DEPARTMENT OF GEOGRAPHY

REQUIREMENTS FOR THE MASTER'S OF SCIENCE IN GIS (PROFESSIONAL) DEGREE

All MSGIS students are expected to have acceptable courses or proficiencies in subject matter presented in GEOG 1180 (Introduction to Geo-Programming), GEOG 3020 (Geographical Analysis) or an upper division basic statistics course, GEOG 3140 (Introduction to GIS), and GEOG 5140 Methods of GIS. Courses or proficiencies used to fulfill these requirements do not count toward graduate credit and should originally be fulfilled as a part of the undergraduate program.

A Master's Degree will require a minimum of **36** credit hours of courses from the required core course list and selected from the technical and application electives lists, or from research seminars offered (GEOG 6400-6599 or 6960), plus a final oral exam taken at the completion of the last semester of study. Professional Master's students must complete the required courses (listed below) plus a minimum of 12 credit hours of elective course work. A grade point average of 3.0 or higher in course work is required. No graded work below a "B-" is acceptable toward the degree.

Students may not register for Individual Projects, Directed Readings, Research Practicum, Thesis Research, Technical Report Research, Internships, Faculty Consultation, or similar courses to fulfill degree requirements. Master's students are required to complete 24 credit hours in residency in the Department of Geography at the University of Utah. All students must be registered for at least one course per Fall/Spring semester. The program usually requires approximately two years of full time study, however all work must be completed within four consecutive calendar years. For further degree requirement details and information, you must refer to the Master's of Science in Geographic Information Science (MSGIS) Graduate Student Handbook.

All MSGIS students are required to assemble a portfolio as courses are completed which includes examples of work demonstrating mastery of the selected skills. Students will present this portfolio project and answer questions from the Supervisory Committee during the final oral exam at the end of the program.

PROGRAM OF STUDY CHECKLIST

COURSE NUMBER/TITLE	Credit Hrs.	Sem/Yr Taken	Grade
GEOG 6000 – Spatial Statistics *(Fall)*	4		
GEOG 6150 – Spatial Data Design *(Fall)*	4		
GEOG 6160 – Spatial Modeling with GIS *(Spring)*	4		
GEOG 6161 – Capstone in GIS *(Spring of last year)*	3		
GEOG 6162 – Project Management	3		
GEOG 6165 – Web GIS	3		
GEOG 6180 – Geo-processing with Python *(Fall)*	3		
TOTAL	**24**		
***TECHNICAL** ELECTIVE COURSES (min. 6 credit hrs.)			
1.	3 or 4		
2.	3		
TOTAL	**6 or 7**		
***APPLICATION** ELECTIVE COURSES (min. 6 credit hrs.)			
1.	3 or 4		
2.	3		
	6 or 7		
Final project and oral defense date:			

***** Elective courses are selected by the student with the assistance of the student's Supervisory Committee/Faculty Advisor.

(over)

MSGIS Elective Coursework

A total of 12 credit hours of elective coursework are required to graduate, six hours (two courses) from each category. Program requirements may change depending on available course offerings.

Technical Electives	**(Choose two from list below)**	
GEOG 5170	GeoData Field Methods *(Fall)*	3
GEOG 6010	Geocomputation	4
GEOG 6020	Advanced Spatial Data Analysis	3
GEOG 6110	Environmental Analysis	3
GEOG 6120	Environmental Optics	3
GEOG 6130	Advanced Remote Sensing	3
GEOG 6190	GIS & Environ'l Health	3
	Sub-Total	**6-7**

Application Electives	**(Choose two from list below)**	
GEOG 5210	Global Climate Change *(S)*	3
GEOG 5270	Biogeography *(S)*	4
GEOG 5320	Geography of Terrorism	3
GEOG 5340	Emergency Management *(S)*	3
GEOG 5440	Global Economic Geography	3
	Sub-Total	**6-7**

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/