

Geography and Geographic Information Science

<http://arts-sciences.und.edu/geography>

FACULTY: Atkinson, Munski (Graduate Director), Niedzielski, Rundquist, Todhunter, Vandeberg (Chair) and Wang (Graduate GISc Certificate Director)

Degrees Granted: Master of Science (M.S.), Master of Arts (M.A.) and Certificate in Geographic Information Science (GISc)

The Geography & GISc Department graduate program includes both thesis and non-thesis options leading to the M.S. and M.A. degrees, and a Certificate in Geographic Information Science. The principle areas of concentration are community and urban development, environmental geography, geographic education, and geospatial techniques. The graduate programs provide close student-faculty interaction, easy access to current computer technology and field equipment, a broad liberal arts academic setting, and an abundant number of research topics within the American Great Plains and Canadian Prairie Provinces. In addition, the department offers an array of courses in geospatial technologies to allow students to build expertise in GIS, remote sensing, cartography and spatial analysis. Prospective graduate students are encouraged to apply by February 1 (for Fall enrollment) and October 15 (for Spring enrollment) of each year to receive fullest consideration for acceptance and funding. Prospective students interested in the Certificate in Geographic Information Sciences should apply by April 1.

The M.S. option in environmental geography reflects a geographic focus on land use, and land use change, climatology, water resources, human impact, biogeography, geomorphology, and landscape ecology. Students follow a sequence of required and elective courses that reflect an environmental emphasis. The M.S. program prepares students for doctoral study or a professional career in government, industry, or education in a wide variety of environmentally-related fields. Students also must take cognate or minor courses in biology, geology, atmospheric sciences, or other related fields.

The M.A. option in community and urban development emphasizes the background education students need to enter careers in community development, local economic development, land use planning, federal government service, historic preservation, and travel and tourism. This option also provides the background for those students wishing to pursue a doctoral degree in human geography. Students in the M.A. option take a selection of courses in population, economic, social, urban, cultural, historical, and regional geography. They also can take minor or cognate courses in business and public administration, international relations, anthropology and archaeology, sociology, languages, and other fields appropriate to their goals.

The Certificate in Geographic Information Science (GISc) gives students a solid theoretical foundation in GISc and the state-of-the-art technical skills needed for a successful career in GISc. Graduates with skills in GISc are in demand in the private and government sectors dealing with human development, environmental management, business, and geographic education at all levels. Students seeking the certificate must be admitted as a graduate student to UND, although students interested in taking only one or more of the courses in the certificate can apply as a non-degree-seeking student. The certificate is designed to serve: a) students pursuing a graduate degree from UND who wish to also pursue the GISc certificate and b) non-degree-seeking professionals already holding a baccalaureate degree who seek to "re-tool." The 12-credit program (9 credits of required courses and 3 of electives) is designed so that on-campus students can complete the necessary certificate course work in 2 years or less. The online version of the program has the same objectives as the on-campus program. However, the online certificate is designed for non-degree-seeking students and working professionals off campus. It focuses on a tight core curriculum that can be completed in 12 months.

Details pertaining to admission requirements, degree requirements and courses offered can be found in the Degree section.

Master of Science (M.S.)

Mission Statement and Program Goals

The mission of the Department of Geography & GISc's Master of Science graduate degree program is to provide a solid foundation in the concepts and theories of physical geography. Furthermore, the program seeks to develop skills in the use of geospatial technologies, that will prepare students for careers in natural resources management, geoscience, federal government service, and geographic information science, or for doctoral work in physical geography.

Goal 1: Students will be able to create new knowledge and apply geographic techniques to solve geographic problems related to natural resources management and the geosciences.

Goal 2: Students will exhibit a fundamental understanding of the breadth, depth, and integration of geography.

Goal 3: Students will be able to integrate their learning in geography to the broader world.

Master of Arts (M.A.)

Mission Statement and Program Goals

The mission of the Department of Geography & GISc's Master of Arts graduate degree program is to provide a solid foundation in the concepts and theories of human geography, and to prepare students for careers in community and local economic development, land use planning, federal government service, historic preservation, geographic information science, and travel and tourism, or for doctoral work in human geography.

Goal 1: Students will be able to create new knowledge and apply geographic techniques to solve geographic problems related to community and local economic development and land use planning.

Goal 2: Students will exhibit a fundamental understanding of the breadth, depth, and integration of geography.

Goal 3: Students will be able to integrate their learning in geography to the broader world.

Certificate in Geographic Information Science (GISc)

Mission Statement and Program Goals

The mission of the graduate Certificate in GISc is to provide a solid theoretical foundation in GISc and state-of-the-art technical skills that prepare students to meet the GISc workforce demands of academia, government, and private industry.

Goal 1: Students will exhibit a fundamental understanding of core concepts and principles of GISc.

Goal 2: Students will be able to design effective maps.

Goal 3: Students will be able to solve spatial problems using GISc.

Goal 4: Students will be able to conduct applied research projects using geospatial technology tools.

Master of Science (M.S.)

Admission Requirements

The applicant must meet the School of Graduate Studies' current minimum general admission requirements as published in the graduate catalog.

1. A four-year bachelor's degree from a recognized college or university.
2. A GPA of at least 3.00 in all undergraduate work.

3. A minimum of 9 semester credits of undergraduate coursework in geography, preferably physical geography. An additional 6 credits in the fields cognate to geography are required.
4. Satisfy the School of Graduate Studies' English Language Proficiency requirements as published in the graduate catalog.
5. International applicants who have received their bachelor's or master's degree in the United States or English speaking Canada are not required to submit the TOEFL or IELTS.
6. Meet all School of Graduate Studies requirements for admission.

Outstanding applicants are evaluated on an individual basis and those with limited background in geography but a distinguished record in another discipline may be accepted in a qualified or provisional status.

Degree Requirements

Students seeking the Master of Science degree at the University of North Dakota must satisfy all general requirements set forth by the School of Graduate Studies as well as particular requirements set forth by the Geography Department.

1. Four required courses:

GEOG 500	Graduate Studies in Geography	1
GEOG 501	Geographic Thought Through Time	2
GEOG 576	Field Methods and Analysis in Geography	3
GEOG 578	Geographic Research and Writing	2
Total Credits		8
2. A minor or cognate area of study, and a graduate program of study that reflects the student's focus on physical geography topics (9 credits). Cognate courses must be from at least two academic departments outside Geography.

Thesis

1. A minimum of 30 semester credits, including 9 semester credits for approved minor or cognate courses.
2. At least one-half of the credits must be at or above the 500-level.
3. A maximum of one-fourth (usually 8-9 semester credits) of the credit hours required for the degree may be transferred from another institution.
4. Preparation and successful defense of a thesis. (A minimum of 6 credits for GEOG 998 Thesis.)

Non-Thesis

1. A minimum of 36 semester credits, including 9 semester credits for approved minor or cognate courses.
2. A minimum of 12 credits that focus upon geospatial skills and techniques which include quantitative methods, computer graphics and mapping, geographic information systems, remote sensing, field methods, and cartography. The non-thesis programs emphasize development of geospatial skills that can be applied to specific problems and projects that may or may not involve research.
3. Two credits of GEOG 997 Independent Study are required.
4. At least one-half of the credits must be at or above the 500-level.
5. A maximum of one-fourth of the credit hours required for the degree may be transferred from another institution.
6. Preparation of a written independent study approved by the faculty advisor.
7. Comprehensive final examination.

Master of Arts (M.A.)

Admission Requirements

The applicant must meet the School of Graduate Studies' current minimum general admission requirements as published in the graduate catalog.

1. A four-year bachelor's degree from a recognized college or university.
2. A GPA of at least 3.00 in all undergraduate work.
3. A minimum of 9 semester credits of undergraduate coursework in geography, preferably in human geography. An additional 6 credits in fields

cognate to geography are also required. Cognate courses must be from at least two academic departments outside Geography.

4. Meet all School of Graduate Studies requirements for admission.
5. Satisfy the School of Graduate Studies' English Language Proficiency requirements as published in the graduate catalog.

Outstanding applicants are evaluated on an individual basis and those with limited backgrounds in geography but a distinguished record in another discipline may be accepted in a qualified or provisional status.

Degree Requirements

Students seeking the Master of Arts degree at the University of North Dakota must satisfy all general requirements set forth by the School of Graduate Studies as well as particular requirements set forth by the Geography Department.

1. Four required courses:

GEOG 500	Graduate Studies in Geography	1
GEOG 501	Geographic Thought Through Time	2
GEOG 576	Field Methods and Analysis in Geography	3
GEOG 578	Geographic Research and Writing	2
Total Credits		8
2. A minor or cognate area of study, and a graduate program of study that reflects the student's focus on human geography topics (9 credits).

Thesis

1. A minimum of 30 semester credits, including 9 semester credits for approved minor or cognate courses.
2. At least one-half of the credits must be at or above the 500-level.
3. A maximum of one-fourth (usually 8-9 semester credits) of the credit hours required for the degree may be transferred from another institution.
4. Preparation and successful defense of a thesis (a minimum of 6 credits for GEOG 998 Thesis).

Non-Thesis

1. A minimum of 36 semester credits, including 9 semester credits for approved minor or cognate courses.
2. A minimum of 12 credits that focus upon geospatial skills and techniques which include quantitative methods, computer graphics and mapping, geographic information systems, remote sensing, field methods, and cartography. The non-thesis programs emphasize development of geospatial skills that can be applied to specific problems and projects that may or may not involve research.
3. A minimum of two credits of GEOG 997 Independent Study
4. At least one-half of the credits must be at or above the 500-level.
5. A maximum of one-fourth (usually 8-9 semester credits) of the credit hours required for the degree may be transferred from another institution.
6. Preparation of a written independent study approved by the faculty advisor.
7. Comprehensive final examination.

Certificate in Geographic Information Science (GISc)

The Geography department offers a graduate certificate in Geographic Information Science (GISc). GISc is the foundation of Geographic Information Systems (GIS), which integrate spatial data sets in the form of digital maps, digital aerial photos, satellite imagery, and global positioning system (GPS) coordinates. The goal of GISc is to model landscapes digitally and to enable the characterization of spatial and temporal processes.

Certificate students must be admitted to UND as either full or part-time graduate students. Application for admission must be made to the UND School of Graduate Studies. The certificate is designed to serve:

1. non-geography graduate students currently pursuing a graduate degree from UND, and

2. non-degree-seeking professionals already holding a graduate and/or baccalaureate degree who seek to "re-tool."

The courses taken in a previously completed GISc certificate program may be applied to a Master's degree in Geography.

Admission Requirements

1. A baccalaureate degree from an accredited university.
2. A GPA of at least 2.75 in all undergraduate work.

Certificate Requirements

Successful completion of the 12-credit GISc Certificate requires the following:

1. Completion of the nine credits of core courses (see below).
2. Completion of at least three credit hours of elective courses (see below).
3. A minimum grade point average of 3.00.
4. Completion time of no more than five years.

5. Required Core Courses

GEOG 471 & 471L	Cartography and Visualization and Cartography and Visualization Laboratory	3
GEOG 474 & 474L	Introduction to Geographic Information Systems (GIS) and GIS Laboratory	3
GEOG 574	Advanced Techniques in Geographic Information Systems	3

Elective Courses

Select one of the following:		3
GEOG 377 & 377L	Quantitative Applications in Geography and Spatial Analysis Laboratory	
GEOG 475	Digital Image Processing	
GEOG 476	Selected Topics in Geographic Information Systems	
GEOG 575	Seminar in Remote Sensing	
GEOG 591	Directed Study in Geographical Problems	
Total Credits		12

Courses

GEOG 500. Graduate Studies in Geography. 1 Credit.

An overview of contemporary research in geography. Includes a field trip and discussions on the differences between graduate and undergraduate education, as well as strategies for successful completion of a graduate degree.

GEOG 501. Geographic Thought Through Time. 2 Credits.

Required of all graduate students. A scholarly examination of the scope and content of geography from its inception to the present.

GEOG 521. Advanced Physical Geography. 3 Credits.

An investigation of an advanced topic in physical geography. May be repeated if a different topic is examined. Prerequisite: Instructor consent. Repeatable.

GEOG 537. Graduate Cooperative Education. 1-3 Credits.

Practical experience of applying advanced concepts of geography. Experience will vary from student to student and must be coordinated with co-op host. Prerequisites: MS/MA students must have minimum of 12 graduate credits and permission of department chair or co-op coordinator.

GEOG 551. Advanced Human Geography. 3 Credits.

An investigation of an advanced topic in human geography. May be repeated if a different topic is examined. Prerequisite: Instructor consent. Repeatable.

GEOG 574. Advanced Techniques in Geographic Information Systems. 3 Credits.

An advanced course designed to extend GIS knowledge and experience and to prepare students to become effective GIS analysts. The course follows a hands-on, problem-solving approach that integrates the interests and analytical needs to participating students. Prerequisite: GEOG 474 or an equivalent approved by the department.

GEOG 575. Seminar in Remote Sensing. 3 Credits.

A seminar in the analysis of remote sensing techniques as applied to contemporary research problems in geography. Prerequisite: GEOG 475 or consent of instructor.

GEOG 576. Field Methods and Analysis in Geography. 3 Credits.

An advanced, intensive approach to the measuring and mapping of cultural and physical features of the earth in the field. Familiarization with the practical problems involved in data collection techniques in rural as well as urban areas and transfer of the pattern of phenomena of an area to a scale suitable for mapping.

GEOG 578. Geographic Research and Writing. 3 Credits.

Required of all graduate students. Orientation to methods of research and communication in geography. Emphasis upon research design, identification of bibliographic and geographic source materials, communication skills, and proposal writing. Prerequisite: Graduate standing. S.

GEOG 591. Directed Study in Geographical Problems. 1-4 Credits.

Directed advanced research in a specialized field of geographic study. May be repeated up to a total of 9 credits. Prerequisite: Consent of instructor. Repeatable to 9 credits. F,S,SS.

GEOG 996. Continuing Enrollment. 1-12 Credits.

Repeatable. S/U grading.

GEOG 997. Independent Study. 2 Credits.

GEOG 998. Thesis. 1-6 Credits.

Repeatable to 6 credits.

Undergraduate Courses for Graduate Credit

GEOG 377. Quantitative Applications in Geography. 2 Credits.

Application of statistical and mathematical techniques to research topics in geography. Prerequisite: MATH 103 or consent of instructor. F.

GEOG 377L. Spatial Analysis Laboratory. 1 Credit.

Practical applications of statistical and mathematical techniques for geographic problems. Students work on projects which involve solving problems by spatial-oriented computations. Use of relevant statistical programs on computers are emphasized. Prerequisite: MATH 103. Corequisite: GEOG 377. F.

GEOG 421. Selected Topics in Physical Geography. 3 Credits.

An examination of an advanced physical geography topic chosen from field methods, biogeography, human impact on the environment, physiography, or others. Repeatable to nine credits if different topics are examined. Prerequisite: GEOG 121 or consent of instructor. Repeatable to 9 credits. F,S.

GEOG 452. Selected Topics in Economic Geography. 3 Credits.

Selected topics in economic geography including but not limited to industrial location, transportation, rural economic development, and others. Repeatable to nine credits if different titles are examined. Prerequisite: GEOG 151 or consent of instructor. Repeatable to 9 credits. On demand.

GEOG 453. Historical Geography. 3 Credits.

Using the spatial approach, landscape change is analyzed over time in various regions of the world using a variety of scales of study. Emphasis is placed upon the relationship of historical geography to historic preservation and tourism. On demand.

GEOG 455. Geopolitics. 3 Credits.

Geographic analysis of the global political system and the significance of the nation-state, intergovernmental organizations, globalization, free trade, and terrorism with consideration of the broad political, social cultural, and economic contexts of world disputes. Prerequisite: GEOG 250 or consent of instructor. On demand.

GEOG 457. Urban Geography and Planning. 3 Credits.

This course examines the internal workings of cities from political, economic, and social perspectives. Geographic approaches to urban analysis are discussed, as are various methods for contemporary urban planning. Students learn to view the city as a geographic phenomenon created by human effort. S.

GEOG 462. Geography of North America II. 3 Credits.

A regional analysis of the physical, cultural, and economic features of a selected region or group of regions within North America. May be repeatable to six credits if a different region is examined. Prerequisite: GEOG 262 or consent of instructor. On demand.

GEOG 463. Regional Geography. 2-3 Credits.

A regional and topical analysis of the physical and cultural features with emphasis on one continent or region. May be repeated up to nine credits provided different regions and approaches are involved. Repeatable to 9 credits. S.

GEOG 471. Cartography and Visualization. 2 Credits.

This course examines the art, science, and technology of cartography and visualization. It familiarizes students with basic cartographic principles and with GIS, both of which are applicable to a wide range of professional fields and academic disciplines. Students learn how maps are designed and used to accurately represent and effectively communicate spatial phenomena and relationships. The course also includes a discussion of selection of proper thematic mapping techniques. Corequisite: GEOG 471L. F.

GEOG 471L. Cartography and Visualization Laboratory. 1 Credit.

Students apply concepts learned in GEOG 471 to produce accurate, appropriate and well-designed maps using GIS software. Lab activities hone the ability of students to be informed producers and consumers of maps and provide hands-on experience that demonstrates how maps function as a communicative visual medium. Corequisite: GEOG 471. F.

GEOG 474. Introduction to Geographic Information Systems (GIS). 2 Credits.

An introductory course that examines the digital representation, manipulation, and analysis of geographic data, with emphasis on the analytical capabilities that GIS brings to bear on the solution of geographic problems. Prerequisites: GEOG 471 and 471L or equivalent or consent of instructor. Corequisite: GEOG 474L. F,S.

GEOG 474L. GIS Laboratory. 1 Credit.

Hands-on application of theory and methods associated with digital spatial data representation, manipulation, and analysis. Corequisite: GEOG 474. F,S.

GEOG 475. Digital Image Processing. 3 Credits.

A course focused on the concepts and principles involved in the use of digital remotely sensed data as they are applied to environmental monitoring and natural resource management. Emphasis is placed on algorithm development and 'hands-on' application of digital techniques to select imagery. Prerequisites: GEOG 374 and 374L. S.

GEOG 476. Selected Topics in Geographic Information Systems. 3 Credits.

An examination of a specific application area or set of techniques in GIS including, but not limited to, Business GIS, Environmental GIS, GIS Databases, GIS Scripting and Web-Based GIS. Repeatable to six credits if different topics are examined. Prerequisites: GEOG 474 and GEOG 474L, or instructor consent. Repeatable to 3 credits. On demand.