University of North Alabama
Department of Geography
Program Guide
Master in Geographic Information Science

PROGRAM OVERVIEW: Geographic Information Science is an innovative approach to applying spatial knowledge and technology to solve contemporary problems. The Master of Science in Geographic Information Science in the Department of Geography at the University of North Alabama focuses on the multidisciplinary application of geography, the spatial paradigm, and methods of geospatial technologies to prepare students to:

- Solve complex environmental, urban, economic, and business problems;
- Conduct independent research;
- Develop skills in critical thinking and writing; and
- Enter professions requiring knowledge of geospatial methods, analysis, and techniques.

The Master of Science degree in Geographic Information Science allows students to choose between a thesis and non-thesis option. All students must complete at least 33 hours of graduate credit, of which six hours (three classes) are required core courses, six hours of research or thesis, and the remaining eighteen hours of electives, as approved by the student’s advisor.

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<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>GE 609</td>
<td>Geographic Methods in Design</td>
<td>3</td>
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<td>GE 610</td>
<td>Seminar in Geospatial Science</td>
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<td>GE 615</td>
<td>Advanced Quantitative Methods in Geography</td>
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<td>GE 699</td>
<td>Thesis and Research and Defense</td>
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<td>GE 695</td>
<td>Thesis (6 hours)</td>
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<td></td>
<td>18 hours from 500-600 electives</td>
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<td>Total Hours</td>
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**PROGRAM OBJECTIVES:** The Master of Science in Geographic Information Science has three objectives:

- Provide advanced coursework and independent research opportunities in the theory and application of geospatial science to a broad range of current issues in environmental, urban, economic, business, and social fields.
- Develop advanced critical and spatial thinking abilities and combine these with a problem-solving proficiency through the application of geospatial methods and technology in the areas of Geographic Information Systems (GIS), remote sensing (RS), aerial photograph interpretation, computer cartography, Global Positioning Systems (GPS), spatial statistics, urban and regional planning, and policy analysis.
- Prepare students for private industry, government, and education careers in geospatial science, a field identified by the U.S. Department of Labor as one of the three major growth industries for the twenty-first century.

**LEARNING OUTCOMES:** Upon completion of a Master of Science in Geographic Information Science, graduates will:

- Ask scientific questions using a geospatial paradigm.
- Design and conduct research using geospatial methods and technologies.
- Employ enhanced analytical, critical, and spatial thinking, and knowledge to solve contemporary problems.
- Graduate with advanced knowledge of geospatial science and thorough competence in the application of geospatial technologies.

**ADMISSION REQUIREMENTS:** Applications will not be considered until they are complete, meaning that all of the materials below must be received. Students applying to the M.S. degree program in Geographic Information Science must meet the general requirements for admission into graduate studies at the University of North Alabama as described in the University’s current Graduate Catalog. In addition to the general requirements for admission to graduate studies, admission to the Geographic Information Science graduate program also requires the following:

1. **Application Form:** An application form is required. This form is completed online and is submitted to the Office of Admissions well in advance of, but not later than, two months prior to the opening date of registration for the term. See more information under Application Deadlines, below.

2. **Transcripts:** Official transcripts from each institution previously attended, including community and junior colleges, must be submitted to the Office of Admissions of the University.

3. **Preparation:** Applicants must hold a bachelor’s degree or higher degree in an appropriate field of study from an accredited institution or expect to receive this degree not long after applying to the program. A bachelor’s degree is required prior to enrollment in the M.S.
program.

4. **Scholastic Achievement**: Applicants must have a minimum of 3.0 Grade Point Average on a 4.0 scale in the last two years of undergraduate work and in all previous graduate work (if any).

5. **Test Scores**: Applicants must have a combined score of at least 300 (new scoring system, since August 2011) or 1000 (old scoring system, prior to August 2011) on the verbal and quantitative sections of the Graduate Record Exam (GRE). Test scores must be sent directly to the Office of Admissions. Applications will not be considered until GRE scores have been received.

6. **Letters of Recommendation**: Applicants must submit three letters of recommendation from academic or professional sources. At least two letters of recommendation must be provided by faculty members from the applicant’s prior undergraduate or graduate program. Letters of Recommendation should be sent directly to the Director of Graduate Studies in the Department of Geography.

7. **Personal Statement**: All applicants must include an essay describing themselves and their interest in the program. Specifically, applicants should answer these questions: 1) Why do you want to enroll in a graduate program? 2) Why do you want to enroll in the M.S. in Geographic Information Science program at UNA? 3) What is your area of interest, and what topics would you like to focus on in the Geographic Information Science program? It is also helpful to answer these questions as completely and specifically as possible, and to indicate which faculty members in the Department of Geography you would be interested in working with as your supervisor/advisors. Personal statements may also contain additional information about the applicant and his or her background and preparation. Personal statements should be sent directly to the Director of Graduate Studies in the Department of Geography.

8. **Funding Application and Résumé** (only for students applying for funding): If an applicant is applying for funding, he or she must complete the Application for Graduate Assistantship form (see below) and submit a recent résumé. These should be sent directly to the Director of Graduate Studies in the Department of Geography. Link to the application form.

A departmental Graduate Admission Committee will review each application and make all admission decisions. All applications and supporting documents must be submitted to the Office of Admissions of the University in accordance with submission deadlines established by that office. **Applications will not be considered by the department until all of the materials noted above have been received.**

**Deadline for application.** Refer to https://www.una.edu/artsandsciences/graduate-programs.html

Applications for admission to the program for fall semester:
- Deadline for early applications and Graduate Assistantships for fall is February 1
- Deadline for late applications for fall is July 1

Applications for admission to the program for spring semester:
- Deadline for all spring applications is Nov. 1
Applications for admission to the program for summer semester:
• Deadline for all summer applications is April 1

FACULTY MEMBERS: Visit UNA Geography Faculty page

• **Matthew Balentine** (PhD, *University of North Carolina at Greensboro*), Assistant Professor: Nature-Society Interactions, Social Dimensions of Hazards, Health Geography, Critical GIS, Electoral Geography

• **Wayne P. Bergeron, LTC (Ret.)** (PhD, *Jacksonville State University*), Associate Professor and Chair: Emergency and disaster management, homeland security, terrorism, intelligence, inter-agency cooperation, crime, and law enforcement

• **Jian Chen** (PhD, University of Memphis), Assistant Professor: GIS, big data analytics, environmental hazards, water resources, remote sensing

• **Lisa Keys-Mathews, GISP** (PhD, *University of Memphis*), Professor: Environmental Hazards, Geospatial Technologies, Geography Education, Undergraduate Research, Best Practices in Teaching and Learning, Central and South America, North America

• **Mario Mighty GISP** (PhD, *University of Florida*), Assistant Professor: Economic Development, Agriculture and GIS, Small Island Developing States, Caribbean, Human-Environment Dynamics

• **Michael Pretes** (PhD, *Australian National University*), Professor: Geopolitics, Economic, Business, Cultural, Tourism, National Parks, Nature-Society Interactions, Australia, Pacific, Arctic, North America

• **Sunhui Sim GISP** (PhD, *Florida State University*), Associate Professor: GIS, Remote Sensing, Urban, Geographic Modeling, Geographic Visualization, East Asia, North America

*GISP: Certified Geographic Information Systems (GIS) Professional*
**COURSE DESCRIPTIONS** (all courses are either three credit hours or four credit hours):

**GE 502. Geopolitics (3 credits)**
Geopolitics examines the intersection of geography, international relations, and politics and explores the geographic factors that explain foreign relations, state behavior, and transnational and global issues such as military conflict, terrorism, international crime, food and water security, energy security, and environmental degradation. Students are trained in negotiation and policy-making skills and participate in a multi-day simulation exercise. (Fall, even-numbered years).

**GE 503. Nature and Society Interactions (3 credits)**
This course involves a global analysis of human-environment issues including human’s impact on the environment and the environment’s impact on humans. Topics addressed may include, but are not limited to, global warming, overpopulation, environmental degradation, environmental hazards and disasters, and effective natural resources use. Field work required.

**GE 504. Environmental Hazards (3 credits)**
Natural and technological events continue to impact people and places across the globe. This course draws upon hazard and disaster experiences to address the nature, impact, and social responses to environmental hazards. Course focus is on the relationship between nature, society and technology and analyzes how people and places experience, cope with, and recovery from environmental disasters.

**GE 510. Integration of Geography and History (3 credits)**
This course integrates the spatial concepts of geography with the chronological concepts of history. Also listed as HI 510 but creditable only in the field for which registered. The integration of the spatial concepts of geography with the chronological concepts of history. Also listed as HI 510 but creditable only in the field for which registered. (Offered on sufficient demand)

**GE 515. Quantitative Methods in Geography. (3 Credits)**
Course provides an introduction to quantitative methods used by geographers to analyze and interpret geographic data and solve geographic problems. Topics include descriptive statistics, hypothesis formulation and testing, sampling strategies, correlation, regression, and spatial pattern analysis. Examples will be drawn from temporal and spatial relationships in physical and human geography. (Fall)

**GE 520. Principles of Urban and Regional Planning. (3 Credits)**
This course introduces planning both as a profession and also as an important element of city, county, and regional government. Focusing on American planning experience, GE 520 covers the fundamentals of spatial decision-making at various levels of government. Substantive areas covered in the course include: the legal basis of planning, organizational structure of planning agencies in the US, comprehensive planning, social issues in planning, tools of land use regulation, growth management techniques, smart growth, transportation planning, environmental planning and urban design. (Fall)

**GE 530. Biogeography. (3 Credits)**
Science of documenting and understanding spatial patterns of biological diversity. This course will introduce students to concepts used in understanding historical, ecological, and geological processes
that contribute to past and present biological distributions including the historical development of biogeographic concepts, plate tectonics, evolution, phylogeography, the fossil record, niche theory, and patterns of disjunction. Applications of biogeography to contemporary issues will also be discussed including global climate change, conservation, invasive species, and human population growth. A field trip is required. Prerequisites: GE 112 or BI 112. (Offered upon sufficient demand)
Course Fees: $30

GE 535. Regional Geomorphology. (3 Credits)
Field-based exploration of landforms and features. Focus is on the examination and understanding of various landforms and the processes that shape these features. Course requires travel. By permission of Instructor. Other travel expenses required. (Offered upon sufficient demand).
Course Fees: $30

GE 550. Fundamentals of Sustainability. (3 Credits)
This course provides the foundational principles undergirding the concept of sustainability from a geographical perspective. Course activities involve tracing the history and development of sustainability and the role of the environment, economy and social issues in sustainability. Participants are exposed to a variety of applications of sustainability at the local, national and international levels, preparing them to be advocates for wise use of resources. (Fall)

GE 554. Remote Sensing (4 Credits)
Course is designed to introduce students to remote sensing science and technology. Course focuses on concepts and technologies such as principles of remote sensing, remote sensing platforms and sensors, and remote sensing applications for urban and natural environments, classification and accuracy assessment. Through a series of hands-on computer-based lab exercises, students develop an understanding of the tools and techniques used to acquire, display, process, and analyze remotely sensed data. Three class periods, one 2-hour laboratory period per week. (Fall)

GE 560. Advanced Cultural Geography. (3 Credits)
A conceptual approach to the study of human environment systems, cultural landscape, ecological perspectives, environmental perception and behavior, and environmental stress. Prerequisite: GE 102 or departmental approval. (Offered on sufficient demand)

GE 568. Geography of Beer, Wine, and Spirits. (3 Credits)
Course examines geographic factors that account for the historical development and regional variation of beer, wine, and spirits. Students are introduced to the practices of viticulture, hop and grain cultivation, enology, brewing, and distilling. The major cultural, economic, political, and environmental aspects of beer, wine, and spirits in major world regions are analyzed. No class activities will involve alcohol consumptions and/or tasting. (Spring, odd-numbered years).

GE 572. Historical Geography of the United States (3 Credits)
This course analyzes the role of geographic conditions in the exploration, settlement, and development of the United States. Also listed as HI 572 but creditable only in the field for which registered.

GE 584. Geographic Information Systems. (4 Credits)
The study and application of concepts and technologies in geographic information systems and
geographic information science including data conceptualization, database design and management, analysis operations, spatial problem solving, and professional system management. Analysis will be conducted in a commercial state-of-the-art Geographic Information Systems software suite. Three class periods; one 2-hour laboratory period per week.

Course Fees: $30

GE 595. Geography Internship. (1-3 Credits)
Open to graduate students in the Department of Geography. A work-related experience with a public or private organization in which the graduate student gains experience in the professional geography field. (Fall, Spring, Summer)

GE 597. Special Topics. (1-4 Credits)
A study of one or more selected topics in applied or theoretical geography. Topics vary according to the needs of the students and the current professional environment. Maybe repeated for credit if the topic is different. (Fall, Spring, Summer)

GE 599. Independent Study-Practicum. (3 Credits)
Open to graduate students on approval of the department chair. Provides for independent study and research under departmental determination, supervision, and evaluation. (Fall, Spring, Summer)

GE 600 Geographic Thought (3 Credits)
A study of the history and development of geographic thought, the evolution of the discipline of geography, and contemporary geographic philosophies, paradigms, and debates.

GE 601. Physical Geography for Teachers (3 Credits)
Considers the spatial aspects of climate, vegetation, soils, and landforms with special emphasis given to map use and map interpretation skills. (Offered on sufficient demand)

GE 602. Cultural Geography for Teachers (3 Credits)
This course considers the spatial aspects of human culture including location, population, migration, economics, politics, and global interdependence with special emphasis on map and atlas interpretation skills. (Offered on sufficient demand)

GE 603. Regional Geography for Teachers (3 Credits)
An examination of the spatial distribution of physical and cultural attributes which give uniqueness and diversity to world regional patterns on the earth’s surface. (Offered on sufficient demand)

GE 604. Methods and Materials of Geographic Education (3 Credits)
The examination and application of instructional procedures and materials focusing upon current geographic objectives, concepts, and methods of learning appropriate to the needs of teachers of geography. (Offered on sufficient demand)
GE 605. Field Experience in Geography (3 Credits)
This is a field-oriented approach to the study of environmental concepts, including man-earth
relationships and is designed to be offered as a Saturday course during the regular school year or as
a short summer course to allow for an adequate block of time to engage in field work. (Offered on
sufficient demand)

GE 609. Geographic Methods and Research Design (3 Credits) (core course)
This course presents the core competencies required to perform professional level research in
Geography. The course will review methods of research design and methodology, with a focus on
appropriate geographic and statistical techniques required. (Spring)

GE 610. Seminar in Geospatial Science. (3 Credits) (core course)
Geospatial science delves into determining the correct data and technology to address today’s issues
related to humans and their environment. An understanding of geospatial science provides a distinct
perspective on the world, a unique lens through which to examine and interpret events, patterns, and
processes that operate on or near the surface of Earth. The Seminar in Geospatial Science builds upon
students’ progression through a series of techniques courses in Geographic Information Science, remote
sensing, and applications in urban, environment, and nature and society interaction. (Offered on
sufficient demand)

GE 615. Advanced Quantitative Methods in Geography. (3 Credits) (core course)
Application of advanced statistical procedures including multivariate techniques for analysis of
point and areal patterns and spatial data. Prerequisite: Undergraduate-level statistics. (Spring)

GE 620. Planning Theory and Process. (3 Credits)
This course is designed to provide an overview of the development of planning theory as it applies
to the field of Urban and Regional Planning in the United States. The course will critically evaluate
trends in planning theory with a focus on the evolution of main ideas and people who have
influenced the field of planning in the US. To accomplish this goal, emphasis will be placed on
normative, conceptual, methodological issues and various roles planners play, and also the ethical
dilemmas they face in practice. (Offered on sufficient demand)

GE 624. Applied Remote Sensing (3 Credits)
This course provides students with advanced topics in remote sensing and image processing
including, change detection, image fusion, principal components analysis, spectral signatures, fuzzy
classification, and pattern recognition. This course includes classroom instruction, videos, laboratory
exercises, fieldwork, and state-of-the-art digital image processing techniques, all to support the
interpretation of satellite imagery for extraction of land use and land cover information. One field
trip is required. Pre-requisite: GE554 or graduate image processing course.

GE 625. Cartographic Design and Visualization. (3 Credits)
This course is concerned with advanced map communication concepts; cartographic visualization;
designing graphic solutions to geographic situations and needs; illustrating spatial patterns; and
considering cartographic representations in terms of aesthetics. Prerequisite: Cartography or
equivalent undergraduate cartography class. (Offered upon sufficient demand)
GE654: Advanced Remote Sensing (3 Credits)
Geography 654 ~ Advanced Remote Sensing - This course is designed to introduce advanced concepts, applications and technologies of Remote Sensing. Instruction includes major remote sensing systems, applications, advanced digital image processing techniques. Prerequisites: GE 554 (Spring)

GE 664. GIS Programming. (3 Credits)
Geographic Information systems (GIS) are powerful computational tools for solving spatial problems. GIS programming serves the purpose of customizing GIS applications and streamlining spatial analysis by assembling functions provided by the underlying GIS platforms. This course introduces students to Model Builder and Geoprocessing script programming with Python in ArcGIS. Topics included GIS programming environment, programming syntax and styles, interface customization and a variety of GIS routines and functions that can be assembled through programming. (Fall)

GE 674. Web GIS. (3 Credits)
Combining the power of the internet and GIS has increased applications of GIS in e-business, e-government, e-science, and daily life. GE 574 introduces graduate students to the basic knowledge of, and advances in, Internet/Web GIS. The course focuses on the principles, methods, applications, and state-of-the-art Web GIS techniques and platforms. Using a hands-on approach, graduate students perform GIS data operations, query maps, analyze spatial data via the internet, and ultimately develop Web GIS apps for diverse audiences. For course objectives and learning outcomes, please see syllabus. Prerequisite: GE 584 or departmental approval. (Spring)

GE 684. Advanced GIS. (3 Credits)
This course focuses on advanced topics in geographic information science (GIS) including: surface analysis, location analysis, network analysis, geo-computation methods & modeling, and big data analytics. Through a series of hands-on self-paced GIS lab exercises, graduate students are introduced to 64-bit ESRI Desktop GIS Platform - ArcGIS Pro. The ultimate goal is to equip graduate students with industry-level advanced analytical and practical skills in GIS and spatial analysis. Prerequisites: GE 584 or departmental approval. (Spring)

GE 685. GIS Applications (3 Credits)
This course builds on the core concepts and techniques covered in the course Geographic Information Systems (GIS) to provide an advanced skill set in a number of application areas of GIS. Using a hands-on approach, students use specialized GIS software to complete projects which focus on GIS applications in business, marketing, local government, urban planning and community development, environmental management, resource planning, hazards, federal government, logistics, and other fields. Topical area(s) are determined by the instructor of record. Prerequisite: GE 584 or departmental approval. (Fall, Spring)

GE 686. Remote Sensing Applications (3 Credits)
Geography 686 ~ Remote Sensing for Hazards Analysis - This course is designed to introduce advanced concepts, applications and technologies in Remote Sensing for Hazards Analysis. The main emphasis of this course is satellite remote sensing applications in Hazards studies, such as flood/drought, tornados/hurricanes, urban heat, and wile fire. The course may be modified
according to students’ interests. Prerequisites: GE 554. (Fall, Spring)

**GE 688. Spatial Modeling and Analysis in Geographic Information Science. (3 Credits)**
This course focuses on advanced problem solving in the spatial environment including GIS system planning, and design, error handling and quality control, decision support techniques, exploratory data analysis, and spatial statistics and geostatistical analysis. Course labs and projects will focus on current issues, events and opportunities in GIScience.

Prerequisite: GE 554 and GE 584. (Offered upon sufficient demand)
Course Fees: $50

**GE 692. Research. (3 Credits)**
Selection of a research topic, collection and analysis of primary and secondary sources, field work, and composition of research paper under faculty supervision. May be taken more than once.
Prerequisite: Permission of supervising faculty and graduate director. (Fall, Spring, Summer)

**GE 695. Thesis. (3-6 Credits)**
Selection of a thesis topic, collection and analysis of primary and secondary sources, field work, and composition of thesis and thesis defense under faculty supervision. May be taken more than once.
Prerequisite: Permission of supervising faculty and graduate director. (Fall, Spring, Summer)

**GE 697. Advanced Topics. (3 Credits)**
Selected topics in geospatial science offered by faculty. May be repeated for credit if the topic is different. Prerequisite: Permission of instructor required in order to enroll. (Fall, Spring, Summer)

**GE 699. Thesis and Research and Defense. (0 Credits) (Core Course)**
This course serves as an orientation to and administration of an oral examination for the MS in Geographic Information Science program. A non-credit course required of all candidates for the thesis and non-thesis options. The course is to be taken during the last term in which the student is expected to complete all other program requirements. A grade of "S" indicating satisfactory performance or a grade of "U" for unsatisfactory performance will be recorded on the transcript. A grade of "S" is required for graduation; the course may be repeated once. Prerequisite: student must have completed all other program requirements or be enrolled in the last course for program completion. (Fall, Spring, Summer)

Please visit UNA Geography website, UNA Geography Facebook, UNA Geography Linkedin, and UNA Geography Instagram to see what UNA Geography is about.

For more information, please contact Graduate Coordinator, Dr. Sunhui Sim at ssim@una.edu

This document was updated by Dr. Sunhui Sim on April 2nd 2021.