DOCTOR OF PHILOSOPHY (PH.D.) MAJOR IN GEOGRAPHIC INFORMATION SCIENCE

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 webpage (http://mycatalog.txstate.edu/graduate/admission-documents/international) for additional requirements.

- completed online ApplyTexas application
- $40 nonrefundable application fee
- $50 nonrefundable international evaluation fee (if applicable)
- baccalaureate degree from a regionally accredited university
- master’s degree in geography or a related field from a regionally accredited university
- official transcripts required 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
- official GRE scores required with a preferred minimum of 303 (verbal and quantitative sections combined)
- 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

TOEFL or IELTS Scores
Non-native English speakers who do not qualify for an English proficiency waiver:
- official TOEFL iBT scores required with a 78 overall
- official IELTS (academic) scores required with a 6.5 overall and
  - minimum individual module scores of 6.0

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

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>GEO 7300</td>
<td>Advanced Geographic Research Design</td>
<td>3</td>
</tr>
<tr>
<td>GEO 7301</td>
<td>Advanced Quantitative Methods in Geography</td>
<td>3</td>
</tr>
<tr>
<td>GEO 7302</td>
<td>Nature and Philosophy of Geography</td>
<td>3</td>
</tr>
<tr>
<td>GEO 7418</td>
<td>Technical Foundations and Methods in Geographic Information Science</td>
<td>4</td>
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</tbody>
</table>

Specialization
Choose 12 hours from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>GEO 7316</td>
<td>Remote Sensing and the Environment</td>
</tr>
<tr>
<td>GEO 7318</td>
<td>GIS and Environmental Geography</td>
</tr>
<tr>
<td>GEO 7361</td>
<td>Advanced Geographic Information Systems</td>
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<tr>
<td>GEO 7362</td>
<td>Geographic Visualization</td>
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<tr>
<td>GEO 7364</td>
<td>Geocomputation</td>
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<tr>
<td>GEO 7365</td>
<td>Theoretical Cartography</td>
</tr>
<tr>
<td>GEO 7366</td>
<td>Advanced Topics in Remote Sensing</td>
</tr>
<tr>
<td>GEO 7372</td>
<td>Seminar in Geographic Information Science</td>
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<tr>
<td>GEO 7447</td>
<td>Spatial Graphics in Geographic Education</td>
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</tbody>
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Electives
Choose 6 hours from the following:

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<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>GEO 7305</td>
<td>Historical Geography of the American Environment</td>
</tr>
<tr>
<td>GEO 7308</td>
<td>Advanced Regional Field Studies</td>
</tr>
<tr>
<td>GEO 7313</td>
<td>Environmental Systems Analysis</td>
</tr>
<tr>
<td>GEO 7314</td>
<td>Environmental Geography of Resource Development</td>
</tr>
<tr>
<td>GEO 7316</td>
<td>Remote Sensing and the Environment</td>
</tr>
<tr>
<td>GEO 7318</td>
<td>GIS and Environmental Geography</td>
</tr>
<tr>
<td>GEO 7330</td>
<td>Geography of Hazards</td>
</tr>
<tr>
<td>GEO 7334</td>
<td>Geographic Aspects of Water</td>
</tr>
<tr>
<td>GEO 7341</td>
<td>Urban Environment</td>
</tr>
<tr>
<td>GEO 7342</td>
<td>Theories and Methods in Geographic Education</td>
</tr>
<tr>
<td>GEO 7344</td>
<td>Seminar in Geographic Curriculum</td>
</tr>
<tr>
<td>GEO 7346</td>
<td>Standards and Assessment in Geography</td>
</tr>
<tr>
<td>GEO 7348</td>
<td>Ethnic Geography</td>
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</tbody>
</table>
Doctor of Philosophy (Ph.D.) Major in Geographic Information Science

**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 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 will then notify the geography graduate committee of the approval for advancement to candidacy.

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**Total Hours**
46

**Comprehensive Examination Requirements**

**Dissertation**
Choose a minimum of 15 hours from the following: 15

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>GEO 7199C</td>
<td>Dissertation</td>
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<td>GEO 7399C</td>
<td>Dissertation</td>
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<tr>
<td>GEO 7699C</td>
<td>Dissertation</td>
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<tr>
<td>GEO 7999C</td>
<td>Dissertation</td>
</tr>
</tbody>
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**Semester Hour Requirements**

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

**Dissertation Proposal**
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**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 will then notify the geography graduate committee of the approval for advancement to candidacy.
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.

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.
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: Standard Letter

This course is a critical analysis of the historical development of geographic thought: its roots, its present status, and future directions.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

GEO 7305. Historical Geography of the American Environment.
This course examines the spatial evolution of environmental problems in the United States using the techniques and analytical perspectives of historical geography. Special emphasis is given to the emergence of environmental problems in the context of urbanization and industrialism. The course will expose students to the most significant work by geographers in this area to date, and to the historical development of environmental geographic analysis in the U.S.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

GEO 7314. Geography of Resource Development.
This course will provide a detailed and in-depth analysis of theories, policies, and practices regarding resource development.
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 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: Standard Letter

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: Credit/No Credit

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 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

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

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, topical 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.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
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.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
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 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 7348. Ethnic Geography.
This course will engage student in the in-depth critical analysis of the theories and methods of ethnic geography. The students will conduct careful research on a topic in ethnic geography. (MULT).
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Multicultural Content
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.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
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): Graduate Assistantship|Exclude from Graduate GPA
Grade Mode: Leveling/Assistantships

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 or equivalent.
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 or equivalent.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
The course focuses on advanced topics including the theoretical basis, mathematical foundations, and current research frontiers in remote sensing. Prerequisite: GEO 5415 or equivalent.  
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.  
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.  
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.  
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.  
Grade Mode: Standard Letter

GEO 7391. Foundation Studies in Geography.  
Students develop knowledge and skills required for success in graduate-level coursework in Geography. Course content varies depending on academic preparation. This course does not earn graduate degree credit. Repeatable with different emphasis. Prerequisite: Approval of graduate advisor in Geography.  
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Course Attribute(s): Exclude from Graduate GPA|Leveling  
Grade Mode: Leveling/Assistantships

GEO 7393A. Qualitative Methods.  
This course introduces the qualitative research paradigm, including appropriate research design, methods of data collection, types of inductive analysis and evaluation, as well as, standards of rigor for research that calls for a deeper understanding of more complex human relationships. The focus and application will be oriented towards human geography.  
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Course Attribute(s): Topics  
Grade Mode: Standard Letter

GEO 7393B. Biogeography in Mountain Environments.  
This course examines how plants and animals interact with and affect geomorphological processes and landforms, and how geomorphological processes, landforms and geological factors affect spatial distribution of animals and plants; all within the environmental limitation and conditions of mountains. The role of humans in affecting these interrelationships will be emphasized.  
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Grade Mode: Standard Letter

GEO 7393C. Managing Urbanization.  
This course examines survey methods and procedures related to managing and preparing for urban growth. Selected topics for examination include transportation planning, housing, historic preservation, and environmental design.  
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 7393D. International Migration.  
This course provides a survey of geographic and social science research conducted across various topics of international migration.  
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 7393E. Geography of Land Management.  
This course explores U.S. land management philosophies, techniques, and development approaches. Major topics include land ethics/philosophies, U.S. traditions in cadastral geography, urban sprawl and green development, land conservation techniques, the role of local/state/federal regulation in land management, and the human-environment impacts of land development.  
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 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.  
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 7393G. Political Geography.  
This course is a survey of geographic and social science research conducted across various topics of political geography.  
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 7393I. Contemporary Topics in Geography Education.
This course will be a survey of recent initiatives in geography education. This course will focus on areas such as research, assessment, and the development and use of instructional materials in relation to the National Science Foundation funded "Road Map for 21st Century Geography Education".
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 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 7393L. Lidar.
This course is an introduction to Light Detection and Ranging (lidar) systems for mapping and analysis. Students will learn to successfully apply knowledge of lidar sensors and technology for a variety of geographic information science applications. Students must have prior knowledge and experience with GIS analysis and mapping tools.
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 7393M. Global Climate Change.
This course examines various implications of global climate change, including impacts on science, politics, and society. Emphasis will be placed on anthropogenic influences across the 20th and 21st centuries, contemporary mitigation options, and future adaptation strategies amidst a complex and dynamic climate system.
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 7393O. 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 will provide in-depth experience with database query languages. Many DBMSs will be reviewed, but practical work will be completed with RDBMSs. Prerequisite: GEO 5418 with a grade of "C" or better, or the equivalent.
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 7393P. Advanced Seminar in Human Geography.
This course will engage students in systematic critical analysis of the theories and methods of human geography. The students will conduct careful research on a topic in human geography.
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 7393R. 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, including structuralism and agency; feminist theory and embodiment; assemblage thinking and actor-network theory; governance; and scale.
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 7393A. 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.
Grade Mode: Credit/No Credit

GEO 7393B. 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.
Grade Mode: Credit/No Credit
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>GEO 7399C.</td>
<td>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. Grade Mode: Credit/No Credit</td>
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| 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. 2 Lecture Contact Hours. 2 Lab Contact Hours. Course Attribute(s): Lab Required 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 or equivalents. 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. 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. 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. 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 long semester. 6 Credit Hours. 6 Lecture Contact Hours. 0 Lab Contact Hours. 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 long semester. 6 Credit Hours. 6 Lecture Contact Hours. 0 Lab Contact Hours. 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 long semester. 6 Credit Hours. 6 Lecture Contact Hours. 0 Lab Contact Hours. 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 long semester. 9 Credit Hours. 9 Lecture Contact Hours. 0 Lab Contact Hours. 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.
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.
Grade Mode: Credit/No Credit