

Executive Summary

University of Utah
Department of Geography
Master of Science Degree in Geographic Information Science (MGIS)
01/11/12

Program Description

The proposed Master of Science in Geographic Information Science is a master's degree program in the Department of Geography designed to provide students with the expertise to be successful in the GIS job market at the advanced technical and managerial levels. The MGIS is to develop skills in acquiring, analyzing and managing large volumes of geospatial information to address problems across a broad range of interdisciplinary application areas, such as environmental management, transportation planning, emergency management, and public health. The MGIS is intended to attract 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. The MGIS is a two-year interdisciplinary full-time post-baccalaureate degree that is comprised of 7 core courses (22 credit hours), 2 technical courses (6 credit hours), and 2 application-oriented courses (6-7 credit hours) for a total of 34 semester hours (minimum). The program is proposed to start in Fall Semester, 2012.

Role and Mission Fit

The proposed MGIS will provide the knowledge and skills for those students seeking a career in GIS that is not provided in existing degree programs at the University of Utah or across the State of Utah. Building on the Department of Geography's successful Certificate Program in GIScience, the MGIS will provide the additional graduate education required for careers in geospatial science and technology fields.

Faculty.

The University of Utah's Department of Geography has been conducting research and teaching in GIS, satellite remote sensing, GPS and geospatial analysis since the 1960s. It is home to one of the first academic GIS development facilities in the U.S.; the Digitally Integrated Geographic Information Technologies (DIGIT) Laboratory (<http://www.digit.utah.edu/>). Ten regular faculty are available to provide instruction and student advisement along with adjunct faculty specialists from the larger community. No additional regular faculty will be needed. Two new adjuncts will be recruited to teach new specialized courses.

Market Demand

A recent Department of Labor study named geospatial technologies along with nano- and bio-technologies as the biggest sources of job growth over the next two decades (http://doleta.gov/BRG/Indprof/geospatial_profile.cfm). More generally, the Bureau of Labor Statistics projects that the number of people employed as Geographers is to increase by 26% between 2008 and 2018 (<http://www.bls.gov/oco/pdf/ocos315.pdf>). This is more than twice the projected national increase in employment in all occupations (10.1%). In addition, employment in cognate fields shows similarly high growth trends: Cartographers and photogrammetrists (26.8%), Computer and information scientists (24.2%), Surveying and mapping technicians (20.4%), and Database administrators (20.3%). Overall, the trends in demand point upward for GIS specialists in this and other countries. The 2010 survey conducted by the Urban and Regional Information Systems Association (URISA) showed the average salary of survey respondents at \$61,540, an increase of 2.5 percent over the 2006 average. GIS managers, meanwhile,

saw a 3.8 percent increase in salary, to \$69,842. Sixty-five percent of respondents work within some level of government (http://www.urisa.org/2010_salary_survey). In many technical fields, the master's degree has become the new entry-level to professional careers in both the private and public sector (*New York Times*, 24 July 2011, p, ED16). This is increasingly the case in the field of Geographic Information Science (GIScience).

Student Demand

Currently, GIS courses are elective coursework in the geography undergraduate and graduate programs. In the last ten years, over 620 students have completed the introductory GIS course. Enrollment in the introductory GIS course has nearly doubled during the same ten year period. While over half of the students are Geography majors, a variety of other majors are represented (i.e. Environmental Studies, Urban Planning, Anthropology, Physics, Computer Science, Political Science, etc.). About 50% of these students enroll in the second GIS course after completing the first course. An number of students have asked for a master's degree with a professional orientation rather, than a research thesis orientation.

Statement of Financial Support

Appropriated Fundx
Special Legislative Appropriation
Grants and Contracts
Special Fees/Differential Tuitionx
Other (please describe).....x returned tuition

Similar Programs Already Offered in the USHE

There are several geography and GIS education programs in the State of Utah. None of these other programs are targeting students and GIS professionals at the master's degree level and with a comprehensive approach to geographic information science.

Program Description

University of Utah MS- Master's Degree in Geographic Information Science 01/05/12

Section I: The Request

The University of Utah requests approval to offer a Master of Science in Geographic Information Science in the Department of Geography effective Fall, 2012. This program has been approved by the Institutional Board of Trustees on (Date TBD).

Section II: Program Description

Complete 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), satellite remote sensing, global positioning systems (GPS), cartography and visualization, and geospatial analysis and statistics. The Master of Science in Geographic Information Science (MGIS) 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. The MGIS is a two-year, full-time post-baccalaureate degree that is comprised of 7 core courses (22 credit hours), 2 technical courses (6 credit hours), and 2 application-oriented courses (6-7 credit hours) for a total of 34 semester hours (minimum). This includes a master's capstone project requiring the students to apply aspects of the MGIS curriculum to the analysis of a real-world problem.

Purpose of Degree

The purpose of the MGIS is to provide students desiring a career in the field of GIS with the skills and expertise required to be successful in the labor market. The MGIS is designed to develop skills in geographic information analysis and management, and thus it reflects the variety and interdisciplinary nature of practical social and environmental problems and seeks to balance technical and management approaches. This program will meet the need for GIS professionals with advanced, graduate degree credentials. There is no other focused, master's level degree program in geographic information science in Utah.

Institutional Readiness

The MGIS will be administered by the Department of Geography, and the degree will be granted within the College of Social and Behavioral Science. The MGIS program will package existing courses in GIS, analytical methods, and application areas with new complementary courses in GIS Project Management, GIS Programming, GIS Applications, and The MGIS Capstone Project. This structure will allow the creation of a needed program without a large investment of resources. The MGIS program will have minimal to no negative impact on the existing graduate and certificate programs. As the proposed program is structured, it will not require reallocation of funds or new faculty lines in its first 5 years. Student Credit Hour (SCH) productivity funds will also be generated which will be used to support the MGIS program.

Faculty

Faculty Category	Faculty Headcount – Prior to Program Implementation	Faculty Additions to Support Program	Faculty Headcount at Full Program Implementation
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)			
Full-time Tenured	10		10
Full-time Non-Tenured			
Part-time Tenured			
Part-time Non-Tenured			
With Master's Degrees			
Full-time Tenured			
Full-time Non-Tenured			
Part-time Tenured			
Part-time Non-Tenured		2	2
With Bachelor's Degrees			
Full-time Tenured			
Full-time Non-Tenured			
Part-time Tenured			
Part-time Non-Tenured			
Other			
Full-time Tenured			
Full-time Non-Tenured			
Part-time Tenured			
Part-time Non-Tenured			
Total Headcount Faculty			
Full-time Tenured	10		10
Full-time Non-Tenured			
Part-time Tenured			
Part-time Non-Tenured		2 (.5FTE)	2
Total Department Faculty FTE (As reported in the most recent A-1/S-11 Institutional Cost Study for "prior to program implementation" and using the A-1/S-11 Cost Study Definition for the projected "at full program implementation.")	10	1	11

Almost all of the MGIS courses are currently taught by regular faculty in the Department of Geography. Two new courses not currently offered at the University will be created for the MGIS program – a course in GIS Project Management and a course in Web GIS. Staffing and funding for these two courses will be provided by the Department of Geography using adjunct faculty and course returned productivity funds.

Staff

The MGIS program will be staffed by the MGIS Director assisted by administrative staff from the Department of Geography for accounting and advising. If the degree is approved, a regular faculty member will serve as the initial MGIS director. S/he will report to the Chair of the Department of Geography in the College of Social and Behavioral Sciences. The Director will be selected from among the tenure track faculty whose primary assignment is in the Department of Geography.

Student admission decisions will be made by the Faculty Program Committee after reviewing each applicant's submitted materials (e.g., letters of recommendation, statement of purpose, transcripts). The Director will be responsible for all record keeping, course scheduling, and placement activities for graduates. The Director will also process students for graduation. A graduate assistant and Department of Geography staff will assist the Director in these activities. Once the MGIS program is operating at full capacity, it is anticipated that the Director will devote 25% of her/his time to directing this program.

Office support, such as program accounting, IT, clerical and office equipment will be provided by the College of Social and Behavioral Sciences and the Department of Geography.

Library and Information Resources

The Marriott Library, as well as the University of Utah's other libraries, already have a substantial collection of GIS-related journals and book collections that would meet the needs of MGIS students. Representatives of the Marriott Library agree that current collections should be adequate for the proposed MGIS, and they pledge to pay special attention to the topics covered by the program's courses and to suggestions from faculty and students for new resources as the budget allows. The CSBS computing labs and staff, and the Department's DIGIT Lab staff will insure sufficient computer systems and software support for the MGIS program.

Admission Requirements

Admission requirements will be at least the minimum required by the Graduate School. Undergraduate transcripts, three letters of recommendation, and a statement of purpose will be reviewed when assessing each applicant's qualifications for the program. The TOEFL and TSE will be required of students for whom English is a second language. Due to the rigorous analytic component of the MGIS, it is assumed that applicants will have a strong quantitative background. Acceptable applicants will be required to have proficiency in mathematics, statistics, computing, mapping and introductory GIS as prerequisites to the program. In addition to the prerequisites, students will be encouraged to take coursework in computer programming prior to application.

Student Advisement

The MGIS Director and staff advisor will provide academic advising and administrative support to individuals applying for the program, as well as, after they are enrolled in the program. The MGIS Director will coordinate the development of the MGIS program, establish program policies and procedures, and work with participating colleges, departments and faculty. The MGIS advisor will assist in: operating the program including scheduling courses; coordinating teaching assignments; recruiting students into the program; and helping students resolve problems related to the program. Each fall a new student orientation will be held to ensure that students understand program requirements. This orientation will also help new students network with other students.

Justification for Graduation Standards and Number of Credits

The MGIS program requires a student to complete a minimum of 34 credit hours. In the development of this program, closely related programs from around the country were surveyed (n=5). With required credit hours ranging from 30-35, the mean number of required credit hours for current programs is 32. Within the College of Social and Behavioral Science at the University of Utah, the mean number of credits required for a master’s degree is 32, so the MGIS would require approximately the current College average.

External Review and Accreditation

No external consultants or reviewers were employed to develop this program. No external accreditation will be sought.

Projected Program Enrollment and Graduates; Projected Departmental Faculty/Students:

Prospective MGIS students will be drawn from a variety of social science, earth science, humanities, engineering, and architecture/planning majors, as well as employed practitioners. The anticipated admission for the first year is seven students, followed by 15 in the second year. Admissions are predicted to increase to 30 by the third year and remain at that level over the next two years. These enrollment estimates are based on the queries received from students, responses to a student survey, and projected growth in the labor market. It is anticipated that ten students will graduate each year.

Data Category	Current – Prior to New Program Implementation	Projected Year 1	Projected Year 2	Projected Year 3	Projected Year 4	Projected Year 5
Data for Proposed Program						
Number of Graduates in Proposed Program	0	0	7	15	30	30
Total # of Declared Majors in Proposed Program	0	7	15	30	30	30
Departmental Data – For All Programs Within the Department						
Total Department Faculty FTE (as reported in Faculty table above)	10	11	11	11	11	11
Total Department Student FTE (Based on Fall Third Week)	0	7	15	30	30	30
Student FTE per Faculty FTE (ratio of Total Department Faculty FTE and Total Department Student FTE above)		.7	1.5	3	3	3
Program accreditation-required ratio of Student FTE/Faculty FTE, if applicable: (Provide ratio here: _____)						

Expansion of Existing Program

New degree program.

Section III: Need

Program Need

Traditionally, the Bachelor's degree was the entry-level degree to many careers outside academia, while the masters' degree was the stepping-stone to the Ph.D. However, in many technical fields the masters' has become the new entry-level to professional careers in both the private and public sector (*New York Times*, 24 July 2011, p, ED16). This is increasingly the case in the field of Geographic Information Science (GIScience), or the development and application of digital technologies for capturing, storing, analyzing and communicating geospatial data.

Geographic information systems (GIS), remote sensing (RS) and related tools have become very sophisticated over the past two decades, increasing the demand for acquiring competency in knowledge and skills that were previously required only for advanced software developers and spatial analysts. For example, a decade in the past being a "GIS Analyst" meant knowing the basics of cartography, spatial statistics and information technologies along with a command of a proprietary GIS software, such as ArcView. However, GIS has moved from proprietary systems to being embedded within enterprise object-relational databases, served across intranets and the Internet using client-server architectures, and customizable through componentware systems and languages such as Python. Spurred on by these technical advances as well as the continuing collapse of data capture, storage and processing costs, the underlying GIScience has also advanced greatly, including revolutionary developments, such as disaggregate spatial statistics, cartography and visualization, GIS/GPS/RS fusion on mobile devices and hyperspectral and laser-based remote sensing systems. These scientific and technological advances have greatly increased the knowledge and skill requirements for entry-level GIS careers.

The proposed Masters in Geographic Information Science will provide students seeking a career in GIS the knowledge and skills that cannot be provided in existing degree programs at the University of Utah. Building on the Department of Geography's successful Certificate Program in GIScience, the MGIS will provide the additional education required for careers in GIS, while not diminishing the current Certificate Program or the department's research-oriented Masters of Science (MS) program.

The current Certificate Program in GIScience serves a valuable market by providing appropriate education for students who seek careers that are GIS-relevant but not GIS-dominant. This includes a wide range of professions in fields such as environmental studies, urban planning, transportation planning, real estate, marketing, public health, anthropology, economics, demographics and so on. Almost any professional field that uses geographic data can benefit from GIS education, and the Certificate Program will remain appropriate; it is open to any major and degree program on campus (including graduate degrees) as well as to non-matriculated students.

The MGIS will build on the Certificate Program by providing opportunity for students who need additional technical education for GIS-centric careers, i.e., professions where GIS development, management and support will be the focus. These jobs are often labeled with titles such as Geospatial Information Scientist and Technologist, Geospatial Analyst, GIS Developer, and GIS Manager. The Department of Geography's current MS program cannot accommodate this due to its research-orientation: students are expected to take one year of courses and spend a second year developing an original research project. In contrast, the

MGIS will substitute the second, research-oriented year for technical coursework that is increasingly essential for entering and succeeding in GIS careers.

Labor Market Demand

The demand for GIS knowledge and skills is strong and will continue to be strong over a longer time horizon. A recent Department of Labor study named geospatial technologies along with nano- and bio-technologies as the biggest sources of job growth over the next two decades (http://doleta.gov/BRG/Indprof/geospatial_profile.cfm). More generally, the Bureau of Labor Statistics projects that the number of people employed as Geographers is to increase by 26% between 2008 and 2018 (<http://www.bls.gov/oco/pdf/ocos315.pdf>). This is more than twice the projected national increase in employment in all occupations (10.1%). In addition, employment in cognate fields shows similarly high growth trends: Cartographers and photogrammetrists (26.8%), Computer and information scientists (24.2%), Surveying and mapping technicians (20.4%), and Database administrators (20.3%). Overall, the trends in demand point upward for GIS specialists in this and other countries.

The 2010 survey conducted by the Urban and Regional Information Systems Association (URISA) showed the average salary of survey respondents at \$61,540, an increase of 2.5 percent over the 2006 average. GIS managers, meanwhile, saw a 3.8 percent increase in salary, to \$69,842. Sixty-five percent of respondents work within some level of government (http://www.urisa.org/2010_salary_survey).

As examples, two local private corporations and a national federal governmental center endorse the establishment of this program in the Department of Geography at the U of U.

"The authoritative and most up-to-date infrastructure asset data repository, public organizations are looking to Geographic Information Systems (GIS) as a platform for managing critical business and operational needs, such as infrastructure asset management." The MGIS program will fill a primary need for our firm in providing advanced education opportunities for our current and prospective employees."

Brian Haslam, President of Azteca Systems- Cityworks, a Utah firm providing support and software for local government, public works and utilities designed to leverage GIS for asset management, permitting and licensing. Size – 80 employees, serves 450 cities, counties and public utilities throughout North America.

Azteca Systems Inc. (<http://www.cityworks.com/>)

As manager and co-owner a small, Utah-based business (RedCastle Resources), I enthusiastically support the development of a Masters of GI Science program. RedCastle Resources (RCR) provides GIS and remote sensing professional services to the USDA Forest Service here in Salt Lake City. Our staff of approximately 50 professionals have degrees in geography, forestry, wildlife biology, range science, and other resource management related disciplines. A majority of their degrees are post-graduate. The one thing these individuals have in common, is a demonstrated expertise in the use of GIS and remote sensing in their field of expertise.

As an employer, RCR depends on universities to provide well qualified candidates for our positions. With approximately 60% of our staff coming from Utah, a strong in-State degree program in GI Science would make RCR a more competitive company and would make it more likely that we can continue to provide high paying, benefited jobs to qualified applicants from Utah.

Mark Finco, PhD

Contract Leader / Principal

Redcastle Resources

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Salt Lake City, UT 84119
Red Castle Resources (<http://redcastleresources.com/>).

The USDA Forest Service depends on highly skilled geospatial professionals to supply knowledge and experience necessary for effective management of the Nation's forest and grassland resources. As an agency comprised of over 35,000 employees managing nearly 200 million acres of public land, we rely on geospatial professionals to develop and maintain many of the key information resources that support planning, implementation, and monitoring efforts across numerous natural and cultural resource disciplines. Availability of a diverse pool of geospatial professionals with strong academic foundations in GIS and remote sensing is critical to the Forest Service's efforts to develop and maintain a skilled, relevant, and adaptive workforce.

The Forest Service maintains two national service centers specializing in geospatial technology in Salt Lake City. The Geospatial Service and Technology Center and the Remote Sensing Applications Center provide advanced analytical support, information services, and training for the use of geospatial technologies on a wide range of natural resource management issues. The University of Utah's geography programs have been important sources for recruiting educated professionals into these centers and their supporting private sector business partners. As director of the Remote Sensing Applications Center here in Salt Lake City, I strongly support and encourage the development of a GIS Science masters program that bolsters the depth and quality of candidates for our future workforce.

Brian Schwind, Director, Remote Sensing Applications Center
Geospatial Management Office, USDA Forest Service, SLC, Utah

Student Demand

Currently, GIS courses are elective coursework in the geography undergraduate and graduate programs. In the last ten years, over 620 students have completed the introductory GIS course. Enrollment in the introductory GIS course has nearly doubled during the same ten year period. While over half of the students are Geography majors, a variety of other majors are represented (i.e. Environmental Studies, Urban Planning, Anthropology, Physics, Computer Science, Political Science, etc.). About 50% of these students enroll in the second GIS course after completing the first course.

Similar Programs

There is currently no other professionally oriented Masters' in GIScience offered by a component of the USHE or by any private college or university in the State of Utah. However, there are similar degree programs offered by major universities in the Intermountain West and western United States:

- Arizona State University: <http://geoplan.asu.edu/mas-gis>
- University of Denver: [http://universitycollege.du.edu/gis/degree/masters/master-of-science-in-geographic-information-sciences-\(gisc\)-online/degreeid/347](http://universitycollege.du.edu/gis/degree/masters/master-of-science-in-geographic-information-sciences-(gisc)-online/degreeid/347)
- University of Southern California: <http://gis.usc.edu/>
- University of Washington: <http://www.outreach.washington.edu/pmpgis/>

Collaboration with and Impact on Other USHE Institutions

There are several geography and GIS education programs in the State of Utah. None of these other programs are targeting GIS professionals at the masters degree level. Salt Lake Community College (SLCC) offers an Associate degree that currently serves as a feeder to our undergraduate geography and Certificate Program in GIS. It is expected that this relationship to strengthen with the creation of the MGIS. Weber State University offers a geography degree and a GIS minor at the undergraduate level. Utah State University offers a geography masters degree program oriented towards natural resource applications, given its location in the College of Natural Resources and in the land-grant institution in the USHE. Utah Valley University has an undergraduate degree program in geomatics (land surveying). Brigham Young University offers an undergraduate degree in geography, but no graduate degrees in geography or GIS. Actually many of these other programs are populated by faculty who are graduates of the Department of Geography at the U of U, so there are good linkages for student matriculation to the MGIS program.

Benefits

The University of Utah would be an ideal home for a Utah-based Masters in GIS program. The university is in an urban setting that is the state capital for Utah, generating an inherent level of demand for GIS professionals through agencies such as UDOT, UTA, UGS and the DNR. Beyond this, Salt Lake City is home to the first GIS state agency in the United States, the State of Utah Automated Geographic Reference Center (AGRC). It is also home to the Remote Sensing Applications Center (RSAC), the primary remote sensing research laboratory for the US Forest Service, as well as the US Department of Agriculture's aerial photography and cartography center. U of U graduates are employed in these agencies and in private firms throughout Utah and the nation.

The University of Utah's Department of Geography has been conducting research and teaching GIS and RS since the 1960s. It is home to one of the first academic GIS development facilities in the US; the Digitally Integrated Geographic Information Technologies (DIGIT) laboratory (<http://www.digit.utah.edu/>). This historic, high level of GIS and RS development has made the Wasatch Front a hotbed for GIS and RS professional activity. The MGIS will help maintain Utah as a national leader in GIS and RS by elevating the educational opportunities that have helped to incubate the local professional community.

Consistency with Institutional Mission

The University of Utah's mission is to serve society through discovery, education, and application of knowledge. This is achieved by supporting high standards in diverse scholarly activity and by intertwining academic pursuit with educating, mentoring and training students. Within this framework, the College of Social and Behavioral Sciences aims to offer a cutting-edge and captivating environment for students that will prepare them for their professional development in a dynamic, fast-paced world.

The MGIS program has been designed with the mission of the University and the aims of the College in mind. The program will provide an accelerated growth opportunity to its students through the provision of intensive instruction and practice in geographic information systems, science, methods and applications. The course sequencing specifically prepares them for advanced placements as GIS professionals in local and global corporations, organizations and government bodies. As an urban university, the University of Utah is the ideal base for graduate education of students working in the numerous businesses and governmental agencies based in Salt Lake City.

Section IV: Program and Student Assessment

Program Assessment

The program assessment will be based upon the ability to achieve the following goals using the provided measures:

1. To recruit and retain high quality students
 - a. Measures: number of applicants, number of admitted students, average GRE of applicants and of admitted students, average undergraduate GPA of applicants and of admitted students, and students most recent degree/institution.
2. To graduate 90% of the admitted students who meet the learning goals of MGIS
 - a. Measures: learning measures include
 - i. The student demonstrates geographic information science knowledge and technical skills in the appropriate classes with 2.75 or higher GPA.
 - ii. The student demonstrates geographic information science specific computer programming skills as measured using course and project work.
 - iii. The student is effective with analytical and critical thinking as measured using assignments and projects in program course work.
 - iv. The student is effective with management and team work as measured using group projects in program course work.
 - v. The student is effective with written and oral communication measured using assignments, written reports, and project presentations.
3. To assure positive student and graduates perceptions of the quality of the MGIS program
 - a. Measures: summaries of student mid and end course evaluations, exit surveys, and alumni interviews/surveys.
4. To meet or exceed the budget projections
 - a. Measures: student credit hours and revenues generated from MGIS.

Expected Standards of Performance

In addition to the Graduate School requirements for graduation with a master's degree, MGIS students will complete a minimum of 34 credit hours and maintain at least a 3.0 overall GPA.

MGIS students are expected to meet the performance standards in the following competency areas:

1. Geographic information science knowledge and technical skills
 - a. Skills will be evaluated through course assessments consisting of exams, laboratory assignments, written papers, individual and group presentations, etc.
2. Geographic information science specific computer programming skills
 - a. Skills will be evaluated through course exams and programming assignments.
3. Analytical and critical thinking
 - a. Skills will be assessed by assignments and projects throughout the course of study.
4. Foundation in geographic information science project management and team work
 - a. Management and team work skills will be measured throughout the program by group projects.
5. Effective communication (written and oral)
 - a. Performance will be evaluated through instructor and peer reviews of assignments, written reports and oral presentations.

In order to maintain the quality of the program and the ability to adjust to changing industry needs,

feedback from current and former students, faculty, and industry representatives will be sought on a regular basis through the Capstone Class project program. This feedback will provide guidance on program content, curriculum modifications, and student interests and needs.

Section V: Finance

Budget

5-Year Budget Projection						
Departmental Data	Current Budget— Prior to New Program Implementation	Year 1	Year 2	Year 3	Year 4	Year 5
Personnel Expense						
Salaries & Wages	0	19200	19200	22400	22400	22400
Benefits		4950	4950	5940	5940	5940
Total Personnel Expense		24150	24150	28340	28340	28340
Non-personnel Expense						
Travel						
Capital						
Library						
Current Expense						
Total Non-personnel Expense						
Total Expense (Personnel + Current)	\$0	\$24150	\$24150	\$28340	\$28340	\$28340
Departmental Funding		Year 1	Year 2	Year 3	Year 4	Year 5
Appropriated Fund						
Other:tuition return to department	0	14280	30600	61200	61200	61200
Special Legislative Appropriation						
Grants and Contracts						
Special Fees/Differential Tuition		1400	3000	6000	6000	6000
Total Revenue	\$0	\$15680	\$33600	\$67200	\$67200	\$67200
Difference						
Revenue - Expense	\$	\$(8470)	\$9450	\$38860	\$38860	\$38860
Departmental Instructional Cost/Student Credit Hour* (as reported in institutional Cost Study for "current" and using the same Cost Study Definition for "projected")	\$	\$	\$	\$	\$	\$

* Projected Instructional Cost/Student Credit Hour data contained in this chart are to be used in the Third-Year Follow-Up Report and Cyclical Reviews required by R411.

Tuition and tuition to program calculated on current 2011-12 amounts.

** Salaries and Wages - .5 FTE MGIS academic advisor staff (33% benefits) plus \$4200 per year adjunct faculty (no benefits)

Projected revenues based on tuition are conservative using lower number of credit hours and resident tuition. It is estimated that each student will take 12-15 graduate credit hours per semester. Twelve credit hours per semester per student is used for the tuition calculation. It is expected that most students will be residents.

Funding Sources

Ten of the 11 FTE are regular faculty members. Cost of the .5FTE staff and the adjunct faculty will be covered by returned tuition and the program fee discussed below.

Rationale for Program Fee for Staff Advisor

The Department of Geography has two base-funded staff, an administrative assistant and an academic coordinator. The Academic coordinator handles student records processing, instructional program administration and advising for approximately 100 undergraduate majors and 45 graduate students. The creation of the MGIS program will require additional focused advising, program administration and career development duties that cannot be provided by existing staff. The MGIS requires the initiation of a program fee to recoup the additional costs created by the program.

A program fee of \$100 per student is proposed, each fall and spring semester for any MGIS student enrolling in three or more credits of coursework (both classroom and on-line classes). A fee would not be assessed during summer semesters, as to encourage summer registrations. This will help achieve more balance in our enrollment pattern and thereby make course planning easier and more predictable for students. Estimating conservatively at 30 students enrolling per fall and spring semester, this will yield approximately \$6,000 per year. These funds along with departmental productivity funds (\$9,000) would be used to hire a .5 FTE advisor for the MGIS students.

Enhanced Career Development Activities

Currently, the Department hosts one career day in November each year on the International GIS Awareness Day. More events would be hosted where students meet (here and on site) with managers of private firms and local, state, and federal agencies. Such activities enhance student relationships with employers, colleagues, and stakeholders associated with their existing and desired career settings. The Capstone Class experience will have students working directly with GIS professionals and potential employers.

Sustaining Student Services for MGIS

These services include the following:

- Recruiting and marketing
- Coordinating the admissions process
- Managing student applications and files
- Advising students
- Managing and processing variety of forms for students and faculty
- Maintaining records and compiling basic data on students
- Assisting Program Manager with events, projects, and miscellaneous assignments
- Assisting with preparation of periodic reports

- Resolving student issues in consultation with the MGIS Director
- Managing student and job list serves
- Coordinating special events for students (awards banquet, orientation sessions, etc.)

Reallocation

The MGIS Director will reallocate a portion of time to this position with no increase in compensation. Beyond this the MGIS program is not expected to necessitate any reallocation of appropriated funds.

Impact on Existing Budgets

The proposed MGIS program utilizes existing courses from our graduate programs and will therefore have no negative budgetary impact on the Geography Department. Revenues generated by courses paid through the MGIS program will accrue to the Geography program to help offset administrative costs and limited additional teaching costs. Two new courses are to be developed as part of the continuing upgrade of our graduate program in geographic information science: GIS Project Management and Web GIS. The costs of teaching these courses will be met with revenues from our existing enrollments in our graduate degree programs combined with the new MGIS student enrollments. It is estimated that 50% of the costs for the new courses taught by adjunct faculty will be expensed to the MGIS program, which amounts to \$4200 per year. No additional regular faculty will be required.

Graduate Director. The Graduate Director of the Department of Geography will administer the MGIS program. This is a regular faculty member. Salary and benefits for the Director are not included in the budget because this is a tenure track faculty member who is already receiving full benefits.

Administrative and Library Support. Additional office support, such as program accounting, IT, clerical and office equipment can be provided by the Department of Geography and the College of Social and Behavioral Sciences.

The MGIS program will not require additional library resources.

Section VI: Program Curriculum

All Program Courses

Required Core Courses	Title	Credit Hours
GEOG 6140	Methods in GIS	4
GEOG 6150	Spatial Databases	3
GEOG 6160	Spatial Modeling with GIS	3
GEOG 6000	Spatial Statistics	3
GEOG 6010	Geocomputation	3
GEOG TBD**	GIS Project Management	3
GEOG 6161	GIS Capstone Project	3
	Sub-Total	22
Technical Electives	(Choose two from list below)	
GEOG 6120	Environmental Optics	3
GEOG 5170	Mobile GIS	3

GEOG 6020	Advanced Spatial Data Analysis	3
GEOG 6190	GIS & Environmental Health	3
GEOG 6180	GIS & Python	3
GEOG 6110	Environmental Analysis	3
GEOG 6130	Advanced Remote Sensing	3
GEOG TBD**	Web GIS	3
	Sub-Total	6
Application Electives	(Choose two from list below)	
GEOG 5320	Geography of Terrorism	3
GEOG 5340	Emergency Management	3
GEOG 6530	Time Geography	3
GEOG 5210	Global Climate Change	3
GEOG 5270	Biogeography	4
GEOG 5440	Global Economic Geography	3
	Sub-Total	6-7
	Total Number of Credits	34-35

** indicates a new course to be added in first year of the program
 New Courses to Be Added in the Next Five Years

Semester 1	Course Prefix and Number	Course Title
<i>(List courses – use one row per course)</i>	TBD	GIS Project Management
Semester 2		
<i>(List courses – use one row per course)</i>	TBD	Web- GIS
<i>Continue with Semesters for Entire Program</i>		

Program Schedule

Year I Fall Semester

GEOG 6140	Methods in GIS	4
GEOG 6000	Spatial Statistics	3
GEOG 6180	GIS & Python	3

Year I Spring Semester

GEOG 6010	Geocomputation	3
GEOG 6150	Spatial Databases	3
GEOG 5320	Geography of Terrorism	3

Year II Fall Semester

GEOG TBD**	GIS Project Management	3
GEOG 5340	Emergency Management	3
GEOG 6020	Advanced Spatial Data Analysis	3

Year II Spring Semester

GEOG 6161	GIS Capstone Project	3
GEOG 6160	Spatial Modeling with GIS	3

Section VII: Faculty

<http://www.geog.utah.edu/faculty/facultylist.html>

Simon C. Brewer, Assistant Professor, Department of Geography
Ph.D. Botany, Universite d'Aiz-Marseille, climate change, paleoecology, environmental modeling, data mining and analysis

Thomas J. Cova, Associate Professor, Department of Geography
Ph.D. Geography, University of California Santa Barbara, GIS, transportation, and emergency management

Philip E. Dennison, Associate Professor, Department of Geography
Ph.D. Geography, University of California Santa Barbara, hyperspectral and multispectral remote sensing of terrestrial ecosystems, wildfire and fire danger modeling

Steven Farber, Assistant Professor, Department of Geography
Ph.D. Geography, McMaster University, spatial analysis, urban transportation geography, spatial econometric modelling, integrated land-use and transportation modelling, activity and time-use analysis, GIS

Richard Forster, Professor, Department of Geography
Ph.D. Geophysics, Cornell University, microwave remote sensing of the cryosphere, application of radar interferometry to studies of glaciers and ground displacement

Kevin Henry, Assistant Professor, Department of Geography
Ph.D. Geography, McGill University, medical and health geography, public health, cancer epidemiology, applied GIS and spatial statistics for health data, health services

George F. Hepner, Professor, Department of Geography
Ph.D., Geography, Arizona State University, land resource analysis, geographic information systems, geospatial intelligence, terrorism/security

Phoebe McNeally, Director of the DIGIT Lab, Department of Geography
Ph.D., Geography, University of Utah, Geographic Information Science and Systems, geographic visualization, spatial decision support systems, snow science/avalanche forecasting

Harvey J. Miller, Professor, Department of Geography
Ph.D., Geography, The Ohio State University, Transportation, mobility science, Geographic
Information Systems (GIS), spatial analysis

Yehua Wei, Professor, Department of Geography
Ph.D. University of California, Los Angeles, economic/urban geography, global urban and
regional development, regional science and spatial analysis