

## Program Overview

The course curriculum for the doctoral degree is designed to provide depth and breadth of knowledge in geographic theory and research methods. To be admitted to the Geography Doctoral program, a student must have completed a Master's Degree in Geography or in a related discipline.

Each doctoral student will have her/his program tailored to meet the academic goals agreed upon in consultation with the Ph.D. research advisor, with the approval of the graduate program coordinator, the department chair, and the dean of The Graduate College. All programs will include the necessary core, skills, specialization, and internal and external elective courses.

## Educational Goal

The educational goal of the program is to provide a Ph.D. in Geography through which students will be educated in the process of geographic research, the development of new knowledge, and the application of this research and knowledge to solve problems with spatial dimensions.

## Financial Assistance

Graduate assistantships and scholarships are available to qualified candidates. Please contact the graduate staff advisor in the Department of Geography for more information about assistantships. The Graduate College can provide further information regarding scholarships.

## Application Requirements

The items listed below are required for admission consideration for applicable semesters of entry during the current academic year. Submission instructions, additional details, and changes to admission requirements for semesters other than the current academic year can be found on The Graduate College's website (<http://www.gradcollege.txstate.edu>). International students should review the International Admission Documents page (<http://mycatalog.txstate.edu/graduate/admission-documents/international/>) for additional requirements.

- completed online application
- \$55 nonrefundable application fee
- or
- \$90 nonrefundable application fee for applications with international credentials
- baccalaureate degree from a regionally accredited university (Non-U.S. degrees must be equivalent to a four-year U.S. Bachelor's degree. In most cases, three-year degrees are not considered. Visit our International FAQs (<https://www.gradcollege.txstate.edu/international/faqs.html>) for more information.)
- master's degree in geography or a related field from a regionally accredited university (Non-U.S. degrees must be equivalent to a U.S. Master's degree. Master's degrees following a three-year Bachelor's degrees may not be equivalent; please contact [gradcollege@txstate.edu](mailto:gradcollege@txstate.edu) ([gcprocessing@txstate.edu](mailto:gcprocessing@txstate.edu)) if you are unsure.)
- official transcripts from **each institution** where course credit was granted
- minimum 3.5 GPA in all completed graduate course work

- completion of a master's thesis or demonstrated evidence of scholarly research and writing
- GRE score is not required
- resume/CV
- statement of purpose explaining the student's reasons for pursuing doctoral study and academic professional interests and goals
- three letters of recommendation demonstrating adequate subject preparation in content and quality as reflected in the student's transcripts

## Approved English Proficiency Exam Scores

Applicants are required to submit an approved English proficiency exam score that meets the minimum program requirements below unless they have earned a bachelor's degree or higher from a regionally accredited U.S. institution or the equivalent from a country on our exempt countries list (<http://www.gradcollege.txstate.edu/international/language.html#wave>).

- official TOEFL iBT scores required with a 78 overall
- official PTE scores required with a 52
- official IELTS (academic) scores required with a 6.5 overall and minimum individual module scores of 6.0
- official Duolingo Scores required with a 110 overall
- official TOEFL Essentials scores required with an 8.5 overall

This program does **not** offer admission if the scores above are not met.

## Degree Requirements

The Doctor of Philosophy (Ph.D.) degree with a major in Geographic Information Science requires 46 semester credit hours.

## Course Requirements

Code	Title	Hours
<b>Required Courses</b>		
GEO 7300	Advanced Geographic Research Design	3
GEO 7301	Advanced Quantitative Methods in Geography	3
GEO 7302	Nature and Philosophy of Geography	3
GEO 7418	Technical Foundations and Methods in Geographic Information Science	4
<b>Specialization</b>		
Choose 12 hours from the following:		12
GEO 7316	Remote Sensing and the Environment	
GEO 7318	GIS and Environmental Geography	
GEO 7361	Advanced Geographic Information Systems	
GEO 7362	Geographic Visualization	
GEO 7364	Geocomputation	
GEO 7365	Theoretical Cartography	
GEO 7366	Advanced Topics in Remote Sensing	
GEO 7368	Lidar and SfM Data Processing and Analysis	
GEO 7369	Exploring Spatial Databases	
GEO 7372	Seminar in Geographic Information Science	
GEO 7419	Advanced Techniques in Geographic Information Science	
GEO 7447	Spatial Graphics in Geographic Education	
<b>Prescribed Electives</b>		

Choose 6 hours from the following:

GEO 7304	Qualitative Research Methods
GEO 7305	Historical Geography of the Environment
GEO 7308	Advanced Regional Field Studies
GEO 7313	Environmental Systems
GEO 7316	Remote Sensing and the Environment
GEO 7318	GIS and Environmental Geography
GEO 7330	Geography of Hazards
GEO 7334	Geographic Aspects of Water
GEO 7341	Urban Environment
GEO 7342	Theories and Methods in Geographic Education
GEO 7344	Seminar in Geographic Curriculum
GEO 7346	Standards and Assessment in Geography
GEO 7349	Population Geography
GEO 7361	Advanced Geographic Information Systems
GEO 7362	Geographic Visualization
GEO 7364	Geocomputation
GEO 7365	Theoretical Cartography
GEO 7366	Advanced Topics in Remote Sensing
GEO 7368	Lidar and SfM Data Processing and Analysis
GEO 7369	Exploring Spatial Databases
GEO 7370	Advanced Seminar in Environmental Geography
GEO 7371	Advanced Seminar in Geographic Education
GEO 7372	Seminar in Geographic Information Science
GEO 7390	Independent Study
GEO 7393C	Managing Urbanization
GEO 7393D	International Migration
GEO 7393E	Geography of Land Management
GEO 7393F	Gender and Development
GEO 7393G	Political Geography
GEO 7393J	Soil and Society
GEO 7393M	Global Climate Change
GEO 7393N	Rivers and Society
GEO 7415	Geographic Applications of Remote Sensing
GEO 7417	Geographic Information Systems
GEO 7418	Technical Foundations and Methods in Geographic Information Science
GEO 7419	Advanced Techniques in Geographic Information Science
GEO 7430	Field Methods
GEO 7447	Spatial Graphics in Geographic Education

#### Dissertation

Choose a minimum of 15 hours from the following:

GEO 7199C	Dissertation
GEO 7299C	Dissertation
GEO 7399C	Dissertation
GEO 7699C	Dissertation
GEO 7999C	Dissertation

**Total Hours**

6

## Comprehensive Examination Requirements

All candidates for graduate degrees must pass one or more comprehensive examinations.

### Advancement to Candidacy Applications for Advancement to Candidacy

The student will need to download the Application for Advancement to Candidacy form from The Graduate College website. The student will need to complete the form and return it to their department, who will then submit it to The Graduate College for approval.

### Advancement to Candidacy Time Limit

Doctoral students will need to be advanced to candidacy within four years of initiating Ph.D. course work. A student will need to indicate their intent to advance to candidacy during the term in which the student will complete the 31 hours of required course work.

No credit will be applied toward a student's doctoral degree for course work completed more than four years before the date on which the student is to advance to candidacy. This time limit applies toward credit earned at Texas State as well as credit transferred to Texas State from other accredited institutions.

Requests for a time extension must be submitted to the student's Ph.D. advisor and graduate coordinator who, in turn, submits a recommendation to the dean of The Graduate College.

### Grade-Point Requirements for Advancement to Candidacy

To be eligible for advancement to candidacy, the student must have a minimum GPA of 3.0. No grade earned below "B" on any graduate course work may apply toward a Ph.D. at Texas State.

Incomplete grades must be cleared through the office of The Graduate College at least ten days before the approval for advancement to candidacy.

### Semester Hour Requirements

The student must complete 31 semester hours of graduate course work to meet the minimum requirements for advancement to candidacy. In some cases, a student may need to complete additional hours before being allowed to advance to candidacy. The student must have satisfied the residency requirement of 18 graduate credit hours.

### Advancement to Candidacy Comprehensive Examination

All applicants for advancement to candidacy for the doctoral degree must pass a comprehensive examination. The examination procedure may be obtained from the graduate staff advisor. Both prevailing expectations in the field and the actual courses taken by the candidate will determine the subject matter of the examination. This examination may not be taken until all required course work has been completed. The student may take the candidacy comprehensive examination without being enrolled in course work provided they have not been enrolled in dissertation course(s).

Arrangements for the examination will be made with the student's Ph.D. advisor. The results of the "Advancement to Candidacy Comprehensive Examination" must be filed in the office of The Graduate College before final approval to advance to candidacy is given by the dean of The

46

Graduate College. The department is responsible for submitting the report to the office of The Graduate College.

## Dissertation Proposal

The dissertation proposal must be approved by the dean of The Graduate College and successfully defended in front of the dissertation committee before a student can advance to candidacy. Information about the dissertation procedures can be found in the "Dissertation Research and Writing" section of this catalog.

## Recommendation for Advancement to Candidacy

The geography graduate committee recommends the applicant for advancement to candidacy to the chair of the Department of Geography and the dean of The Graduate College. The dean of The Graduate College certifies the applicant for advancement to candidacy once all requirements have been completed.

## Dissertation Research and Writing

All doctoral students are required to complete a dissertation. The dissertation must be an original contribution to scholarship and the result of independent investigation in a significant area. Preparation of the dissertation must follow the latest edition of Kate L. Turabian's *A Manual for Writers* or the *Annals of the Association of American Geographers*.

## Dissertation Enrollment Requirements

### Enrollment

After being admitted to candidacy, students must be continuously enrolled each term for dissertation hours. If a student is receiving supervision on the dissertation during the summer or the student is graduating during the summer, the student must be enrolled in dissertation hours for that term. All candidates for graduation must be enrolled in dissertation hours during the term in which the degree is to be conferred.

### Hours

Students must complete a minimum of 15 semester hours of dissertation research and writing credit.

## Dissertation Time Limit

Students are expected to complete the dissertation within three years of advancement to candidacy. The geography graduate committee will review the student's progress annually.

## Ph.D. Advisory Committee

The Ph.D. advisory committee must be formed to oversee the research and writing of the dissertation. The Ph.D. advisory committee will include a Ph.D. advisor and a minimum of three additional committee members (two of whom must be from the Department of Geography and one from outside the department). The members must be chosen from qualified Ph.D. faculty. The Ph.D. advisor and the advisory committee will be selected in consultation with the student and through mutual agreement with committee members. The Ph.D. advisor will chair the dissertation committee and must be from the major department. The advisor and advisory committee must be approved by the graduate program coordinator, the department chair, as listed on the "Dissertation Committee Request" form and submitted to the dean of The Graduate College for final approval.

## Committee Changes

Any changes to the advisory committee must be submitted for approval to the advisory committee chair, the graduate coordinator, the department chair, and the dean of The Graduate College. Changes must be submitted no less than sixty days before the final oral comprehensive examination. The "Dissertation Advisor/Committee Member Change Request" form may be obtained from The Graduate College website.

## Dissertation Proposal

Students must submit the dissertation proposal and one copy of the official "Dissertation Proposal" form to their dissertation advisor. After obtaining **original** committee members' signatures and the department chair's signature, the student must submit the dissertation proposal and the form to the dean of The Graduate College for approval before proceeding with research on the dissertation. The proposal form may be obtained from The Graduate College website.

## Defense of the Dissertation Proposal

Students must defend the dissertation proposal in an oral examination with the Ph.D. advisory committee. The examination will address the proposed dissertation topic (problem definition and scope), research method, and relevant literature. The advisory committee must sign the "Defense of the Dissertation Proposal" form and then submit it for the signature of the department chair. The original must be sent to the office of The Graduate College.

## Final Oral Comprehensive Examination

Students must pass the final oral examination that covers the dissertation and the general field of the dissertation. To schedule the final oral examination, the student must apply to their Ph.D. advisor the term that they complete the dissertation. A completed "Doctoral Comprehensive Examination Report" form must be submitted to the dean of The Graduate College.

## Approval and Submission of the Dissertation and Abstract

The approval of the dissertation requires positive votes from the Ph.D. advisor and from a majority of the members of the Ph.D. advisory committee. One copy of the dissertation and the signed "Thesis/Dissertation Committee Approval" form must be submitted to the dean of The Graduate College for final approval once the committee has approved the dissertation. Refer to the *Graduate College Guide to Preparing and Submitting a Thesis/Dissertation* (available on The Graduate College website) for specific submission guidelines.

Doctoral level courses in Geography: GEO

## Courses Offered

### Geography (GEO)

#### GEO 7190. Independent Study.

Research in geography under the direction of a supervising professor. Repeatable once for additional credit with a different topic.

**1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Standard Letter

**GEO 7199A. Dissertation.**

Original research and writing in Geography is to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each long semester.

**1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7199B. Dissertation.**

Original research and writing in Geographic Education is to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each long semester.

**1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7199C. Dissertation.**

Original research and writing in Geographic Information Science, to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each long semester.

**1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7290. Independent Study.**

This course is designed to provide a student with credit while conducting independent research in consultation with his or her research advisor. Repeatable once for additional credit with a different topic.

**2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Standard Letter

**GEO 7299A. Dissertation.**

Original research and writing in Geography to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each long semester.

**2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7299B. Dissertation.**

Original research and writing in Geographic Education to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each long semester.

**2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7299C. Dissertation.**

Original research and writing in Geographic Information Science, to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each long semester.

**2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7300. Advanced Geographic Research Design.**

The purpose of this course is to develop an appreciation for the process of research as practiced by contemporary professional geographers. Topics covered include formulating research problems, reviewing and critiquing published literature, developing and executing a research design, and completing a research project.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7301. Advanced Quantitative Methods in Geography.**

How to mathematically and statistically model geographic problems is the focus of this course. The application of multivariate statistical techniques to geographic problems and the problems that spatial data create in the application of statistical and other quantitative techniques are central issues.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7302. Nature and Philosophy of Geography.**

This course is a critical analysis of the historical development of geographic thought: its roots, its present status, and future directions. (MULT).

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Multicultural Content

**Grade Mode:** Standard Letter

**GEO 7304. Qualitative Research Methods.**

This course introduces the qualitative research paradigm, including research design, methods of data collection, and inductive analysis. Standards of scientific research that call for a deeper evaluation of complex social relationships are emphasized. The focus and application will be oriented towards human geography and nature-society relations.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7305. Historical Geography of the Environment.**

This course examines the evolution of environmental problems using the techniques and analytical perspectives of historical geography. Special emphasis is given to the emergence of environmental challenges related to urbanization and climate change. Students engage with scholarship related to historical geography of the environment and develop original research related to environmental change.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7308. Advanced Regional Field Studies.**

Advanced study of geographic phenomena during field excursions to a particular site or region. Course includes preparation of site inventory, site guides, and on-site presentations. Repeatable once for additional credit with a different site or region.

**3 Credit Hours. 1 Lecture Contact Hour. 4 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Standard Letter

**GEO 7313. Environmental Systems.**

Theories and concepts involved in environmental systems will be examined. Tools and research issues relevant to their analysis will also be explored. Basic principles, as well as specific research questions and techniques, will be proposed to give students a foundation for analysis of current issues involving environmental systems.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7316. Remote Sensing and the Environment.**

A detailed examination and implementation of sophisticated approaches for processing satellite digital images with emphasis on environmental applications.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7318. GIS and Environmental Geography.**

This course examines the nature of environmental problems and explores the potential of GIS for environmental modeling and management. The conceptual basis for using GIS as well as the framing of environmental research problems will be covered.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7330. Geography of Hazards.**

This seminar examines research on issues related to the geography of hazards. Topics will be determined by instructor and student interests. Special emphasis will be placed on conceptual, theoretical, and methodological approaches to advance the study of spatial aspects of hazards such as risk, vulnerability, resilience, relief, recovery, and change.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7334. Geographic Aspects of Water.**

This seminar is a critical analysis of developmental and current literature that define water's critical role in determining the physical and cultural characteristics of the earth. Principal focus will be placed on water's role on land use and as a critical resource.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7337. Global Climate Change.**

This course examines the science of climate change and a range of implications for societies and various environmental contexts. Emphasis will be placed on anthropogenic influences driving changes across the 20th and 21st century and socioenvironmental responses amidst a complex and dynamic climate system.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7339. Geography of Land Management.**

This course explores scholarly research and primary sources related to the history and geography of land management. Emphasis is placed on research exploring the intersection of land management practices and social, economic, and environmental conditions, including the effects of natural resource development and anthropogenic climate change.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7340. Managing Urbanization.**

This course examines concepts and procedures related to managing and preparing for urban growth. Selected topics for examination include transportation planning, community engagement, housing and gentrification, uneven development, and environmental problems.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7341. Urban Environment.**

Students in this course will critically engage with scholarly and governmental research relating to urban environments, urban environmentalism, and urban environmental management. Emphasis is placed on students developing and executing a unique, topically relevant research project aimed at improving our understanding of the way in which human-environment interaction influences, and is influenced by, urban geography and the urban experience. (MULT).

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Multicultural Content

**Grade Mode:** Standard Letter

**GEO 7342. Theories and Methods in Geographic Education.**

This seminar is a critical analysis of previous and current literature concerning problems in pedagogy, philosophy, learning theory, research methods, teaching methodologies, and techniques of geographic education. A research paper will be required of each student on a topic related to the course content. (MULT).

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Multicultural Content

**Grade Mode:** Standard Letter



**GEO 7344. Seminar in Geographic Curriculum.**

The seminar will be a survey and discussion of major curricula in geographic education. Geography will be viewed as a school subject that is part of the social studies, as an element of interdisciplinary studies, and as a stand alone subject.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7345. Contemporary Topics in Geographic Education.**

This course is a survey of initiatives and reforms in geography education spanning from the 1980s to the present day. Students are expected to develop and carry out research plans that address current theories in geographic education. Repeatable once for additional credit with a different topic.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Standard Letter

**GEO 7346. Standards and Assessment in Geography.**

An introduction to assessment procedures in geography education is central to the course. Analysis of national standards in geography and how they have affected geographic learning in grades K-12 will be addressed.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7349. Population Geography.**

An in-depth study of the growth, movement, and spatial distribution of human populations is the central theme. Students will read and discuss professional articles that stress both theory and analytical techniques. Topics will include population growth and the environment, rural and small town depopulation, spatial diffusion processes, migration trends and theories, urban population growth, and techniques such as multivariate analysis and population projections. (MULT).

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Multicultural Content

**Grade Mode:** Standard Letter

**GEO 7350. Practicum in Teaching Geography.**

This course introduces key concepts in teaching geography and provides regular training and planned periodic evaluations of instructional responsibilities. Course topics include instructional and assessment strategies in geography and classroom management. This course is required for first-year instructional assistants in the Geography Department. Students do not earn graduate degree credit.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Graduate Assistantship|Exclude from Graduate GPA

**Grade Mode:** Leveling/Assistantships

**GEO 7352. Social Theory, Space, and Geography.**

This course examines key texts and concepts in social and political theory, focusing on theories of space and their mobilization in geographical research. Space and geography are approached with respect to several topics and debates in social theory including structuralism and agency, feminist theory and embodiment, racial formations, assemblage thinking and actor-network theory, hybridity, governance, and scale.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7361. Advanced Geographic Information Systems.**

This course provides exposure to advanced topics in GIS, particularly to quantitative methods and techniques for developing and interpreting models of natural and anthropogenic phenomena over the geographical space.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7362. Geographic Visualization.**

This course focuses on the interdisciplinary field of Geographic Visualization. Students will review visualization research in computer graphics, human computer interaction, GIScience, and cartography and relate the research approaches to useful and usable geographic visualizations. Prerequisite: GEO 3411 with a grade of "D" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7364. Geocomputation.**

Geocomputation reviews and analyzes concepts of computational modeling in Geography. The course will include modeling theory and advanced topics such as parallel processing, neural networks, cellular automata, scientific visualization, and fuzzy modeling. Students will practice model development, specifically spatially explicit simulation.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7365. Theoretical Cartography.**

This course focuses on theoretical developments in cartography, and in particular looks at the role of maps and other graphic devices as tools for the discovery, analysis, and communication of geographical knowledge. Prerequisite: GEO 3411 with a grade of "D" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7366. Advanced Topics in Remote Sensing.**

The course focuses on advanced topics including the theoretical basis, mathematical foundations, and current research frontiers in remote sensing. Prerequisite: GEO 5415 with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7368. Lidar and SfM Data Processing and Analysis.**

This course covers doctoral level skills in Light Detection and Ranging (lidar) systems and Structure from Motion (SfM) workflows for mapping and analysis of the environment. Students learn to successfully apply knowledge of lidar data and SfM workflows for a variety of Geographic Information Science applications.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7369. Exploring Spatial Databases.**

This course covers principles of spatial ontologies and spatial semantics to facilitate appropriate database conceptualization, design and implementation. Course assignments and projects provide in-depth experience with database query languages. Course work is completed using a spatially-enabled Relational Database Management Systems (RDBMS). Prerequisite: GEO 7417 or equivalent with a grade of 'B' or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7370. Advanced Seminar in Environmental Geography.**

This research seminar focuses on the methods, approaches, issues, and concepts of major themes in environmental geography. Special emphasis will be placed on theoretical and conceptual understandings of how humans interact with the environment from a geographical perspective. Repeatable once for additional credit with a different topic.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Standard Letter

**GEO 7371. Advanced Seminar in Geographic Education.**

This research seminar analyzes literature and research into recent trends in geographic education. Emphasis will be on new developments in curriculum, content, and teaching methodologies. Repeatable once for additional credit with a different topic.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Standard Letter

**GEO 7372. Seminar in Geographic Information Science.**

This course deals with advanced and current research issues in Geographic Information Science. Based on this objective, the course aims at educating doctoral students to conduct research in Geographic Information Science as well as develop innovative applications of Geographic Information Science. May be repeated for credit with a different topic.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Standard Letter

**GEO 7374. Advanced Seminar in Human Geography.**

This course engages students in systematic critical analysis of theories and methods in human geography. It considers classic texts as well as emerging scholarship on various topics including, but not limited to, geographies of gender, race, and ethnicity, economic geography, political ecology, and geographic education.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**GEO 7390. Independent Study.**

Research in geography under the direction of a supervising professor. Repeatable once for additional credit with a different topic.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Standard Letter

**GEO 7393D. International Migration.**

This course provides a survey of geographic and social science research conducted across various topics of international migration. (MULT).

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Multicultural Content|Topics

**Grade Mode:** Standard Letter

**GEO 7393F. Gender and Development.**

This course is a survey of geographic and social science research conducted across various topics of gender studies and international development. (MULT).

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Multicultural Content|Topics

**Grade Mode:** Standard Letter

**GEO 7393G. Political Geography.**

This course is a survey of geographic and social science research conducted across various topics of political geography. (MULT).

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Multicultural Content|Topics

**Grade Mode:** Standard Letter

**GEO 7393J. Soil and Society.**

This course explores the importance of soil resources for environmental and socioeconomic sustainability. Soil science will be introduced, but the majority of the course will focus on soil's value to societies. Specific topics that will be explored include soil geography, historical abuses of soil resources, and current conservation efforts.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Topics

**Grade Mode:** Standard Letter

**GEO 7393K. Biogeomorphology.**

This course will examine the ways in which plants and animals interact with and affect geomorphological processes and landforms, and how geomorphological processes, landforms, and geological factors affect spatial distributions of animals and plants. The role of humans in affecting these interrelationships will be emphasized.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Topics

**Grade Mode:** Standard Letter

**GEO 7393N. Rivers and Society.**

This course examines river system processes and how they are influenced by human activities. We will discuss the principles and practices of large-scale river basin management with an emphasis on the different perspectives and motivations driving different management goals.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Topics

**Grade Mode:** Standard Letter

**GEO 7393Q. Geomorphology in the Anthropocene.**

This course will examine the ways in which humans interact with and affect geomorphological processes and landforms, and how humans directly act as geomorphological agents. The level at which human activities have transformed the surface of the Earth will be examined.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Topics

**Grade Mode:** Standard Letter

**GEO 7399A. Dissertation.**

Original research and writing in Geography, to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each semester (including summer) for at least three dissertation hours.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7399B. Dissertation.**

Original research and writing in Geographic Education, to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each semester (including summer) for at least three dissertation hours.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7399C. Dissertation.**

Original research and writing in Geographic Information Science, to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each semester (including summer) for at least three dissertation hours.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7415. Geographic Applications of Remote Sensing.**

Students will focus on geographic applications of the principles and practices of digital image processing, classification, and modeling using satellite images.

**4 Credit Hours. 2 Lecture Contact Hours. 4 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**GEO 7417. Geographic Information Systems.**

Course is concerned with the analysis of interpretation of maps stored in digital form. Students are introduced to the concepts involving computerized cartographic and geographic data input, storage and retrieval, data manipulation and analysis, graphic and tabular report generation, and cartographic modeling.

**4 Credit Hours. 2 Lecture Contact Hours. 4 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**GEO 7418. Technical Foundations and Methods in Geographic Information Science.**

This course addresses technical foundations and methods in management, analysis, visualization, and dissemination of geographically-referenced data and information in digital form. Topics include data structures, algorithms, and a variety of methods used in GIS and spatial data analysis.

**4 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**GEO 7419. Advanced Techniques in Geographic Information Science.**

This course develops advanced Geographic Information System (GIS) concepts and application issues, spatial data manipulation and analysis skills, and provides hands-on experience with GIS, programming, and spatial analytics hardware/software programs. Emphasis is placed on practical application of skills to real world issues using advanced GIS techniques and geoprogramming. Prerequisite: GEO 7417 or equivalent with a grade of "C" or better and instructor approval.

**4 Credit Hours. 2 Lecture Contact Hours. 3 Lab Contact Hours.**

**Grade Mode:** Standard Letter



**GEO 7430. Field Methods.**

Methods and techniques for observing, measuring, recording, and reporting on geographic phenomena are investigated in this course. Students will learn the use of instruments and materials in the collection of data for mapping and field research in the local area. Prerequisites: GEO 2410 and GEO 3301 both with grades of "D" or better.

**4 Credit Hours. 2 Lecture Contact Hours. 4 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**GEO 7447. Spatial Graphics in Geographic Education.**

This course examines traditional and innovative geoinformation and geovisualization technologies and their relationship to spatial thinking and the teaching and learning of geography. The course reviews academic literature, research methods, and teaching methodologies related to spatial graphics in geographic education. The lab portion provides geovisualization design skills for geographic education.

**4 Credit Hours. 2 Lecture Contact Hours. 4 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**GEO 7599A. Dissertation.**

Original research and writing in Geography to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each long semester.

**5 Credit Hours. 5 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7599B. Dissertation.**

Original research and writing in Geographic Education to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each long semester.

**5 Credit Hours. 5 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7599C. Dissertation.**

Original research and writing in Geographic Information Science, to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each long semester.

**5 Credit Hours. 5 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7699A. Dissertation.**

Original research and writing in Geography, to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each semester (including summer) for at least three dissertation hours.

**6 Credit Hours. 6 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7699B. Dissertation.**

Original research and writing in Geographic Education, to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each semester (including summer) for at least three dissertation hours.

**6 Credit Hours. 6 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7699C. Dissertation.**

Original research and writing in Geographic Information Science, to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each semester (including summer) for at least three dissertation hours.

**6 Credit Hours. 6 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7999A. Dissertation.**

Original research and writing in Geography, to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each semester (including summer) for at least three dissertation hours.

**9 Credit Hours. 9 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7999B. Dissertation.**

Original research and writing in Geographic Education, to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each semester (including summer) for at least three dissertation hours.

**9 Credit Hours. 9 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit

**GEO 7999C. Dissertation.**

Original research and writing in Geographic Information Science, to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each semester (including summer) for at least three dissertation hours.

**9 Credit Hours. 9 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing

**Grade Mode:** Credit/No Credit