeatable. Examination of the settlement patterns, regional economies, political organization, and character of the landscapes of selected major regions of the non-European and American world. Repeatable when region changes.

**GEOG 481. GIScience I. 4 Credits.**
Introduction to geographic information science, geographic information systems (GIS), the current population survey (CPS), remote sensing, and cartography. Sequence with GEOG 482/582, 491/591.

**GEOG 482. GIScience II. 4 Credits.**
Spatial data collection, spatial data models, database design, data editing, geographic information system (GIS) project management, and advanced topics in geographic information science. Sequence with GEOG 481/581, 491/591, 493/593.
Prereq: GEOG 481.

**GEOG 485. Remote Sensing I. 4 Credits.**
Introduction to remote sensing science including its physical basis, instruments, platforms, data, processing methods, and applications. Sequence with GEOG 486/586.
Prereq: GEOG 481.

**GEOG 486. Remote Sensing II. 4 Credits.**
The use of digital electromagnetic data for classification, mapping, and monitoring biologic, hydrologic, atmospheric, geologic, and human processes and environmental change. Sequence with GEOG 485/585.
Prereq: GEOG 485.

**GEOG 490. GIScience: [Topic]. 4 Credits.**
Repeatable. Advanced topics on geographic information systems science including spatial analysis and modeling, data visualization, cartography, volunteered geographic information, GIS programming. Repeatable five times for a maximum of 24 credits.
Prereq: GEOG 481 or GEOG 311.

**GEOG 491. Advanced Geographic Information Systems. 4 Credits.**
Automated processing of geospatial data using Python scripting language. Programming for spatial analysis such as 3-D and network modeling; processing of big data (satellite imagery, climate data, demographic information). Sequence with GEOG 481/581, 482/582.
Prereq: GEOG 482.

**GEOG 493. Advanced Cartography. 4 Credits.**
Map design and production methods; use of color, cartographic visualization, graphing, data graphics theory, and integration of geographic information systems (GIS) and graphics tools. Sequence with GEOG 481/581, 482/582.
Prereq: GEOG 481.

**GEOG 494. Spatial Analysis. 4 Credits.**
Introduction to a variety of spatial analysis techniques that can be used for understanding and modeling geographic phenomena. Series.
Prereq: GEOG 481.

**GEOG 495. Geographic Data Analysis. 4 Credits.**
Analysis and display of geographical data by traditional data-analytical methods and by scientific-visualization approaches.
Prereq: GEOG 481.

**GEOG 496. Location-Aware Systems. 4 Credits.**
Explores technical fundamentals of location-aware systems, such as location models and location-based services, as well as challenges such as user privacy.
Prereq: GEOG 281.

**GEOG 497. Qualitative Methods in Geography. 4 Credits.**
Explores conceptual and practical dimensions of qualitative research. Includes linking theory and method; research question formulation; project design; ethics; data gathering, analysis, and presentation.
Prereq: GEOG 341, 342, or 343.

**GEOG 498. Geospatial Project Design. 4 Credits.**
Introduction to methods for designing and implementing professional projects involving geospatial data, technologies, and analytical methods.
Prereq: GEOG 481.

**GEOG 503. Thesis. 1-16 Credits.**
Repeatable.

**GEOG 507. Seminar: [Topic]. 1-5 Credits.**
Repeatable.

**GEOG 508. Workshop: [Topic]. 1-16 Credits.**
Repeatable.

**GEOG 510. Experimental Course: [Topic]. 1-4 Credits.**
Repeatable. Topics are listed in the class schedule each term.

**GEOG 521. Advanced Climatology: [Topic]. 4 Credits.**
Topics in climatology, including physical climatology, dynamic and synoptic climatology, and paleoclimatology. Repeatable when topic changes.

**GEOG 523. Advanced Biogeography: [Topic]. 4 Credits.**
Selected topics in biogeography including relation of plants and animals to their environment, historical changes in plant distribution, and palynological analysis. Special fee. Repeatable when topic changes.

**GEOG 525. Hydrology and Water Resources. 4 Credits.**
Emphasis on surface water including precipitation, evapotranspiration, surface runoff, and stream flow. Understanding and analysis of processes. Management for water supply and quality. Special fee.

**GEOG 527. Fluvial Geomorphology. 4 Credits.**
Hydraulics and hydrology of stream channels; channel morphology and processes; drainage network development; fluvial deposits and landforms; field and analytical methods. Required field trips. Special fee.

**GEOG 530. Long-Term Environmental Change. 4 Credits.**
Evolution of the physical landscape during the Quaternary period. Elements of paleoclimatology, paleoecology, and geomorphology. Required field trips. Special fee.

**GEOG 533. Fire and Natural Disturbances. 4 Credits.**
Wildfire and other landscape disturbance processes, historical and current patterns of fire, use and management of fire. Offered alternate years.

**GEOG 541. Political Geography. 4 Credits.**
Spatial perspectives on global political patterns and processes. Relationship of political territories to resources, ethnic patterns, and ideological communities. Impact of political arrangements on landscapes.

**GEOG 542. Urban Geography. 4 Credits.**
Urbanization throughout the world, the structure of urban settlements; cities as regional centers, physical places, and homes for people; geographic problems in major urban environments.

**GEOG 544. Cultural Geography. 4 Credits.**
Patterns of culture as a force in human affairs. Dynamics of identity, place, and power. The creation of culture at different scales.

**GEOG 545. Culture, Ethnicity, and Nationalism. 4 Credits.**
Relationship of ethnic groups and nationality to landscapes, perception, and cultural geographic phenomena. Distribution of ethnic and national groups.

**GEOG 548. Tourism and Development. 4 Credits.**
Tourism-related concepts and practices associated with tourism planning, development, marketing, and impacts in different geographic contexts.

**GEOG 561. Environmental Alteration. 4 Credits.**
Human alterations of the earth's major ecosystems. Consequences of human activity at different times and places with respect to soils, atmosphere, vegetation, landforms, and water.

**GEOG 563. Geography, Law, and the Environment. 4 Credits.**
Values underlying American legal approaches to environmental issues; the role of laws in reflecting and shaping human understanding and use of the environment. Special fee.

**GEOG 565. Environment and Development. 4 Credits.**
Critical analysis of development concepts. Economic activity and environmental impacts. Sustainable development. Development projects and landscapes in the industrializing world.

**GEOG 567. International Water Policy. 4 Credits.**
Examines problems in water policy and governance in a global context. Draws on interdisciplinary perspectives, compares case studies, and analyzes institutions.

**GEOG 568. Contemporary Food Systems. 4 Credits.**
Explores contemporary food systems at local, national, and global scales. Emphasis on the political economy and sociocultural dynamics linking agriculture, food industries, and consumption.

**GEOG 571. North American Historical Landscapes. 4 Credits.**
Examines the origin and evolution of cultural landscapes in North America through historical and contemporary sources, and draws upon the local region for student projects.

**GEOG 575. Advanced Geography of Non-European-American Regions: [Topic]. 4 Credits.**
Repeatable. Examination of the settlement patterns, regional economies, political organization, and character of the landscapes of selected major regions of the non-European and American world. Repeatable when region changes.

**GEOG 581. GIScience I. 4 Credits.**
Introduction to geographic information science, geographic information systems (GIS), the current population survey (CPS), remote sensing, and cartography. Sequence with GEOG 482/582, 491/591.

**GEOG 582. GIScience II. 4 Credits.**
Spatial data collection, spatial data models, database design, data editing, geographic information system (GIS) project management, and advanced topics in geographic information science. Sequence with GEOG 481/581, 491/591, 493/593.
Prereq: GEOG 581.

**GEOG 585. Remote Sensing I. 4 Credits.**
Introduction to remote sensing science including its physical basis, instruments, platforms, data, processing methods, and applications. Sequence with GEOG 486/586.
Prereq: GEOG 581.

**GEOG 586. Remote Sensing II. 4 Credits.**
The use of digital electromagnetic data for classification, mapping, and monitoring biologic, hydrologic, atmospheric, geologic, and human processes and environmental change. Sequence with GEOG 485/585.
Prereq: GEOG 585.

**GEOG 590. GIScience: [Topic]. 4 Credits.**
Advanced topics on geographic information systems science including spatial analysis and modeling, data visualization, cartography, volunteered geographic information, GIS programming. Repeatable five times for a maximum of 24 credits.
Prereq: GEOG 581.

**GEOG 591. Advanced Geographic Information Systems. 4 Credits.**
Socioeconomic analysis with geographic information systems (GIS) and the U.S. census, network modeling, 3-D models of natural and urban landscapes, web-based GIS and programming. Sequence with GEOG 481/581, 482/582.
Prereq: GEOG 582.

**GEOG 593. Advanced Cartography. 4 Credits.**
Map design and production methods; use of color, cartographic visualization, graphing, data graphics theory, and integration of geographic information systems (GIS) and graphics tools. Sequence with GEOG 481/581, 482/582.
Prereq: GEOG 582.

**GEOG 594. Spatial Analysis. 4 Credits.**
Introduction to a variety of spatial analysis techniques that can be used for understanding and modeling geographic phenomena. Series.
Prereq: GEOG 581.

**GEOG 595. Geographic Data Analysis. 4 Credits.**
Analysis and display of geographical data by traditional data-analytical methods and by scientific-visualization approaches.
Prereq: GEOG 581.

**GEOG 596. Location-Aware Systems. 4 Credits.**
Explores technical fundamentals of location-aware systems, such as location models and location-based services, as well as challenges such as user privacy.
Prereq: GEOG 581.

**GEOG 597. Qualitative Methods in Geography. 4 Credits.**
Explores conceptual and practical dimensions of qualitative research. Includes linking theory and method; research question formulation; project design; ethics; data gathering, analysis, and presentation.

**GEOG 598. Geospatial Project Design. 4 Credits.**
Introduction to methods for designing and implementing professional projects involving geospatial data, technologies, and analytical methods.

**GEOG 601. Research: [Topic]. 1-16 Credits.**
Repeatable.

**GEOG 602. Supervised College Teaching. 1-5 Credits.**
Repeatable.

**GEOG 603. Dissertation. 1-16 Credits.**
Repeatable.

**GEOG 605. Reading and Conference: [Topic]. 1-16 Credits.**
Repeatable.

**GEOG 606. Field Studies: [Topic]. 1-16 Credits.**
Repeatable.

**GEOG 607. Seminar: [Topic]. 1-5 Credits.**
Repeatable.

**GEOG 608. Workshop: [Topic]. 1-16 Credits.**
Repeatable.

**GEOG 609. Practicum: [Topic]. 1-16 Credits.**
Repeatable.

**GEOG 610. Experimental Course: [Topic]. 1-5 Credits.**
Repeatable.

**GEOG 611. Theory and Practice of Geography I. 4 Credits.**
Introduction to professional practice in geography and the development of geographic concepts and theories from Ancient times through the mid-twentieth century. Sequence with GEOG 612, 613.

**GEOG 612. Theory and Practice of Geography II. 4 Credits.**
The development of geographic concepts and theories from the mid-20th century to the present. Students learn to refine effective geographic research questions. Sequence with GEOG 611 and 613.
Prereq: GEOG 611.

**GEOG 613. Research Design. 4 Credits.**
Examines main components of research design, including research questions, methodological approach, institutional review boards, funding programs, proposal writing, and application. Sequence with GEOG 611 and 612.
Prereq: GEOG 612.

**GEOG 631. Progress in Physical Geography. 1 Credit.**
Recent developments in climatology, geomorphology, hydrology, and biogeography. Lectures, readings, and presentation of faculty and student works in progress. Repeatable for maximum of 12 credits.

**GEOG 632. Progress in Human Geography. 1 Credit.**
Recent developments in cultural, economic, environmental and political geography. Lectures, readings, and presentation of faculty and student works in progress. Repeatable for maximum of 12 credits.

**GEOG 633. Progress in Geographic Information Science. 1 Credit.**
Recent developments in cartography, GIS, remote sensing, data analysis, and visualization. Lectures, readings, and presentation of faculty and student works in progress. Repeatable for maximum of 12 credits.