

MICHIGAN STATE UNIVERSITY

November 15, 2013

MEMORANDUM

TO: Dr. Douglas Estry, Associate Provost for Undergraduate Education
and Dean of Undergraduate Studies

FROM: Dr. John Gaboury, Associate Provost for Academic Services

RE: Request for a New Bachelor of Science Degree in Environmental
Geography

For Transmittal to the University Committee on Undergraduate
Education (UCUE)

The request referenced above is being sent to the University Committee on Undergraduate Education (UCUE) in accordance with the *Bylaws for Academic Governance*, 4.4.

UCUE Response Requested:

Please ask the committee to consider the request referenced above and provide consultative commentary. Please mail the related materials referenced under the heading Attachments at the end of this memorandum to the committee members.

After receiving the committee's consultative response, the Provost will make a determination to forward or not to forward the request to the University Committee on Curriculum for its approval of curriculum and degree requirements.

If you have any questions, please call Joy Speas, University Curriculum Administrator, at 5-8420.

Thank you.

Attachments:

1. Request to Establish a New Academic Program form dated October 9, 2013: Bachelor of Science Degree in Environmental Geography and attachments.



**University
Curriculum and
Catalog**

Hannah Admin. Building
426 Auditorium Road
Room 151A
East Lansing, MI 48824

517-355-8420
Fax: 517-353-1935

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View a Program		Main Menu
Stephanie Smith, RO	Thursday, 10/10/2013	
Program Name: Environmental Geography Degree: BS Sequence Number: 1		Program Request ID: 2224
Effective Dates: Fall 2013 - Open Status: Interim Initial Action: New		
Requested Date: 6/5/2012 2:50:07 PM		
<p>1. Department/School/College: 38366 Department of Geography</p> <p>2. Name of Program: Environmental Geography</p> <p>3. Name of Degree: BS</p> <p>4. Type of Program: Major</p> <p>5. Effective Start Semester: Fall 2013 2014</p> <p>6. Target student audience for the program: undergraduates at MSU</p> <p>7. Enrollment: What is the expected enrollment per year: 50 What is the minimum enrollment acceptable: 10</p> <p>8. Source of budget for the program: To align academic planning and curricular change, ALL requests for NEW funds must be included in the College's annual planning letter. Provost approval of new funds and the effective date for the new program must align. If funding is not approved, then the program request will not be forwarded to Faculty Senate. Internal reallocation If new funds, was this request included in the College's annual planning letter? Indicate yes or no. If no, then this is a department or college fund reallocation (If the program is implemented, no additional resources are required.).</p> <p>9. Projected Costs as compared to other programs in unit: Same</p> <p>10. Staff requirement: How many additional staff will be required: 0 Who will provide the primary instruction. Describe any external linkages(industry, government, etc.):</p> <p>11. Will additional equipment be required: Approximate cost: 0 Source of funding:</p> <p>12. Will additional library materials be required: Approximate cost: 0 Source of funding: No funding needed</p> <p>13. Will additional space be required: Type: Approximate amount:</p> <p>14. If the program requirements contain a named concentration, do you wish for the concentration to be noted on the student's transcript?:</p>		

No

15. Detailed Description:

Summary rationale for new program:

The department is proposing the new Environmental Geography BS in response to an Academic Program Review and changing opportunities for bachelor's degree recipients in employment and continuing education. The Environmental Geography BS aligns with the department's undergraduate degree program and faculty research expertise.

The department has set the requirements for the BS in Environmental Geography to conform to the new College of Social Science requirements for the bachelor's degree.

A. Background information:

Geography has undergone a thorough review of its majors, in light of the fact that our major counts are low. It is our goal to make our major more rigorous and more appealing to students and, as a result, enabling them to be better prepared to enter the workforce or graduate school. We believe the changes we are recommending will accomplish these goals. We believe by focusing on the environmental aspects of this new major, it will not only be more attractive to a wide variety of students, but will better train them for careers in the field.

B. Rational for offering the Program:

MSU has had a Geography Department and a Geography major for decades. This new major is intended to replace our current BS degree in Geography, which we are concurrently cancelling. Our Department is nationally recognized and a College-wide leader in research, grants and teaching. To have a rigorous and applicable major for our Department is logical.

C. Rationale for the program to be housed in the primary administration unit:

There are no other Geography units on campus, and thus it seems logical that the Geography Department should house this new major.

D. Educational objectives of the new program and their relationship to those of the College and the University:

Our goals are to provide depth and breadth within the field of Environmental Geography and to provide the technical skills and theoretical background necessary to a student specializing in environmental applications.

E. Faculty who were instrumental in developing the program and who will be responsible for implementing it:

Dr Randall Schaetzl chaired the committee who developed the new program, and along with our undergraduate advisor, Ellen White, will help implement it. Other committee members were David Campbell (GEO), Adrienne Goldsberry (GEO), and Brad Miller (GEO student rep).

F. Program description:

Please note that the requirements of this new program are based on the assumption that the pending curricular changes at the College level are implemented as currently planned.

Suggested Catalog Copy:

ENVIRONMENTAL GEOGRAPHY

The Bachelor of Science degree in Environmental Geography provides comprehensive academic training in the environment and how its many aspects interrelate across the landscape. Geographic knowledge is essential for understanding rapid social and environmental change in a globalized society. Environmental geographers describe, analyze, and explain the arrangement of the Earth's physical features. With training in both the natural and social sciences, Environmental geographers have a wide range of career opportunities in public and private sectors. They find work in consulting, government, tourism, teaching, environmental analysis, non-profit organizations, and natural resource management. Employers in the environmental field increasingly recognize the need for broadly trained environmental scientists who can bridge the gap between the social science (geography, planning, land use) and physical science (geology, hydrology, geomorphology) aspects of natural systems. To this end, the undergraduate program in Environmental Geography is designed to produce broadly trained scientists with a holistic understanding of the environment.

Requirements for the Bachelor of Science Degree in Environmental Geography - suggested catalog language

1. The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog; 120 credits, including general elective credits, are required for the Bachelor of Science degree in Environmental Geography.

The University's Tier II writing requirement for the ^{Environmental} Geography major is met by completing Geography 480. That course is referenced in item 3. e. below.

2. The requirements of the College of Social Science ^{for the Bachelor of Science degree} as described in the ~~College~~ section of this catalog.

3. The following required major courses (39 to 41 credits) with a minimum 2.00 grade point average.

a. One of the following Calculus courses (3 credits)

MTH 124 Survey of Calculus I (3 cr)

MTH 132 Calculus I (3 cr)

MTH 152H Honors Calculus I (3 cr)

b. Two of the three following Physical Geography courses (6 or 7 credits)

GEO 203 Introduction to Meteorology (3 cr) (3 cr)

GEO 206 Physical Geography AND GEO 206L Physical Geography Laboratory (4 cr)

GEO 306 Environmental Geomorphology (3 cr)

c. One of the following Human/Regional Geography courses (3 credits)

GEO 113 Introduction to Economic Geography (3 cr)

GEO 151 Introduction to Human Geography (3 cr)

GEO 204 World Regional Geography (3 cr)

GEO 330 Geography of the United States and Canada (3 cr)

GEO 333 Geography of Michigan and the Great Lakes Region (3 cr)

GEO 335 Geography of Latin America (3 cr)

GEO 336 Geography of Europe (3 cr)

GEO 337 Geography of Asia-Pacific (3 cr)

GEO 338 Geography of Africa (3 cr)

GEO 339 Geography of the Middle East and North Africa (3 cr)

d. Either of the following Geographic Techniques courses (3 or 4 credits)

GEO 221 Introduction to Geographic Information (3 cr) AND GEO221L Geographic Information Laboratory (1 cr)

OR

GEO 363 Introduction to Quantitative Methods for Geographers (3 cr)

e. GEO 480 Senior Seminar (W) (3 credits)

f. Twelve additional credits in Geography including at least 6 credits at the 300-level and above and 6 credits at the 400-level.

g. Nine credits in coursework from the College of Natural Sciences and/or the College of Agriculture and Natural Resources at the 300-level and above

GEO Assessment plan

This assessment plan is designed to address the three new majors in GEO: the BS in GISci, the BS in Environmental Geography, and the BA in Human Geography.
Curricular goals

Our goal for all three majors is to provide a broad overview of the wide-ranging subject matter of geography including coursework in introductory courses across the discipline. Students should be able to understand the basic principles of the discipline and how to apply them to a variety of real-world problems. Within each degree, we aim to provide in-depth understanding of the three major foci of our department: physical geography, human geography, and geographic techniques, along with the skills necessary to be effective contributors in the workplace. The restructured majors also allow more flexibility in elective course selection.

Assessment structure

Curricular assessment is provided by a variety of capstone courses and active learning experiences. GEO 480 - Senior Seminar - is used as the capstone experience for the BS degree in Environmental Geography and for the BA degree in Human Geography. In this course, students conduct undergraduate-level research, write reports, demonstrate written and oral communication skills, and present completed projects. GEO 425 - Problems in Geographic Information Science - is used as the capstone experience for the BS degree in Geographic Information Science. This course requires that students demonstrate an understanding of GIS principles and their application to real-world problems. We also

encourage students to pursue and utilize internship experiences. We have internship arrangements with a variety of government agencies and private firms and nearly all of our students take advantage of these opportunities. Assessment is made by the internship agency via a summary evaluation letter, and a reflective paper submitted by the student. In addition, we encourage overseas study experiences, particularly for those in the Human Geography degree. Lastly, we do perform exit interviews with some of our students, and every 3-4 years we send out a survey to all of our graduates, asking for their opinions of the program - what worked, what was useful, who got them interested in the program, what improvements they would suggest, etc. These surveys have been very helpful to us, especially in the GISci BS degree program which is still fairly new and is being revised as we speak.

Outcomes

We believe our graduates will be well-trained in both general geography concepts and in depth in more specialized areas of the discipline. They will possess state-of-the-art skills and techniques, and they will have demonstrated practical application of their coursework and abilities.

Michigan State University

Assessing Student Outcomes

College: Social Science
 Department: Geography
 Program or Major: Environmental Geography
 Program Level: BS
 Contact Person: Randall Schaetzl or Alan Arbogast

Inventory of Written Statements and Plans

1. Do you have a written mission statement or statement of purpose? yes no
 If yes, please attach a copy or reference where this can be found:
2. Do you have a written statement of intended educational outcomes yes no
 describing what a student should know or be able to do when they have completed this program?
3. Do you have a written method of assessment for measuring student outcomes? yes no
4. Does your program have a separate accreditation process? yes no
 If yes, please list all accrediting agencies below:

Assessment Methodologies

It is likely that some assessment measures are already in place in this program even if they are not identified as being part of a formal assessment plan. Listed below are some of the assessment methodologies you may be using. Indicate "A" if the method is currently being used; "B" if it is not being used but you are interested in using it; and "C" if the method of assessment does not apply to your program.

Direct Methods of Assessment

1. C Comprehensive Examinations
2. C Writing proficiency Examinations
3. C National Examinations assessing subject matter knowledge
4. C Graduate Record Exam General Test
5. C Graduate Record Exam Subject Test
6. C Certification Examinations
7. C Licensure Examinations
8. C Locally developed pre-test or post-test for subject matter knowledge
9. B Senior thesis or major project
10. B Portfolio evaluation of student work

- 11. A Capstone courses
- 12. C Audio or Video tape evaluations

Indirect Methods of Assessment

- 1. C Comparison or benchmarking with peer institutions
- 2. B Job placement of graduates
- 3. B Employer surveys
- 4. C Advisory groups from your profession
- 5. B Graduate school acceptance rates
- 6. B Student graduation/retention rates
- 7. A Exit interviews with students graduating or leaving the program
- 8. A Student satisfaction surveys
- 9. A Student course evaluations
- 10. C Focus group discussions
- 11. A Alumni surveys
- 12. B Alumni honors, awards, achievements
- 13. A Analysis of grade distributions
- 14. C Peer review of courses
- 15. C Peer review of program
- 16. C Curriculum/syllabus analysis
- 17. C Community service/volunteerism participation
- 18. Other:

Does your program have an experiential learning component? X yes no
 If yes, how do you assess the student learning outcomes from that experience?

- 1. Participate in a class designed to complement the experience
- 2. Student journals
- 3. X Formal evaluation procedures from field-based supervisor
- 4. Formal meetings between supervisor, student, and faculty
- 5. Formal test of practical skills
- 6. Other:

Implementation Plans

1. How has your department used any of the indicators above to improve services and programs for students?

We are continually adjusting our course and curricular strategies, upgrading syllabi and polling alumni to improve the educational system for our students. The latest curriculum revision is in response to an external review.

2. When you think about developing and implementing an assessment plan, what concerns do you have?

Our major counts are fairly low, so we always struggle with getting ample numbers of respondents to our alumni surveys.

Return this form to: Kelly Funk
 221 Administration Building

Assessing Student Outcomes modified and used with permission, Dr. Sharron L. Ronco, Florida Atlantic University

16. Are there admissions requirements for this program?:

Grade or grade-point average requirements and if so in which course(s), portfolio requirement, audition, essay, etc. If there are not admission requirements other than those required by the University policy indicate "none".

none

DEPARTMENT LEVEL APPROVAL STATUS

Approved: Department of Geography
9/12/2013 4:07:03 PM by Judy Reginek for Alan F. Arbogast, Chairperson

SIGNOFFS STATUS

No Response by: College of Agriculture and Natural Resources

Signed Off: College of Natural Science
9/24/2013 4:57:18 PM by Teri Roache for Gerard Mark Voit, Associate Dean

Signed Off: Department of Mathematics
9/13/2013 10:47:24 AM by Casim Abbas for Yang Wang, Chairperson

COLLEGE LEVEL APPROVAL STATUS

Approved: College of Social Science
10/9/2013 4:48:15 PM by Jeanne Kalin for Ethan Segal, Associate Dean

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COLLEGE OF SOCIAL SCIENCE

1. Request to establish a **Bachelor of Science** degree in **Environmental Geography** in the Department of Geography. The University Committee on Undergraduate Education (UCUE) will consider this request.

- a. **Background Information:**

The department is proposing a new Bachelor of Science degree in Environmental Geography in response to Academic Program Review and changing opportunities for bachelor's degree recipients in employment and continuing education. The proposed new degree aligns with the department's undergraduate degree program and faculty research expertise and will replace the current Bachelor of Science degree in Geography which will be placed in moratorium and phased out and discontinued.

The Department of Geography is nationally recognized and a college-wide leader in research, grants, and teaching. The department's goal is make the new major more rigorous and appealing to students, enabling them to be better prepared to enter the workforce or graduate school. Focusing on the environmental aspects of geography will better equip students for careers in the field, providing them comprehensive academic training on this dimension of our environment. A wide-range of career opportunities in the public and private sector, including work in consulting, government, tourism, teaching, environmental analysis, non-profit organizations, and natural resource management is available to environmental geographers.

- b. **Academic Programs Catalog Text:**

The Bachelor of Science degree in Environmental Geography provides comprehensive academic training in the environment and how its many aspects interrelate across the landscape. Geographic knowledge is essential for understanding rapid social and environmental change in a globalized society. Environmental geographers describe, analyze, and explain the arrangement of the Earth's physical features. With training in both the natural and social sciences, environmental geographers have a wide range of career opportunities in public and private sectors. They find work in consulting, government, tourism, teaching, environmental analysis, non-profit organizations, and natural resource management. Environmental scientists are increasingly in demand for jobs that require expertise in bridging the gap between the social science and physical science aspects of natural systems.

Requirements for the Bachelor of Science Degree in Environmental Geography

1. The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog; 120 credits, including general elective credits, are required for the Bachelor of Science degree in Environmental Geography.

The University's Tier II writing requirement for the Environmental Geography major is met by completing Geography 480. That course is referenced in item 3. below.

2. The requirements of the College of Social Science for the Bachelor of Science degree.
3. The following courses with a minimum 2.0 grade-point average (39 to 41 credits):

	CREDITS
a. One of the following courses (3 credits):	
MTH 124 Survey of Calculus I	3
MTH 132 Calculus I	3
MTH 152H Honors Calculus I	3
b. Two of the following courses (6 or 7 credits):	
GEO 203 Introduction to Meteorology	3
GEO 206 Physical Geography	3
and	
GEO 206L Physical Geography Laboratory	1

- | | | | |
|----|--|--|---|
| | GEO 306 | Environmental Geomorphology | 3 |
| | Students who choose Geography 206 must also enroll in Geography 206L either concurrently or in a subsequent term. | | |
| c. | One of the following courses (3 credits): | | |
| | GEO 113 | Introduction to Economic Geography | 3 |
| | GEO 151 | Introduction to Human Geography | 3 |
| | GEO 204 | World Regional Geography | 3 |
| | GEO 330 | Geography of the United States and Canada | 3 |
| | GEO 333 | Geography of Michigan and the Great Lakes Region | 3 |
| | GEO 335 | Geography of Latin America | 3 |
| | GEO 336 | Geography of Europe | 3 |
| | GEO 337 | Geography of Asia-Pacific | 3 |
| | GEO 338 | Geography of Africa | 3 |
| | GEO 339 | Geography of the Middle East and North Africa | 3 |
| d. | One of the following courses (3 or 4 credits): | | |
| | GEO 221 | Introduction to Geographic Information | 3 |
| | GEO 221L | Geographic Information Laboratory | 1 |
| | GEO 363 | Introduction to Quantitative Methods for Geographers | 3 |
| | Students who choose Geography 221 must also enroll in Geography 221L either concurrently or in a subsequent term. | | |
| e. | The following course (3 credits): | | |
| | GEO 480 | Senior Seminar | 3 |
| f. | Twelve additional credits in Geography courses including at least 6 credits at the 300-level and above and 6 credits at the 400-level. | | |
| g. | Nine additional credits in courses from the College of Agriculture and Natural Resources or the College of Natural Science at the 300-level and above. | | |

Effective Fall 2014.

DEPARTMENT of GEOGRAPHY

Alan F. Arbogast, Chairperson

The discipline of geography, as the study of place and space, concerns itself with the analysis and explanation of the occurrence, distribution, and interrelationships of physical and cultural patterns on the earth's surface. The discipline is also interested in how the earth's physical and human landscapes change over time. Geography can be classified both as a social science and a natural science as it examines human beings and their environment and serves as a bridge between the physical and cultural worlds. The undergraduate program is designed to prepare students for various careers in business, industry, education and government.

Strengths of the department include physical geography (climate, soils, vegetation), environmental change, spatial technologies (GIS, remote sensing, cartography), urban-economic geography, and nature-society interactions.

UNDERGRADUATE PROGRAMS

The Department of Geography offers programs in geography and geographic information science leading to the Bachelor of Arts and Bachelor of Science degrees. Minors in Geography and Geographic Information Science are also available.

environmental and human

GEOGRAPHIC INFORMATION SCIENCE

The Bachelor of Science Degree in Geographic Information Science provides a rigorous, in-depth program for students interested in the application of information technology to the spatial dimensions of the Earth's human and physical systems. It is an ideal program for those pursuing a career in the spatial technology sector, or for those considering graduate study in geography and related disciplines. Students attain substantial general quantitative and technical skills, as well as practical experience in the application of skills to solving problems drawn from local, regional, and global settings.

Requirements for the Bachelor of Science Degree in Geographic Information Science

1. The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog: 120 credits, including general elective credits, are required for the Bachelor of Science degree in Geographic Information Science.

The University's Tier II writing requirement for the Geographic Information Science major is met by completing Geography 425 or 480. Those courses are referenced in item 3. below.

2. The requirements of the College of Social Science for the Bachelor of Science degree.

The College's NATURAL SCIENCE REQUIREMENT for the Geographic Information Science major is met by completing 15 additional credits in courses offered by a department or program in the College of Natural Science, chosen from the following: Biochemistry and Molecular Biology, Biological Science, Chemistry, Entomology, Geological Sciences, Lyman Briggs, Mathematics, Microbiology and Molecular Genetics, Physics and Astronomy, Plant Biology, Plant Pathology, Physiology, Statistics and Probability, and Zoology. Students should see their academic advisor to obtain a list of approved courses which will meet this requirement.

CREDITS

3. The following required major courses: 30 to 32
- a. One of the following courses (3 or 4 credits):
- GEO 113 Introduction to Economic Geography 3
 - GEO 151 Cultural Geography 3
 - GEO 206 Physical Geography 3
 - GEO 206L Physical Geography Laboratory 1
- Students who choose Geography 206 must also enroll in Geography 206L.
- b. All of the following courses (16 credits):
- GEO 221 Introduction to Geographic Information 3
 - GEO 324 Remote Sensing of the Environment 4

GEO 325	Geographic Information Systems	3
GEO 425	Problems in Geographic Information Science (W)	3
GEO 463	Introduction to Quantitative Methods for Geographers and Planners	3
c. A minimum of 11 credits selected from the following:		
GEO 419	Applications of Geographic Information Systems to Natural Resource Management	4
GEO 423	Cartographic Design and Production	4
GEO 424	Advanced Remote Sensing	4
GEO 426	Thematic Cartography	4
GEO 428	Digital Terrain Analysis	4
GEO 453	Metropolitan Environments: Urban Forms and Land Uses	3
GEO 480	Senior Seminar (W)	3
GEO 498	Internship in Geography	3

Insert ①

GEOGRAPHY

Within the discipline of geography, a tracking system permits students pursuing a bachelor's degree to concentrate in various interest areas. The departmental advisor and faculty members are available to discuss program options and career opportunities with interested students.

monatorium requested Fall 2014

Requirements for the Bachelor of Arts Degree in Geography

- The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog; 120 credits, including general elective credits, are required for the Bachelor of Arts degree in Geography.
 The University's Tier II writing requirement for the Geography major is met by completing Geography 480. That course is referenced in item 3. a. below.
- The requirements of the College of Social Science for the Bachelor of Arts degree.

3. The following required major courses:	CREDITS
a. All of the following courses:	31
GEO 113 Introduction to Economic Geography	3
GEO 151 Cultural Geography	3
GEO 206 Physical Geography	3
GEO 206L Physical Geography Laboratory	1
GEO 221 Introduction to Geographic Information	3
GEO 463 Introduction to Quantitative Methods for Geographers and Planners	3
GEO 480 Senior Seminar (W)	3
b. One of the following courses:	
GEO 330 Geography of the United States and Canada	3
GEO 333 Geography of Michigan and the Great Lakes Region	3
GEO 335 Geography of Latin America	3
GEO 336 Geography of Europe	3
GEO 337 Geography of East Asia	3
GEO 338 Geography of Africa	3
c. Nine additional credits in Geography including at least one course at the 400 level.	

Requirements for the Bachelor of Science Degree in Geography

- The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog; 120 credits, including general elective credits, are required for the Bachelor of Science degree in Geography.
 The University's Tier II writing requirement for the Geography major is met by completing Geography 480. That course is referenced in item 3. a. below.
- The requirements of the College of Social Science for the Bachelor of Science degree.
 The College's NATURAL SCIENCE REQUIREMENT for the Geography major is met by completing 15 additional credits in courses offered by a department or program in the College of Natural Science, chosen from the following: Biochemistry and Molecular Biology, Biological Science, Chemistry, Entomology, Geological Sciences, Lyman Briggs, Mathematics, Microbiology and Molecular Genetics, Physics and Astronomy, Plant Biology, Plant Pathology, Physiology, Statistics and Probability, and Zoology. Students should see their academic advisor to obtain a list of approved courses which will meet this requirement.

3. The following required major courses:	CREDITS
a. All of the following courses:	31
GEO 113 Introduction to Economic Geography	3
GEO 151 Cultural Geography	3
GEO 206 Physical Geography	3
GEO 206L Physical Geography Laboratory	1
GEO 221 Introduction to Geographic Information	3
GEO 463 Introduction to Quantitative Methods for Geographers and Planners	3
GEO 480 Senior Seminar (W)	3
b. One of the following courses:	

ENVIRONMENTAL GEOGRAPHY

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Requirements for the Bachelor of Science Degree in Environmental Geography

1. The University requirements for bachelor's degrees as described in the *Undergraduate Education* section of this catalog; 120 credits, including general elective credits, are required for the Bachelor of Science degree in Environmental Geography.
The University's Tier II writing requirement for the Environmental Geography major is met by completing Geography 480. That course is referenced in item 3. below.
2. The requirements of the College of Social Science for the Bachelor of Science degree.
3. The following courses with a minimum 2.0 grade-point average (39 to 41 credits):

									CREDITS
a.	One of the following courses (3 credits):								
	MTH	124	Survey of Calculus I						3
	MTH	132	Calculus I						3
	MTH	152H	Honors Calculus I						3
b.	Two of the following courses (6 or 7 credits):								
	GEO	203	Introduction to Meteorology						3
	GEO	206	Physical Geography						3
			and						
	GEO	206L	Physical Geography Laboratory						1
	GEO	306	Environmental Geomorphology						3
	Students who choose Geography 206 must also enroll in Geography 206L either concurrently or in a subsequent term.								
c.	One of the following courses (3 credits):								
	GEO	113	Introduction to Economic Geography						3
	GEO	151	Introduction to Human Geography						3
	GEO	204	World Regional Geography						3
	GEO	330	Geography of the United States and Canada						3
	GEO	333	Geography of Michigan and the Great Lakes Region						3
	GEO	335	Geography of Latin America						3
	GEO	336	Geography of Europe						3
	GEO	337	Geography of Asia-Pacific						3
	GEO	338	Geography of Africa						3
	GEO	339	Geography of the Middle East and North Africa						3
d.	One of the following courses (3 or 4 credits):								
	GEO	221	Introduction to Geographic Information						3
	GEO	221L	Geographic Information Laboratory						1
	GEO	363	Introduction to Quantitative Methods for Geographers						3
	Students who choose Geography 221 must also enroll in Geography 221L either concurrently or in a subsequent term.								
e.	The following course (3 credits):								
	GEO	480	Senior Seminar						3
f.	Twelve additional credits in Geography courses including at least 6 credits at the 300-level and above and 6 credits at the 400-level.								

- g. Nine additional credits in courses from the College of Agriculture and Natural Resources or the College of Natural Science at the 300-level and above.**

GEO 330	Geography of the United States and Canada	3
GEO 333	Geography of Michigan and the Great Lakes Region	3
GEO 335	Geography of Latin America	3
GEO 336	Geography of Europe	3
GEO 337	Geography of East Asia	3
GEO 338	Geography of Africa	3
c.	Nine additional credits in Geography including at least one course at the 400 level.	

SPATIAL INFORMATION PROCESSING SPECIALIZATION

The spatial information processing specialization, which is administered by the Department of Geography, is available as an elective to students who are enrolled in bachelor's degree programs at Michigan State University. With the approval of the department and college that administer the student's degree program, the courses that are used to satisfy the requirements for the specialization may also be used to satisfy the requirements for the bachelor's degree.

The spatial information processing specialization is designed to develop academic expertise and professional competence in collecting, manipulating, analyzing, and displaying spatially-referenced information through the geographic subdisciplines of cartography, remote sensing, and geographic information systems.

Students who plan to complete the requirements for the spatial information processing specialization should contact the undergraduate advisor for spatial information processing in the Department of Geography.

Requirements for the Spatial Information Processing Specialization

The student must complete a minimum of 21 credits in courses as specified below:

	CREDITS
1. The following course:	3
GEO 221 Introduction to Geographic Information	3
2. One of the following courses:	3
GEO 490 Independent Study	3
GEO 498 Internship in Geography	3
3. Four of the following courses:	15 or 16
GEO 324 Remote Sensing of the Environment	4
GEO 326 Thematic Cartography	4
GEO 423 Map Production and Design	4
GEO 424 Advanced Remote Sensing	4
GEO 463 Introduction to Quantitative Methods for Geographers and Planners	3

MINOR IN GEOGRAPHY

The Minor in Geography, which is administered by the Department of Geography, provides a fundamental foundation to the breadth of study within the field of geography as well as grounding in general geographic theory.

The minor is available as an elective to students who are enrolled in bachelor's degree programs at Michigan State University other than the Bachelor of Arts or Bachelor of Science Degrees in Geography. With the approval of the department and college that administers the student's degree program, the courses that are used to satisfy the minor may also be used to satisfy the requirements for the bachelor's degree. At least 12 unique credits counted towards the requirements for a student's minor must not be used to fulfill the requirements for that student's major.

Students who plan to complete the requirements for the minor should consult an undergraduate advisor in the Department of Geography.

Requirements for the Minor in Geography

	CREDITS
Complete a minimum of 21 credits in the Department of Geography from the following:	

1. A minimum of 9 credits from the following:
 - GEO 113 Introduction to Economic Geography 3
 - GEO 151 Cultural Geography 3
 - GEO 203 Introduction to Meteorology 3
 - GEO 206 Physical Geography 3
 - GEO 206L Physical Geography Laboratory 1
 - GEO 221 Introduction to Geographic Information 3
2. A minimum of 3 credits from the following:
 - GEO 204 World Regional Geography 3
 - GEO 330 Geography of the United States and Canada 3
 - GEO 333 Geography of Michigan and the Great Lakes Region 3
 - GEO 335 Geography of Latin America 3
 - GEO 336 Geography of Europe 3
 - GEO 337 Geography of Asia-Pacific (I) 3
 - GEO 338 Geography of Africa 3
3. Complete a minimum of 9 additional credits in Geography courses, of which 6 credits must be at the 400-level. The courses must be approved by the student's academic advisor.

MINOR IN GEOGRAPHIC INFORMATION SCIENCE

The Minor in Geographic Information Science, which is administered by the Department of Geography, provides a fundamental foundation to the breadth of study within the field of geographic information science.

The minor is available as an elective to students who are enrolled in bachelor's degree programs at Michigan State University other than the Bachelor of Science Degree in Geographic Information Science. With the approval of the department and college that administers the student's degree program, the courses that are used to satisfy the minor may also be used to satisfy the requirements for the bachelor's degree. At least 12 unique credits counted towards the requirements for a student's minor must not be used to fulfill the requirements for that student's major.

Students who plan to complete the requirements for the minor should consult an undergraduate advisor in the Department of Geography.

Requirements for the Minor in Geographic Information Science

CREDITS

Complete a minimum of 20 credits in the Department of Geography from the following:

1. The following course (3 credits):
 - GEO 221 Introduction to Geographic Information 3
2. One of the following courses (3 credits):
 - GEO 490 Independent Study 3
 - GEO 498 Internship in Geography 3

Both Geography 490 and 498 must have geographic information science, remote sensing, or cartography content to fulfill this requirement. Students should obtain advisor approval prior to enrolling in a section of either of these courses.
3. Complete a minimum of 14 credits from the following courses:
 - GEO 324 Remote Sensing of the Environment 4
 - GEO 325 Geographic Information Systems 3
 - GEO 363 Introduction to Quantitative Methods for Geographers 3
 - GEO 419 Application of Geographic Information Systems to Natural Resources Management 4
 - GEO 423 Cartographic Design and Production 4
 - GEO 424 Advanced Remote Sensing 4
 - GEO 425 Problems in Geographic Information Science (W) 3
 - GEO 426 Thematic Cartography 4
 - GEO 428 Digital Terrain Analysis 4
 - GEO 453 Metropolitan Environments: Urban Forms and Land Uses 3
 - GEO 494 Remote Sensing Field Techniques 2

Additional courses as approved by the student's academic advisor.

TEACHER CERTIFICATION OPTIONS

A geography disciplinary minor is available for secondary teacher certification.

Students who elect the geography disciplinary minor must contact the Department of Geography to plan their programs of study.

For additional information, refer to the statement on *TEACHER CERTIFICATION* in the *Department of Teacher Education* section of this catalog.