# Combined Geography BS /
# Master of Science in Geographic Information Science
# Handbook – Fall 2018

***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. GIScience 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 combined BS/MSGIS program is designed to allow students to get focused GIScience training and complete both their Bachelors and Master's degrees in just five years.

***Admission to the Program***
- Students must be enrolled as Geography majors when applying for admission to the combined program
- Students must apply for admission into the program by April 1 of their junior year. Students will be notified before May 1 of the application decision
- Entering students must have at least a 3.0 cumulative GPA
- After admission to the graduate program, students may no longer be eligible for some types of financial aid and scholarships. It is recommended that students consult with the Financial Aid office about options prior to participating in this combined degree program.

***Program Procedures***
- The university registration system uses the term "career" to indicate which program a student is enrolled in. The undergraduate (BS) and graduate (MSGIS) careers are separate in this system. <u>Students must register for classes under the correct career to have a course count toward the correct degree requirement</u>. Meeting with the advisor each semester before the add/drop deadline for an enrollment review is mandatory, and will ensure that you have registered for courses under the correct career.
- No course may be counted toward both degrees
- Courses taken for the graduate degree will not be eligible for graduate credit until the requirements for both degrees are satisfied.
- Graduate tuition will be charged on all classes, even undergraduate courses, once student has been admitted to the graduate program
- Transfer of the student from undergraduate to graduate status occurs after acceptance into the MSGIS program at the beginning of the fourth year. A program fee of $100/semester will be assessed to students with graduate status
- Both degrees will be awarded simultaneously at the end of the program. The Master's degree will not be awarded unless the BS has been earned.
- Students wishing to exit the combined program can apply <u>qualifying</u> coursework toward the traditional BS requirement without penalty

***Geography BS Course Requirements***
- **A minimum of 122 credit hours is required for the Geography BS**
  - Students must fulfill all academic standards, general education requirements, bachelor degree requirements and major requirements required by the University of Utah and the Department of Geography to be awarded the BS degree
- **All combined program Geography BS students are required to complete the following courses for the major:**
  - GEOG 1000 (Earth Environments and Global Change)
  - GEOG 1400 (Human Geography)
  - GEOG 3020 (Geographical Analysis)
  AND
    - GEOG 3100 (Intro to GIS & Cartography)
  - One upper division physical geography course taken from this list:

- GEOG 3/5200 (Geomorphology: Mtns, Rivers, Deserts)
- GEOG 3/5205 (Regional and Global Climates)
- GEOG 3/5210 (Global Climate Change)
- GEOG 3/5215 (Climate Change and Its Impacts)
- GEOG 3/5290 (Water in Utah)
- GEOG 3/5202 (Snow and Ice)
- GEOG 3310 (Introduction to Natural Hazards)
- One upper division human geography course taken from this list:
  - GEOG 3/5909 (Introduction to Medical Geography)
  - GEOG 3350 (Resource Conservation & Environmental Management)
  - GEOG 3/5375 (Sustainable Transportation)
  - GEOG 3420 (Political Geography)
  - GEOG 3620 (Geography of North America)
- One Geography CW course taken from this list:
  - GEOG 3/5270 (Biogeography: Global Patterns of Life)
  - GEOG 3/5400 (Population Geography)
- The following combined program core courses:
  - GEOG 1180 (Introduction to Geo-Programming)
  - GEOG 3110 (The Earth from Space: Remote Sensing of the Environment)
  - GEOG 5110 (Environmental Analysis Through Remote Sensing)
  - GEOG 5140 (Methods in Geographic Information Systems)
  - GEOG 5170 (Satellites, Lasers and Compasses: Field Methods for Geographic Data)
- Math Core:
  - MATH 1050 (College Algebra)
- Math or Physics Elective (pre-requisite for GEOG 6120 MSGIS elective):
  - MATH 1060 (Trigonometry) OR
  - PHYS 2010 (General Physics)

## *MSGIS Course Requirements*
- **A minimum of 30 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 (Spatial Statistics)
  - GEOG 6150 (Spatial Data Design)
  - GEOG 6160 (Spatial Modeling with GIS)
  - GEOG 6161 (Capstone in GIS)
  - GEOG 6162 (Project Management
  - GEOG 6165 (Web GIS)
  - GEOG 6180 (GIS & Python)
  - A minimum of 6 credit hours of elective courses must be taken from this list:
    - GEOG 6010 (Geocomputation)
    - GEOG 6020 (Advanced Spatial Data Analysis)
    - GEOG 6120 (Environmental Optics)
    - GEOG 6130 (Advanced Remote Sensing)
    - GEOG 6190 (GIS & Environmental Health)
  - Each year, the department offers several research courses designed for graduate students. These courses are numbered GEOG 6400-6599 or 6960. Students are encouraged to take these research courses, and may petition to have a research course substituted for an elective. The student's supervisory committee must approve this substitution.
  - The student's supervisory committee must approve course substitutions.

- 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.
- If a student needs to take graduate courses before their fourth year in the program (i.e. under their undergraduate career), up to 12 credit hours of graduate credit earned as an undergraduate student may be applied to the MSGIS program requirements with Graduate Advisor approval.
  - The form "Request for Graduate Credit in BS/MS Program" must be completed and submitted to the Registrar's Office during 1st semester as a matriculated graduate student
  - Students who drop out of the program cannot use requested credits toward an undergraduate degree and are not guaranteed acceptance of these credits toward a graduate degree
  - Changes made to an academic record as a result of submitting this form are final and may not be reversed at a later date

### *Supervisory Committee*
- MSGIS 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*
After admission to the MSGIS program, you are expected to complete your degrees within 2 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 combined BS/MSGIS program. Students cannot reapply to the combined program once they have been discontinued, and  must apply to the regular MSGIS program to complete their Masters degree.

- 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 *BS-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 June 1st for fall semester graduation, November 1st for spring semester graduation, and February 1st for summer semester graduation.
- No MS degree will be awarded unless the BS has been earned.
- Courses taken for the graduate degree will not be eligible for graduate credit until requirements for both degrees are satisfied

### *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.

*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 GIS workflow and how to develop it to perform GIS operations and spatial analysis optimally. |
| 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/