

Master's of Science in Geographic Information Science Handbook – Fall 2016

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 Master's 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 3140 Introduction to GIS
 - GEOG 3020 Geographical Analysis or an upper division basic statistics course
 - GEOG 5140 Methods in GIS
 - An introductory-level programming course, or equivalent experience, is strongly recommended.

Course Requirements

- **A minimum of 36 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 (Spatial Data Design for GIS)
 - GEOG 6160 (Spatial Modeling with GIS)
 - GEOG 6161 (Capstone in GIS)
 - GEOG 6162 (Project Management)
 - GEOG 6165 (Web GIS)
 - GEOG 6180 (Geoprocessing with Python)
 - A minimum of 6 credit hours of technical elective courses must be taken from this list:
 - GEOG 5170 (GeoData Field Methods)
 - GEOG 6010 (Geocomputation)
 - GEOG 6020 (Advanced Spatial Data Analysis)
 - GEOG 6110 (Environmental Analysis Through Remote Sensing)
 - GEOG 6120 (Environmental Optics)
 - GEOG 6130 (Advanced 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. This substitution must be approved by the student's supervisory committee.
 - A course requirement will only be waived 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. Course substitutions must be approved by the student's supervisory committee.
- Students will be notified if new courses that fulfill degree requirements become available.

- A program of study listing the courses fulfilling MSGIS requirements must be approved by the student's supervisory committee.
- 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 9 credit hours of graduate credit earned as a nonmatriculated student may be applied to the MSGIS program requirements.
 - Credits must be taken no more than 3 years prior to approval.
 - Nonmatriculated credits must be approved by the student's supervisory committee.

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 is made up of 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**
- Each student 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 each fall and spring semester 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. This request must be approved by the student's supervisory committee and the department chair. 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
 - military service

- 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* form with the Registrar's Office, Graduation Division (window 15 Student Services Building) at least two months before their planned semester of graduation. Deadlines for submission are July 1st for fall semester graduation, November 1st for spring semester graduation, and March 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.

Dismissal Procedure

- Students may be dismissed from the MSGIS program as the result of failure to make progress towards degree (including completion of coursework and portfolio), having a cumulative grade point average below a 3.0 for more than one semester, not maintaining active enrollment in Geography classes, violation of the Code of Student Rights and Responsibilities (<http://regulations.utah.edu/academics/6-400.php>), or violation of ethical standards.
- In cases of failure to make progress, students will be warned in writing at least one semester before a dismissal vote, and given required progress to meet by a deadline.
- Dismissal cases will be voted on by the Graduate Committee, requiring at least a two-thirds approval of the Committee for dismissal from the graduate program.

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, 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 time frame.
Communication Skills	Be able to effectively communicate 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.

Portions of this skills list were adapted from “The essential skills to succeed in a GIS career” by Michalis Avraam, <http://michalisavraam.org/2009/11/the-essential-skills-to-succeed-in-a-gis-career/>