



# Geography

Graduate Faculty

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## Programs

- Geographic Information Science *cert*
- Outdoor Leadership *cert*

## Geographic Information Science *cert*

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Required Credits: 12

Required GPA: 3.00

### I REQUIRED COURSES

Note: It is advised that students not having previously taken a GIS course include GEOG 5231, Introduction to Geographic Information Systems, as one of their courses

Select 4 courses from the following list:

- GEOG 5150 Applications of Machine Learning (3 credits)
- GEOG 5226 Cartography (3 credits)
- GEOG 5231 Introduction to Geographic Information Systems (3 credits)
- GEOG 5232 Intermediate Geographic Information Systems (3 credits)
- GEOG 5255 Introduction to Remote Sensing (3 credits)
- GEOG 5265 Spatial Analysis (3 credits)
- GEOG 5275 Advanced Geographic Information Systems (3 credits)
- GEOG 5285 Drone Applications (3 credits)
- GEOG 5910 Directed Independent Study (3 credits)  
*or*GEOG 5970 Internship (3 credits)  
*or*GEOG 5980 Research (3 credits)

### Program Learning Outcomes | Geographic Information Science

1. Comprehend the fundamental concepts and practices of Geographic Information Systems (GIS).
2. Collect, manage, analyze, and visualize geospatial data using GIS software.
3. Employ cartographic and map design principles to produce maps and visualizations.
4. Select and apply appropriate geoprocessing tools and spatial analysis techniques to solve real-world problems.
5. Effectively communicate spatial information through maps and visualizations.

## Outdoor Leadership *cert*

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**\*\*Program Offered Pending Approval from MinnState, Dept of Education, and HLC\*\***

Required Credits: 14

Required GPA: 3.00

### I REQUIRED COURSES

Complete the following courses:

- ENVR 5150 Outdoor Field Skills (2 credits)
- ENVR 5710 Indigenous Environmental Knowledge: Global Perspective (3 credits)
- GEOG5224
- GEOG 5360 Adventure Programming (3 credits)
- GEOG 5700 Wilderness First Aid (1 credit)
- GEOG 5750 Wilderness First Responder (2 credits)

## Geography Courses

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### GEOG 5125 Weather and Climate (3 credits)

Weather is the study of the atmosphere over short time scales, while climate is the study of long-term weather trends. The study of weather is commonly termed meteorology, which is actually a branch of physics associated with fluid dynamics. Climate is associated with statistical procedures and analyses. This course examines the geographic patterns and processes of global climate and weather, as well as topics such as global climate change, global climate models, and extreme weather events. Students learn about the Earth's atmosphere; energy budgets and astronomical controls on weather processes; oceanic and atmospheric circulation; the basic atmospheric parameters; atmospheric hazards such as tornadoes, hurricanes, hail, and lightning; and global climate change issues.

### GEOG 5130 Biogeography (3 credits)

This course examines the distribution and diversity of flora and fauna across multiple scales. It will focus on the factors that shape and influence these patterns and investigate the role of disturbance in this process. It will also incorporate both field and lab experiences to further examine the key concepts of biogeography.

### GEOG 5140 Landscape Ecology (3 credits)

This course examines the connection of pattern and process at the scale of the landscape. Students will utilize several analytical methods to examine and explain how humans, disturbance and natural process work in concert to create landscape-level dynamics and change. The course will also cover how landscape ecology is applied to assist in conservation efforts.

**GEOG 5150 Applications of Machine Learning (3 credits)**

The uses of machine learning, data science and artificial intelligence are everywhere today. Much of the data we create through our daily activities gets processed and used to customize services, offer better health care, or target you for specific advertising. Although there are many benefits of using data in these ways, there can be pitfalls and caution is always warranted when employing these tools. As such this class attempts to teach you the basic foundations of machine learning with particular emphasis to its application in environmental and spatial analysis. To this end, we will use the python development environment and we will emphasize the most commonly used tools including supervised learning algorithms (logistic regression, linear regression, neural networks), unsupervised learning algorithms (k- means, principal component analysis). In addition, we also cover anomaly detection, natural language processing and building recommender systems. A central focus will be building this foundation so students can successfully participate in a Kaggle competition which is a premier venue for testing your machine learning skillset.

**GEOG 5190 Qualitative Methods in Geographic Research (3 credits)**

As a geographic perspective becomes increasingly important in analysis of critical issues at multiple scales from the local to the global, this course demonstrates how research grounded in qualitative methodologies encourages innovative approaches and yields significant insights. Prerequisites: GEOG 2200. While not required, it is highly recommended that GEOG 4265/5265 and GEOG 4210/5210 be taken previously or concurrently.

**GEOG 5220 Field Map Skills (3 credits)**

In this course, you will experience using industry standard GIS technology utilized in the field for data collection and analysis. You will practice techniques and best practices for sampling and collection of spatial data. Prerequisite: GEOG 5231.

**GEOG 5226 Cartography (3 credits)**

Construction and production of maps with an emphasis on computer-generated thematic maps and graphs. Lecture 3 hours, laboratory 2 hours. Prerequisite: Consent of instructor.

**GEOG 5231 Introduction to Geographic Information Systems (3 credits)**

This course develops a proficiency in basic GIS skills for those new to GIS. The premise of the course revolves around analytical problem solving using spatial data and techniques. The course also focuses on graphic communication of quantitative data including cartographic mapping concepts and data classification. This course concentrates on learning to navigate the current version of ArcGIS software at a beginner's level and developing and creating maps as communication tools.

**GEOG 5232 Intermediate Geographic Information Systems (3 credits)**

This course covers the theories and application of GIS for spatial data management, thematic mapping, and environmental data analysis and modeling. Intermediate GIS expands on the concepts and methods presented in the Introduction to GIS course and guides students through a more comprehensive overview of the geospatial analysis principles and techniques used in GIS. Course objectives include (1) enhance and build knowledge of GIS as a system and science, (2) improve geospatial reasoning and analysis skills, and (3) develop and enhance problem solving skills. Prerequisite: GEOG 5231 or consent of instructor.

**GEOG 5255 Introduction to Remote Sensing (3 credits)**

Analysis of a special class of pictures that provide an overhead perspective. These images have unique properties that provide a distinct advantage to assessing spatial changes and patterns of change on the Earth's surface. Students develop an understanding and the skills necessary for interpreting air photos, satellite, and remotely sensed images. Prerequisite: GEOG 5231 or consent of instructor.

**GEOG 5265 Spatial Analysis (3 credits)**

An examination in the concepts and application of advance spatial statistical methodologies. These include, kriging, spatial autocorrelation, spatial regression models, and cluster analysis.

**GEOG 5275 Advanced Geographic Information Systems (3 credits)**

This course will give students hands on experience working with advanced geodatabases, the basic automation and scripting of geospatial processes, web mapping, and server side application in GIS. Prerequisites: GEOG 5231 and GEOG 5232.

**GEOG 5285 Drone Applications (3 credits)**

This course explores the use of Unmanned Aircraft Systems (UAS, aka ;drones;) in natural resources management and environmental sciences with an emphasis on forestry. Students will engage in hands-on experience with planning drone mapping operations, collecting data using drone systems, and the subsequent processing and analysis of the data acquired from drone flights. Prerequisite(s): None.

**GEOG 5360 Adventure Programming (3 credits)**

Nuts and bolts of planning educational outdoor adventure experiences. Also reviews theory, literature, and program types. Prerequisite(s): None

**GEOG 5410 Geography of North America (3 credits)**

A regional analysis of the physical, demographic, economic and cultural characteristics of the nations in North America.

**GEOG 5531 Political Geography (3 credits)**

This course utilizes "World Systems Theory" to investigate 1) theories of State formation and organization; 2) historical processes of imperialism, colonialism, and decolonization; 3) major issues of the emerging political economy; 4) historical and contemporary geopolitics; and 5) the political geography of everyday life.

**GEOG 5532 Political Ecology (3 credits)**

Political ecology utilizes a necessary geographical perspective to understand and analyze the biophysical processes that shape issues otherwise inadequately conceptualized as political, economic or social. This spatial understanding developed by political geographers reveals relationships of the ecological and the political that are simultaneously mutually reinforcing and, often, mutually antagonistic. GEOG 3531/5531 or consent of instructor.

**GEOG 5550 Site and Resource Analysis in Planning (3 credits)**

This course emphasizes techniques and methods in the location, analysis, evaluation, and design of sites, focusing on identifying use potentials and impact limitations for planning and management. Prerequisites: GEOG 2400 or consent of instructor

**GEOG 5560 Metropolitan Land Use Planning (3 credits)**

An examination of the identification and inventory methods of land use analysis including the designing of land use models which are compatible with environmental, social, and economic goals.

**GEOG 5570 Recreational Lands Management for Sustainable Tourism (3 credits)**

This course investigates the planning processes involved with management of natural resources on public recreational lands. More specifically, it covers topics such as planning efforts and approaches to bolster local economies by increasing recreation opportunities for both residents and tourists alike, while balancing sustainability to ensure the vitality of the tourism sector and quality resources for generations to come. Prerequisite(s): none.

**GEOG 5580 Regional Development Planning (3 credits)**

An examination of methods and processes emphasizing contemporary relationships between planners and governments, the private sector, and nongovernmental organizations regarding relationships between regions nationally and internationally, with special attention to environmental sustainability.

**GEOG 5630 Conservation Biology (3 credits)**

Principles and theories of conservation biology. Topics include biodiversity, threats to biodiversity, extinctions, management of threatened and endangered species, managing habitats for conservation, and methods to mitigate biodiversity loss. Also BIOL 5630

**GEOG 5700 Wilderness First Aid (1 credit)**

Wilderness Advanced First Aid is an initial course for outdoor adventurers and outdoor professionals who may need to provide patient care when help is delayed for hours to days. The course focuses on basic lifesaving skills, patient assessment, field care for common injuries and illnesses, environmental illnesses, and proper reporting for rescue assistance. Prerequisite(s): None.

**GEOG 5750 Wilderness First Responder (2 credits)**

Following the Wilderness Medical Associates Wilderness First Responder curriculum, this course is ideally suited to professionals or other individuals who may find themselves as the primary medical caregivers for a long time. The program's goal is to help learners develop the critical thinking skills necessary to develop appropriate diagnoses and treatment plans for patients being managed in remote, low-resource areas. Students who finish this course and complete the WFR tests will receive the Wilderness Medical Associates Wilderness First Responder Certificate. Prerequisite(s): GEOG 5700.

**GEOG 5810 Geography of Europe (3 credits)**

A regional analysis of the cultural, economic, physical and landscape patterns of the European cultural region. NOTE: Recommended for students in Euro-Spring, International Studies, foreign languages, and prospective teachers.

**GEOG 5820 Geography of East, South, and Southeast Asia (3 credits)**

This course is designed to provide a more in depth look at Asian sub regions of South, East and Southeast Asia. Geographically, we will examine and analyze activities in this part of the world through cultural, demographic, political, economic, urban and geopolitical lenses. Prerequisite: GEOG 5820

**GEOG 5840 Geography of Africa (3 credits)**

Despite persistent bias about it, Africa's cultural complexity, social dynamism, and political/economic struggle have tremendous relevance for the study of global trends at the start of the twenty-first century. The central purpose of this course is to demonstrate that relevance by investigating the cultural, historical, economic, and political dimensions of change in Africa.

**GEOG 5860 Geography of Latin America and the Caribbean (3 credits)**

This course is designed to provide a more in depth look at the region of Latin America and the Caribbean. We recognize at the outset that this is a broad subject and may be looked at from numerous perspectives. Our objective thus is to examine this geographic region through economic, cultural, environmental, urban and political lenses.

**GEOG 5870 Planning for Sustainable Cities (3 credits)**

Using a World Regional Geography approach, this course examines the dynamics of urban development across the globe, with particular reference to sustainable urban design and urban biodiversity. Political, cultural, environmental and economic influences on the city are examined in both the developed and the developing world.

**GEOG 5910 Directed Independent Study (3 credits)**

Arranged individual study

**GEOG 5931 Experimental Course (3 credits)**

A course proposed for inclusion in the University curriculum. May not be offered more than two times as an experimental course.

**GEOG 5932 Experimental Course (3 credits)**

A course proposed for inclusion in the University curriculum. May not be offered more than two times as an experimental course.

**GEOG 5933 Experimental Course (3 credits)**

A course proposed for inclusion in the University curriculum. May not be offered more than two times as an experimental course.

**GEOG 5934 Experimental Course (3 credits)**

A course proposed for inclusion in the University curriculum. May not be offered more than two times as an experimental course.

**GEOG 5935 Experimental Course (3 credits)**

A course proposed for inclusion in the University curriculum. May not be offered more than two times as an experimental course.

**GEOG 5936 Experimental Course (3 credits)**

A course proposed for inclusion in the University curriculum. May not be offered more than two times as an experimental course.

**GEOG 5937 Experimental Course (3 credits)**

A course proposed for inclusion in the University curriculum. May not be offered more than two times as an experimental course.

**GEOG 5938 Experimental Course (3 credits)**

A course proposed for inclusion in the University curriculum. May not be offered more than two times as an experimental course.

**GEOG 5939 Experimental Course (3 credits)**

A course proposed for inclusion in the University curriculum. May not be offered more than two times as an experimental course.

**GEOG 5970 Internship (3 credits)**

Graded Satisfactory/Unsatisfactory only. Student internships may be either full-time or part-time in a public or private agency appropriate to the degree objective. Internships consist of closely supervised periods of service that are arranged in advance of the course registration. Students should consult their advisor concerning prerequisites.

**GEOG 5980 Research (3 credits)**

Research carried out by the student that is based on appropriate methodology and scholarship.

**All-University Courses**

The course numbers listed below, not always included in the semester class schedule, may be registered for by consent of the advisor, instructor, or department chair, or may be assigned by the department when warranted. Individual registration requires previous arrangement by the student and the completion of any required form or planning outline as well as any prerequisites.

1910, 2910, 3910, 4910 DIRECTED INDEPENDENT STUDY  
 1920, 2920, 3920, 4920 DIRECTED GROUP STUDY  
 1930, 2930, 3930, 4930 EXPERIMENTAL COURSE  
 1940, 2940, 3940, 4940 IN-SERVICE COURSE  
 1950, 2950, 3950, 4950 WORKSHOP, INSTITUTE, TOUR  
 1960, 2960, 3960, 4960 SPECIAL PURPOSE INSTRUCTION  
 1970, 2970, 3970, 4970 INTERNSHIP  
 1980, 2980, 3980, 4980 RESEARCH  
 1990, 2990, 3990, 4990 THESIS