Master's of Science in Geographic Information Science
Handbook – Fall 2023

Program Description

Geographic Information Science (GIScience) is the integration of the theoretical representation of geographic space, absolute and relative positions, and their relationships with physical and human attributes on the Earth's surface. Geographic information science is composed of various geographical scientific and technological areas of study, including geographic information systems (GIS), remote sensing, global positioning systems (GPS), cartography and visualization, and geospatial analysis and statistics. The Masters of Science in Geographic Information Science (MSGIS) is designed for both employed professionals and full-time students who want to deepen their understanding and expertise in the application of geographic information to social and environmental problems.

Prerequisites
- Incoming students are expected to have the following courses or equivalent experience:
  - GEOG 3100 Intro to GIS and Cartography
  - GEOG 3020 Geographical Analysis or an upper division basic statistics course
  - GEOG 4140 Advanced Methods in GIS
  - An introductory-level programming course, or equivalent experience, is strongly recommended.

Course Requirements
- **A minimum of 33 credit hours is required for the MSGIS**
- Graduate students must register for courses listed as 6000 level or above to obtain graduate credit.
  - An exception is available for courses listed at the 5000 level if that course does not have a listing at the 6000 level or above.
- **All MSGIS students are required to complete the following courses:**
  - GEOG 6000 (Advanced Geographical Data Analysis)
  - GEOG 6150 (Geospatial Big Data)
  - GEOG 6160 (Spatial Modeling and Geocomputation)
  - GEOG 6161 (Capstone in GIS)
  - GEOG 6165 (Data Visualization)
  - GEOG 6180 (Geoprocessing with Python)
  - A minimum of 6 credit hours of technical elective courses must be taken from this list:
    - GEOG 5170 (Geospatial Field Methods: GPS and Drones)
    - GEOG 6020 (Advanced Spatial Data Analysis)
    - GEOG 6110 (Environmental Analysis Through Remote Sensing)
    - GEOG 6120 (Advanced Optical Remote Sensing)
    - GEOG 6130 (Advanced Active Remote Sensing)
    - GEOG 6190 (GIS Environmental & Public Health)
  - A minimum of 6 credit hours of application elective courses must be taken from this list:
    - GEOG 5210 (Global Climate Change)
    - GEOG 5270 (Biogeography: Global Patterns of Life)
    - GEOG 5320 (Geography of Terrorism and Homeland Security)
    - GEOG 5340 (Geography of Disasters and Emergency Management)
    - GEOG 5440 (Global Economic Geography)
  - Each year, the department offers several research courses designed for graduate students. These courses are numbered GEOG 6960, any GEOG course starting with "64", or any GEOG course starting with "65." Students are encouraged to take these research courses, and may petition to have a research course substituted for a technical or application elective. The student's supervisory committee must approve this substitution.
  - A course requirement will be waived only if a student has taken a course at the University of Utah for a previous degree. With the exception of the capstone course, courses cannot be taken again for the MSGIS. In this case, a course substitution will be allowed. The student's supervisory committee must approve course substitutions.
  - Students are required to take the five core courses (i.e., GEOG 6000, GEOG 6150, GEOG 6160, GEOG 6165, GEOG 6180) before taking Capstone (GEOG 6161) to ensure they have the necessary skills for Capstone. Exceptions need to be pre-approved by the supervisory committee.
- Students will be notified if new courses that fulfill degree requirements become available.

- The student's supervisory committee must approve a program of study listing the courses fulfilling MSGIS requirements.
- Students must maintain a GPA of 3.0 or higher in their coursework. No grade below B- will count towards the student's program of study.
- Up to nine credit hours of graduate credit earned as a non-matriculated student may be applied to the MSGIS program requirements.
  - The student's supervisory committee must approve non-matriculated credits.

Supervisory Committee
- Students will be appointed a supervisory committee made up of three faculty members from the Department of Geography.
- The supervisory committee will review the student's program of study, a portfolio of the student's coursework, and ask questions of the student in an oral defense of the portfolio.
- A majority of the supervisory committee must approve of the student's program of study, portfolio, and oral defense.

Portfolio and Oral Defense Requirements
- The MSGIS program requires that each student submit a portfolio to their supervisory committee in their final semester before graduation.
  - The portfolio includes projects done as part of the student's coursework.
  - The portfolio should demonstrate that the student has mastered the skills contained in Table 1.
  - The portfolio should be made available to the committee in digital format. Students are encouraged to present their portfolio as a web site, which could be viewed by potential employers.
  - For each project within the portfolio, a description of how the project demonstrates skills listed in Table 1 should be included.
- **The portfolio must be submitted to the supervisory committee by the end of the 13th week of the student's final semester before graduation**
- Students will defend their portfolio in an oral presentation attended by the supervisory committee.
  - The oral defense must take place no later than the last day of finals week in the student's final semester before graduation.
  - The supervisory committee must consent to the scheduling of the oral defense.
- At the oral defense, the supervisory committee will ask questions to assess mastery of skills listed in Table 1.

Completion Time
All work for the degree must be completed within 4 consecutive calendar years.

Graduate School Requirements
- All students must be registered for at least one course from the time of formal admission through completion of all requirements for the MSGIS, unless granted an official leave of absence.
  - This requirement does not apply to summer semester, unless a student plans to complete their degree during summer semester.
  - If students do not comply with this continuous registration policy and do not obtain an official leave of absence, they will be automatically discontinued from the MSGIS program and will be required to reapply to finish the program.
- Students who wish to discontinue their studies for one or more semesters (other than summer term) must file a Request for Leave of Absence form with the Graduate School. The student's supervisory committee and the department chair must approve this request. Requests for leaves of absence may be granted for up to one year for circumstances related to:
  - a serious health condition of the student or family member,
  - parental leave to care for a newborn or newly adopted child,
  - a call to serve in military service, or
  - other compelling reasons that the department believes is in the best interests of both the student and the university.

- The Graduate School may have additional degree requirements that are not described in this document. Please see http://gradschool.utah.edu/.

Paperwork and Deadlines

- Students should track their progress towards the MSGIS degree on the *MSGIS Record of Progress* Form.
- Students must file an *Application for Graduate Degree* online with the Registrar's Office, Graduation. If they need to change their graduation date, they will need to file a paper copy with the Graduation office, Late/Reapply (window 15 Student Services Building) at least two months before their planned semester of graduation. Deadlines for submission are August 30th for fall semester graduation, November 1st for spring semester graduation, and April 1st for summer semester graduation.

Ethics

Students are expected to adhere to a high standard of ethics in their research, course work, and examinations, as outlined in the University Code of Student Rights and Responsibilities. Violation of ethical standards can result in disciplinary action by the Graduate Committee.

Safety and Wellness

Your safety is our top priority. In an emergency, dial 911. Report any crimes or suspicious people to 801-585-COPS; this number will get you to a dispatch officer at the University of Utah Department of Public Safety (DPS; dps.utah.edu). If at any time, you would like to be escorted by a security officer to or from areas on campus, DPS will help — just give a call.

The University of Utah seeks to provide a safe and healthy experience for students, employees, and others who make use of campus facilities. In support of this goal, the University has established confidential resources and support services to assist students who may have been affected by harassment, abusive relationships, or sexual misconduct. A detailed listing of University Resources for campus safety can be found at https://registrar.utah.edu/handbook/campussafety.php

Your well-being is key to your personal safety. If you are in crisis, call 801-587-3000; help is close.
The university has additional excellent resources to promote emotional and physical wellness, including the Counseling Center (https://counselingcenter.utah.edu), the Wellness Center (https://wellness.utah.edu), and the Women's Resource Center (https://womenscenter.utah.edu). Counselors and advocates in these centers can help guide you to other resources to address a range of issues, including substance abuse and addiction.

Table 1. MSGIS Skills List.

Skill	Description
GIS Analysis	Perform core vector and raster GIS analyses including overlay, interpolation, map algebra, terrain modeling, network analysis, and multi-criteria analysis.
Spatial Data and Algorithms	Understand methods for acquiring, evaluating, creating, manipulating, editing, and converting data and metadata in preparation for spatial analysis. Be familiar with how operations are carried out and when they are applicable.
GIS Workflow	Understand the importance of workflow in GIS and how to develop a workflow to perform GIS operations and spatial analysis.
Model Building	Be able to interpret existing geoprocessing models, create new models, add tools and data to a model, and string tools together to form an analysis workflow. Be able to choose appropriate models for modeling static and dynamic geographic processes. Be able to document a model so that others can understand its purpose and how it works.
Cartography and Graphic Design	Be able to design maps for different purposes, mediums, and audiences, and demonstrate cartographic design principles including color and symbology theory.
Spatial Analysis	Design, implement, and report on the analysis of spatial data. Describe and test hypotheses regarding distributions of spatial datasets.

Data Models and Structures	Be able to explore the data models within a database, and understand its structure.
Database Design	Given specific requirements for data, be able to design appropriate data models. Be familiar with database design tools.
Structured Query Language (SQL)	Be familiar with SQL and be able to write queries involving spatial objects and relationships.
Project Design	Be familiar with how to develop a project plan, which includes defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved, quantifying the necessary resources (e.g. staff, software, and hardware), preparing reports, and determining budgets and timelines for completion.
Project Management	Demonstrate your ability to work individually and collaboratively. Successfully deliver a solution within the required period.
Communication Skills	Be able to communicate effectively the technical aspects of your work to both technical and layperson audiences.
Basic Programming or Scripting	Be familiar with a programming or scripting language, and be able to build workflows or custom solutions for solving spatial analysis problems.