

ITEM 142-1009-R0309

**Approval to establish a Masters of Science in Geography**

**THAT:**

In accordance with Montana University System Policy, the Board of Regents of Higher Education authorizes The University of Montana—Missoula to establish a Masters of Science in Geography.

**EXPLANATION:**

Geography is a discipline at the interface of social science, physical/natural sciences, and information science that trains students to work in a variety of fields and settings. As such, it is not uncommon for geography departments to offer both M.S. and M.A. degree programs to differentiate between the physical and human areas of study, and academic and professional orientations.

The M.S., and its options, will allow students to be better prepared for work in professional areas that require emphasis in science and technology. Students desiring to study physical geography (i.e., biogeography climatology, geomorphology, and meteorology) will be better served by a M.S. degree, because of its very nature, than the current M.A. degree. It is often the case that state and federal agency job classifications often explicitly require a M.S. degree of applicants. Additionally, practitioners in the planning and GIS fields have expressed a need for more trained professionals in these areas. The M.S. degree program with restructured options will help to fill this need. The M.A. program will continue for those students with stronger interest in cultural/human issues and careers in teaching and research.

**ATTACHMENTS:**

MONTANA BOARD OF REGENTS

LEVEL II REQUEST FORM

Item No.:	142-1009-R0309	Date of Meeting:	March 5-6, 2009
Institution:	The University of Montana—Missoula		
Program Title:	Establish M.S. in Geography		

Level II proposals require approval by the Board of Regents.

**Level II action requested (check all that apply):** Level II proposals entail substantive additions to, alterations in, or termination of programs, structures, or administrative or academic entities typically characterized by the (a) addition, reassignment, or elimination of personnel, facilities, or courses of instruction; (b) rearrangement of budgets, cost centers, funding sources; and (c) changes which by implication could impact other campuses within the Montana University System and community colleges. Board policy 303.1 indicates the curricular proposals in this category:

- 1. Change names of degrees (e.g. from B.A. to B.F.A.)
- 2. Implement a new minor or certificate where there is no major or no option in a major;
- 3. Establish new degrees and add majors to existing degrees;
- 4. Expand/extend approved mission; and
- 5. Any other changes in governance and organization as described in Board of Regents' Policy 218, such as formation, elimination or consolidation of a college, division, school, department, institute, bureau, center, station, laboratory, or similar unit.

**Specify Request:**

The University of Montana – Missoula requests permission to establish a Masters of Science program in Geography, and to shift two existing options (Cartography & GIS and Community & Environmental Planning) from the existing M.A. to the new M.S.

## **IV. Proposal**

### **1. Overview**

This proposal is to create a Master of Science (M.S.) Degree in Geography. This M.S. degree would complement and further articulate the existing M.A. degree with the Major in Geography (General Geography). Furthermore, this proposal will move two existing options in Cartography and GIS (Cart/GIS) and in Community and Environmental Planning (CEP) from the M.A. to the proposed M.S. The structures, course and research requirements corresponding to these two options are being modified to provide for both academic and professional orientations. It is envisioned that the new degree and modified options will produce a stronger set of programs that will better serve students.

### **2. Need**

#### **a. Specific Needs.**

The Department of Geography and the President's Office at The University of Montana have both had repeated requests from practitioners in the planning and Cart/GIS fields (in both the public and private sectors) for curricula in Cart/GIS and in CEP that are more professionally oriented and sensitive to the Cart/GIS and planning needs of local governments and industry in Montana.

Another need stems from the fact that the discipline of geography is unique when compared with other established academic disciplines in that it overlaps the social and physical sciences, and informational technologies (e.g., cartography, GIS, and remote sensing). As such, it is not uncommon for geography departments to offer both M.S. and M.A. degree programs to differentiate between the physical and human areas of study, and academic and professional orientations.

Geography's external departmental review completed in January 2007 evoked the strong recommendation of the administration that Geography restructure its graduate programs to create a M.S. degree with options in Cart/GIS and CEP. The purpose behind this recommendation was to bring Geography's curriculum into alignment with other geography departments in the United States that have established similar degrees to better serve majors in physical geography, cartography and GIS, and planning.

Establishing an M.S. would allow students more interested in the physical area of study with a more professional orientation to obtain the credentials necessary for those positions, while students pursuing an M.A. would concentrate on more on cultural human issues and possible careers in teaching and research.

#### **b. How will students and other constituencies be served?**

The M.S., and its options, will allow students to be better prepared for work in professional areas that require emphasis in science and technology.

Students desiring to study physical geography (i.e., biogeography climatology, geomorphology, and meteorology) will be better served by a M.S. degree, because of its very nature, than the current M.A. degree. Some students hoping to work in federal agencies following the completion of the existing M.A. program find that agency job classifications explicitly require a M.S. degree of applicants.

As noted in above, practitioners in the planning and GIS fields have expressed a need for more trained professionals in these areas. The M.S. degree program with restructured options will help to fill this particular need, while preserving the M.A. degree for those students with different interests.

**c. Anticipated demand.**

Many of our current students have expressed the perspective that changes in our degree programs such as proposed here would better fit their academic and professional goals. Alumni working in the GIS and planning professions have also noted that such changes would have benefited them with respect to their levels of training and ability to complete degree requirements in a timely fashion. Discussions with prospective graduate students have revealed that the proposed changes would increase the attractiveness of our degree programs as compared with others elsewhere in the region and in the nation.

**3. Institutional and System Fit**

**a. Connection between existing and proposed programs.**

As noted above, this proposal will create a M.S. degree that will complement an existing M.A. It will also shift the two options from the M.A. to the M.S., as appropriate. The proposal will thus actually serve to better articulate the academic and professional fields falling under the scope of the discipline. Geography faculty members will work with prospective students to determine the best course of study, depending on the students' career plans and specific interests.

**b. Will approval of the proposed program require changes to any existing programs at the institution?**

No changes to any existing programs at The University of Montana, other than slight changes to course and thesis requirements corresponding to the two options, will be required.

**c. Describe what differentiates this program from other, closely related programs at the institution.**

Graduate studies in cartography/GIS and planning at The University of Montana are only offered by The Department of Geography. Though graduate study in geomorphology can be pursued in the Department of Geosciences, the orientation of such work differs from that which is frequently undertaken in geography. Furthermore, the M.S. will permit students to focus their studies and research in the areas of biogeography, climatology, and meteorology in addition to geomorphology.

**d. How does the proposed program serve to advance the strategic goals of the institution?**

The University of Montana has maintained a graduate program in planning for approximately thirty years, and it has a goal to see this program improved such that it better serves the needs of students, practitioners, and Montana communities that are faced with challenges relating to changing demographics and economies. This planning program, which is not duplicated elsewhere in the Montana University System, will also be better suited for accreditation as a result of the proposed changes.

The university also has the goal of promoting the development of programs and research related to mountain studies, and the M.S. will better allow this goal to be realized.

**e. Describe the relationship between the proposed program and any similar programs within the Montana University System.**

The Department of Earth Sciences at Montana State University offers a M.S. degree. Geology and Geography are concentrations offered within that degree. Close examination of the course offerings in the Geography concentration show few overlaps with courses offered by the Department of Geography at the University of Montana.

In the area of General Geography, one course taught in the Earth Sciences Department is similar to one taught in the Department of Geography at UM. This course is GEOG 405, Geographic Thought taught at MSU, which compares with GEOG 520, Seminar in Geographical Thought is taught at the University of Montana. This particular course is featured in virtually every master's level program in geography departments throughout the United States. Otherwise there is virtually no duplication of courses offered by the Department of Earth Sciences at MSU and the Department of Geography at The University of Montana.

No new courses will be added to the Department of Geography's curriculum as a result of the creation of a Master of Science degree. Consequently, there will be virtually no impact on similar programs offered at Montana State University. None of the other units of the Montana University Systems have similar programs that might be affected.

The Department of Earth Sciences at MSU offers two graduate-level courses that concern planning, one that focuses on Land Use Planning and the other that concerns

Tourism Planning. A specific concentrated program of study in planning is not provided through the Geography concentration there, nor through the MSU School of Architecture's Master in Architecture degree program.

Similarly, the Department of Earth Sciences offers two graduate level courses concerning GIS. One of these courses is concerned with GIS Research Fundamentals and the other with Advanced GIS Analysis. A specific concentrated program of study in cartography and GIS is not provided through the Geography concentration there. Both of the courses at MSU are taught by adjunct faculty.

#### **4. Program details**

##### **a. Detailed description of the proposed curriculum.**

### **GRADUATE DEGREES IN GEOGRAPHY**

**M.A. or M.S. in GEOGRAPHY without option (General Geography)**

**M.S. in GEOGRAPHY with option in CARTOGRAPHY AND GIS**

**M.S. in GEOGRAPHY with option in COMMUNITY AND ENVIRONMENTAL  
PLANNING**

**9/9/08**

The Department of Geography offers graduate study leading to the M.A. and M.S. degrees. Students in General Geography may elect to pursue either degree. Students in either the Cartography & GIS Option or the Community or the Environmental Planning Option must complete the requirements of those options under the M.S. degree.

In addition to course requirements, students pursuing the M.A. or M.S. without option (General Geography) are required to successfully defend a thesis or one or more papers of publishable quality before an examining committee. The paper or papers of publishable quality must be intended for publication in a peer-reviewed journal.

Students pursuing the M.S. in Geography with option in Cartography & GIS or with option in Community and Environmental Planning may choose either a thesis track, a professional paper track, or a non-thesis track. Requirements for the thesis track are the same as those for General Geography. The professional paper track requires the successful completion of a professional paper. The difference between a thesis and a professional paper is that while the thesis is directed toward advances in the discipline, the professional paper may be directed toward advances in the profession. Both the thesis and professional paper must be successfully defended before an examining committee. The non-thesis track requires additional course work, the successful completion of a comprehensive written examination, and the successful defense of a

significant professional work (report, portfolio, etc.) before an examining committee.

A minimum of 30 credits plus a thesis (typically 3-6 cr.) is required for the M.A. or M.S. degree in General Geography. A minimum of 30 credit hours is required for either the Cartography & GIS Option or the Community and Environmental Planning Option when choosing a thesis or professional paper track. A minimum of 40 hours is required for the non-thesis track. See specific requirements for the *options* for additional information on the thesis, professional paper, and professional degree tracks.

Graduate School Requirements: Of the minimum number of credits required, 20 must be in the major. Of course credits (exclude thesis), 50% but no more than 18 credits must be 500-level courses. Students register for thesis and other credits commensurate with the use of facilities, involvement of faculty, and demonstrated progress in the degree program. Students must be continuously registered including the final term during which they complete all degree requirements. Please see Graduate School Policy on *Continuous Registration*.

**M.A. or M.S in GEOGRAPHY without option (General Geography)  
9/18/07**

**Symbolic Systems Requirements for M.A. or M.S. in General Geography (3-6 credits; does not count toward the 30 credit minimum).**

M.A. students in General Geography must satisfy a symbolic system requirement through a language or quantitative methods course (see a. or b. below), depending on area of specialization. M.S. students in General Geography must satisfy a symbolic system requirement through a quantitative methods course (see b. below). Symbolic systems courses must be taken for a letter grade. Upon approval of the advisor, previous course work may meet the symbolic systems requirement.

- a. Language course: at least one semester of the second year of a foreign language (200- level or higher; intensive language programs, such as summer institutes, are highly recommended)
- b. Quantitative methods course: at least one 400- or 500-level quantitative methods course (Math 444, Math 445, Geog 484, Math 541, Math 543, Math 547, Psych 520, Psych 521, Psych 522, Soc 562 or 563, a course in spatial statistics, etc.)

**Additional courses for students who do not possess an undergraduate degree in geography or closely allied field (3-9 credits; does not count toward 30 credit minimum).**

In consultation with the advisor, students are strongly encouraged to take upper-division or graduate courses in systematic geography (Geography and Society, Physical Geography, Human-Environment Interaction)

**If not previously taken (4 credits; does not count toward 30 credit minimum)**

Geog 387-3 Principles of Digital Cartography  
Geog 389-1 Laboratory

**Required Courses (11 credits)**

Geog 500-R2	Geography Graduate Colloquium
Geog 504-1	Introduction to Geographical Research
Geog 505-2	Research Design
Geog 520-3	Seminar in Geographical Thought

Methods-3 A techniques course based on the student's research interests, such as field methods (i.e. Geog 385), quantitative methods (i.e. Math 444 or 445, Geog 484, Soc 562 or 563, etc.), qualitative methods (i.e. Soc 561, EVSt 555, etc.), historical methods, survey methods (i.e. Econ 486), advanced computer methods, etc.

The intent of the methods requirement is provide students with a solid background in methodologies used for thesis research.

Methods courses in geography that are related to a student's thesis research can fulfill the methods requirement, but not methods courses that are degree requirements, including requirements of an option. (Elective methods courses, however, can be used to meet the methods requirement.)

**Seminar (minimum 3 credits)**

One Seminar in Geography (in addition to Geog 520)

**Electives (minimum 16 credits)**

In consultation with the advisor, students in Geography without option elect upper-division or graduate-level courses from the following

**Regional Geography Courses**

**Geographic Methods Courses**

**Systematic Geography Courses from the fields of  
Geography and Society  
Physical Geography  
Human-Environment Interaction**

**Other Courses from Allied Disciplines**

**M.S. in GEOGRAPHY with option in CARTOGRAPHY & GIS**  
**9/18/07**

**Tracks:** Those choosing to pursue the option in Cartography & GIS may choose a thesis, professional paper, or non-thesis degree track.

**Thesis track:** A minimum of 30 credits plus a thesis (typically 3-6 credits) are required. The thesis must be successfully defended before an examining committee. Geog 504 and 505 are required as part of the thesis and will not count toward the 30 credit minimum.

**Professional paper track:** A minimum of 30 credits plus a professional paper (typically 3-6 credits) are required. The professional paper must be successfully defended before an examining committee. Geog 504 and 505 are required as part of the professional paper and will not count toward the 30 credit minimum. The difference between a thesis and a professional paper is that while the thesis is directed toward advances in the discipline, the professional paper may be directed toward advances in the profession.

**Non-thesis track:** A minimum of 40 credits are required plus the successful completion of a comprehensive written examination, and the successful defense of a significant professional work (paper, report, portfolio, etc.) before an examining committee.

Those students selecting the thesis and professional paper tracks are required to complete a methods requirement:

**Methods-3** A methods course based on the student's research and/or professional interests, such as field methods (i.e., Geog 385), quantitative methods (i.e., Math 444 or 445, Geog 484, Soc 562, etc.), qualitative methods (i.e., Soc 561, EVST 555, etc.), historical methods, or survey methods (i.e., Econ 486), advanced computer methods, etc.

The intent of the methods requirement is to provide students with a solid background in methodologies used for research and professional practice.

All students in the Cartography & GIS Option must complete a symbolic systems requirement with MATH 444 and/or MATH 445. In consultation with the advisor, students also must meet a methods requirement with an advanced computer methods course, e.g. CS 207, 365, or 435. If not taken previously, students are required to take Geog 387-3 cr. and Geog 389-1 cr. (credits do not count toward degree).

Students who have not previously completed coursework in the area of Geographical Thought will be required to take Geog 520 (Seminar in Geographical Thought).

**Graduate School Requirements:** Of the minimum number of credits required, 20 must be in the major. Of course credits (excluding thesis), 50% but no more than 18 credits must be 500-level courses. Students register for thesis and other credits commensurate with the use of facilities, involvement of faculty, and demonstrated progress in the degree program. Students must be continuously registered including the final term during which they complete all degree requirements. Please see Graduate School Policy on *Continuous Registration*.

Students electing the Cartography and GIS option must complete the following:

**Required Courses (25 credits)**

Geog 483-3	Transport, Planning, and GIS
Geog 489-1	Laboratory (with Geog 483)
Geog 487-3	Remote Sensing and Raster GIS
Geog 489-1	Laboratory (with 487)
Geog 488-3	Thematic Cartography and GIS
Geog 489-1	Laboratory (with 488)
Geog 500-R2	Geography Graduate Colloquium
Geog 580-3	Seminar in GIS and Cartography
Geog 587-3	Digital Image Analysis and Modeling
Geog 589-1	Laboratory (with 587)
Geog 588-3	Vector GIS
Geog 589-1	Laboratory (with 588)

**Electives (5-15 credits)**

Geog 467-3	Planning Decision Support Systems
Geog 468-3	Community and Regional Analysis
Geog 469-1	Laboratory (with Geog 468)
Geog 484-3	Spatial Analysis and GIS
Geog 485-3	Internet GIS
Geog 489-1	Laboratory (with 485)
Geog 495-3	Digital Mapping & Design
Geog 589-3	Internship
For 551-4	Digital Image Processing

Other electives may be chosen in consultation with the advisor.

**Courses taken previously:** The same courses taken previously or similar courses taken elsewhere will be evaluated by the advisor in order determine whether or not they satisfy any of the requirements. Criteria for such evaluations include the course content, the date that the course was taken, and the grade received. In general, professional training courses such as those offered by software companies may not be used to substitute for course requirements. Since GIS is so dependent on advances in technology, courses taken over three

years previously cannot be used to substitute for requirements. Geog 387/89, Principles of Digital Cartography, is primarily concerned with the discipline of cartography and the manner in which it can be used to improve maps made with a GIS. Previous GIS training will not be considered a substitution for this course.

**M.S. in GEOGRAPHY with option in COMMUNITY AND ENVIRONMENTAL PLANNING**

**9/18/07**

**Tracks:** Those choosing to pursue the option in Community and Environmental Planning may choose a thesis, professional paper, or non-thesis degree track.

**Thesis track:** A minimum of 30 credits plus a thesis (typically 3-6 credits) are required. The thesis must be successfully defended before an examining committee. Geog 504 and 505 are required as part of the thesis and will not count toward the 30 credit minimum.

**Professional paper track:** A minimum of 30 credits plus a professional paper (typically 3-6 credits) are required. The professional paper must be successfully defended before an examining committee. Geog 504 and 505 are required as part of the professional paper and will not count toward the 30 credit minimum. The difference between a thesis and a professional paper is that while the thesis is directed toward advances in the discipline, the professional paper may be directed toward advances in the profession.

**Non-thesis track:** A minimum of 40 credits are required plus the successful completion of a comprehensive written examination, and the successful defense of a significant professional work (report, portfolio, etc.) before an examining committee.

All students in the Community and Environmental Planning Option must complete a symbolic systems requirement with MATH 444 and/or MATH 445.

Students who have not previously completed coursework in the area of Geographical Thought will be required to take Geog 520 (Seminar in Geographical Thought).

Those students selecting the thesis and professional paper tracks are required to complete a methods requirement:

**Methods-3** A methods course based on the student's research and/or professional interests, such as field methods (i.e., Geog 385), quantitative methods (i.e., Math 444 or 445, Geog 484, Soc 562, etc.), qualitative methods (i.e., Soc 561, EVST 555, etc.), historical methods, or survey methods (i.e., Econ 486), advanced computer methods, etc.

The intent of the methods requirement is to provide students with a solid background in methodologies used for research and professional practice.

**Graduate School Requirements:** Of the minimum number of credits required, 20 must be in the major. Of course credits (excluding thesis), 50% but no more

than 18 credits must be 500-level courses. Students register for thesis and other credits commensurate with the use of facilities, involvement of faculty, and demonstrated progress in the degree program. Students must be continuously registered including the final term during which they complete all degree requirements. Please see Graduate School Policy on *Continuous Registration*.

***Prior coursework completed by CEP graduate students will be reviewed for proficiency in the areas of urban and rural studies, and for physical geography. Students showing deficiencies in any of these areas will be required to complete requisite coursework in addition to the graduate degree requirements.***

**Required Courses (in addition to other option requirements discussed above – minimum of 25 credits)**

Geog 435-3	Environmental Hazards and Planning
Geog 465-3	Planning Principles and Processes
Geog 466-3	Environmental Planning
Geog 468-3	Community and Regional Analysis
Geog 469-1	Laboratory with Geog 468
Geog 500-R2	Geography Graduate Colloquium
Geog 560-3	Seminar in Planning
Geog 561-3	Land Use Law

**Select at least one of the following courses (3-4 credits):**

Geog 412-3	Towns and Rural Settlement
Geog 467-3	Planning Decision Support Systems
Geog 483-3	Transport, Planning & GIS
Geog 489-1	Laboratory with Geog 483
Geog 564-3	Planning Design

**Highly recommended for either degree:**

Geog 598-R3	Internship (maximum 6 cr.)
Geog 562-2	Land Use Clinic

**Electives (7-17 credits)**

***Community Planning Group***

Geog 401-3	Regionalism and the Rocky Mountain West
Geog 415-3	Migration and Population Change
Geog 417-3	Cultural and Global Competence
Anth 451-3	Cultural Resource Management
Anth 587-3	Seminar in Cultural Resource Management
Comm 512-3	Seminar in Dispute Resolution
EVST 450-3	Food, Agriculture, and the Environment
EVST 477-3	Environmental Justice Issues and Solutions
For/ EVST 473-3	Collaboration in Natural Resources Decisions
For 475-3	Sociology of Environment and Development

For 478-3	Montana Community Analysis
Soc 340-3	The Community
Soc 342-3	Urban/Metropolitan Sociology
Soc 346-3	Rural Sociology
Soc 571-3	Seminar in Rural and Environmental Change
PSc 501-3	Public Administration
PSc 364-3	State and Local Government

**Environmental Planning Group**

Geog 322-3	Meteorology
Geog 365-3	Geomorphology
Geog 426-3	Biogeography
Geog 432-3	Human Role in Environmental Change
Geog 525-3	Global Change
EVST 465-3	Restoration Ecology
EVST 540-3	Watershed Conservation Ecology
For 424-3	Community Forestry and Conservation
For 455-3	Riparian Ecology and Management
For 481-3	Forest Planning
For 485-3	Watershed Management
NAS 330E-3	Ecological Perspectives in Native American Traditions

**GIScience Group**

Geog 487-3	Remote Sensing and Raster GIS
Geog 489-1	Laboratory (with 487)
Geog 488-3	Thematic Cartography and GIS
Geog 489-1	Laboratory (with 488)
Geog 580-3	Seminar in GIS and Cartography
Geog 587-3	Digital Image Analysis and Modeling
Geog 589-1	Laboratory (with 587)
Geog 588-3	Vector GIS
Geog 589-1	Laboratory (with 588)
CRT 182-T-2	Computer Aided Design (COT Course)

**Policy Group**

EVST 502-3	Environmental Law for Non Lawyers
EVST 560-3	Environmental Impact Analysis
For 422-3	Natural Resources Policy and Administration
LAW 663/EVST 567-2	Water Law

**Native American Communities**

NAS 324H-3	Indians of Montana Since the Reservation Era
NAS 341S-3	Contemporary Issues of American Indians
NAS 400-3	Tribal Sovereignty

**Others**

Geog 596-R3	Independent Study (maximum 3 cr.)
Other electives in consultation with advisor	

**b. Planned implementation.**

Because the proposed changes to our degree programs represent a restructuring, a phased implementation will not be required. In the immediate-term, we expect that current levels of enrollment in the M.A. General degree will be split with the M.S. General (approximately 5-6 students per year in each). This should grow as the changes become publicized through the UM Graduate Catalog, our own departmental media (website, newsletter), and national geography program guides. We also expect that current levels of enrollment in the two options (approximately 3-4 students per year in each) will continue in the immediate-term, and even grow as a result of publicity.

**5. Resources****a. Faculty resources.**

Our current faculty resources are completely adequate to accommodate and implement this proposal. There will be no additional faculty or staff requirements.

**b. Other resources.**

There will be no additional space or curriculum needs in order to implement this proposal.

**6. Assessment**

The success of the proposed changes to our graduate degree programs will be measured through the tracking of statistics concerning changes in enrollments and matriculation for each degree and option. Furthermore, the Department of Geography's current assessment plan, revised and approved in fall 2007, will be modified to address the proposed degree and modified options in order to measure learning outcomes associated with each.

**7. Process leading to submission**

This proposal originated in the Department of Geography following the aforementioned department review, meetings with professional practitioners, and discussions with current and prospective students and alumni. The faculty created a subcommittee to articulate and develop the proposal, which was presented to the faculty for review and revision. The proposal was then approved by consensus. The Chair of Geography and the Dean of the College of Arts and Sciences then signed the documents necessary to submit the proposal to the Provost's Office and the Faculty Senate.

This proposal was reviewed and approved by the affected departments as follows:

Department Name: Geography

Date: 9/18/08

In addition the deans of the following Schools/Colleges reviewed and approved the proposal:

Dean of: The College of Arts and Sciences                      Date: 9/23/08

The proposal was reviewed and approved by the Faculty Senate at the University of Montana      Date: January 2009

[No outside consultants were employed for the development of this proposal.]