

009:277 Thesis	arr.	018:217 Studies in Italian Literature	3 s.h.
009:279 Special Work	arr.	018:279 Special Work	arr.
009:355 Seminar	3 s.h.		

Italian - Primarily for Undergraduates

018:001 Elementary Italian	4 s.h.
For students who have no knowledge of Italian. Offered fall semesters GE: foreign language.	
018:002 Elementary Italian II	4 s.h.
Offered spring semesters. GE: foreign language. Prerequisite: 018:001 or equivalent.	
018:011 Intermediate Italian	4 s.h.
Offered fall semesters. GE: foreign language. Prerequisite: 018:002 or equivalent.	
018:012 Intermediate Italian II	4 s.h.
Offered spring semesters GE: foreign language. Prerequisite: 018:011 or equivalent	
018:013 Conversational Italian	2 s.h.
Offered fall semesters. Prerequisite: 018:002 or 018:103.	
018:014 Conversational Italian II	2 s.h.
Offered spring semesters. Prerequisite: 018:011 or equivalent.	
018:029 First-Year Seminar	1-2 s.h.
Small discussion class taught by a faculty member; topics chosen by instructor; may include outside activities (e.g., films, lectures, performances, readings, visits to research facilities). Taught in English. Open only to first- and second-semester students.	
018:053 Special Work	arr.

Italian -for Undergraduate and Graduate Students

018:103 Intensive Elementary Italian	6 s.h.
Offered spring semesters. GE: foreign language. Prerequisite: two years of another foreign language.	
018:105 Modern Italian Fiction	3 s.h.
Prerequisite: 018:012.	
018:106 Modern Italian Poetry and Drama	3 s.h.
Continuation of 018:105, but may be taken as independent unit. Prerequisite: 018:012 or equivalent.	
018:111 Advanced Composition and Conversation	3,4 s.h.
Offered fall semesters. Prerequisite: 018:012 or equivalent.	
018:112 Advanced Composition and Conversation	3,4 s.h.
Offered spring semesters. Prerequisite: 018:111.	
018:114 Studies in Italian Language	3 s.h.
Prerequisite: 018:111 or equivalent.	
018:119 Medieval Italian Literature	3 s.h.
Prerequisite: 018:012.	
018:120 Medieval and Renaissance Italian Literature	3 s.h.
Continuation of 018:119, which is not prerequisite. Prerequisite: 018:012.	
018:142 Topics In Italian Literature	3 s.h.
Topics chosen by genre, gender, artistic and literary movement, or regional and cultural diversity. Prerequisite: 018:111 or equivalent.	
018:153 Special Work	arr.
018:162 Topics in Italian Culture and Civilization	3 s.h.
Prerequisite: 018:111 or equivalent.	
018:198 Honors Research and Thesis	3 s.h.

Italian-Primarily for Graduate Students

018:203 Intensive Elementary Italian	4 s.h.
Fundamentals-pronunciation, reading, writing, comprehension, speaking; content of 018:001-002 in one semester. Prerequisite: two years of another foreign language.	

GENETICS

Faculty members and students in the College of Liberal Arts participate in the Genetics Program. For information about the program, see the Graduate College section of the Catalog.

GEOGRAPHY

Chair:

Professors: Marc P. Armstrong, James B. Lindberg, George P. Malanson, Michael L. McNulty, R. Rajagopal, David R. Reynolds, Gerard Rushton
Associate professors: Rex D. Honey, Rebecca S. Roberts

Assistant professors: David A. Bennett, David McGinnis, Tad Mutersbaugh, Claire Pavlik
Adjunct associate professor: David E. Osterberg
Adjunct Instructor: J. Michael Steinmaus
Undergraduate degrees: B.A., B.S. in Geography
Undergraduate nondegree program: minor in Geography

Graduate degrees: M.A., Ph.D. in Geography
Web site: <http://www.uiowa.edu/~geog>

Geography is concerned with place and environment and the ongoing processes of change within and between social and physical systems. Geography's importance to scholarly inquiry is rooted in the complexity of the social and environmental problems with which it deals. Its analytical power comes from its ability to understand and work with emerging properties of complex systems and with problems that require synthesis and integration. The three concepts at the core of the discipline-space, place, and scale-provide theoretical constructs and methodological tools for a science of the complex character of social and environmental phenomena.

Nowhere is this more apparent than when investigating the dynamic interrelationships between nature and society. Social problems often include environmental components, and environmental problems must be understood as a complex web of natural and social causes and consequences. Geographers deal with issues such as distribution and consumption of natural resources, air and water quality, processes and management of physical systems, climate changes and ecosystem dynamics, growth and development of urban areas, population dynamics, transportation problems, social conflict, social justice, and gender. These cannot be adequately understood through grounding in one of the physical or social sciences alone, nor can work in only one of these lead directly to appropriate solutions to environmental problems.

Geographers view society and nature as a physical/social/cultural system. They apply uniquely geographical perspectives and tools, as well as specialized knowledge from the individual social and scientific disciplines, to analyze the emergent properties of these systems.

Career opportunities for majors in geography exist in many branches of government,

nongovernmental organizations, and business. In demand are persons capable of dealing with resource management, urban and regional development, site selection and market area analysis, and problems in distribution and complex interrelationships between physical, ecological, social, and political systems.

Courses in geography are commonly required of students preparing to teach at the elementary and secondary school levels and those who want to pursue careers in urban and regional planning. They also provide a background for many related professions, including law, health care, environmental or transportation engineering, and international business.

Undergraduate Programs

The geography faculty has developed an undergraduate instructional program that serves students majoring or minoring in geography as well as those in other disciplines who are interested in taking geography courses as part of a liberal education. The department also participates in a number of University interdisciplinary programs that have global, area studies, urban, or environmental components.

Bachelor's Degrees

Requirements for the B.A. and B.S. in geography have changed. Students who enter the major on or after the first day of fall semester 2000 must complete the new requirements. Students who enter the major before the first day of fall 2000 may choose to complete either the old requirements (see the 1998-2000 General Catalog) or the new requirements. Students who choose the old requirements must complete the major and graduate by August 2004.

Each student majoring in geography selects one of three programs of study: geography and social change, environmental studies, or geographic information science. The course offerings in these programs include some overlapping of requirements.

Majors may work toward either a Bachelor of Science or a Bachelor of Arts. Either degree is appropriate for those who plan to pursue advanced training or careers in geography, environmental studies, or geographic information science. Students with interests in quantitative analysis and model building should choose the B.S. degree and should master an appropriate computer programming language.

Transfer students must earn at least 15 semester hours of geography course work in residence at The University of Iowa.

GIS laboratory

The University has established a Geographic Information System Instructional Laboratory (GISIL). Housed in the Department of Geography, the facility consists of a networked system of student workstations. Students in the environmental studies or geography and social change programs who wish to gain additional experience in the theory and application of geographic information systems (GIS) should

take 044:113 Principles of Geographic Information Systems and at least 6 more semester hours in GIS-based courses in the Department of Geography.

General Requirements

All geography majors must complete the following courses.

- 044:001 Introduction to Human Geography 4 s.h.
- or
- 044:010 The Contemporary Global System 4 s.h.
- 044:003 Introduction to Earth Systems Science 4 s.h.
- 044:005 Foundations of GIS 3 s.h.
- 044:019 Contemporary Environmental Issues 3 s.h.
- 044:150 Senior Project Seminar or 044:151 Senior Thesis 3 s.h.

All majors must complete one 3-semester-hour course offered by the Department of Statistics and Actuarial Science and numbered 22S:025 or above. The following are recommended.

- 22S:025 Elementary Statistics and Inference 3 s.h.
- 22S:102 Introduction to Statistical Methods 3 s.h.

Bachelor of Arts students must satisfy a mathematics requirement consisting of any college-level mathematics course of 3 semester hours or more, except 22M:001, 22M:002, or 22M:003.

Bachelor of Science students must satisfy a mathematics requirement consisting of one of the following sequences.

- 22M:015-016 Mathematics for the Biological Sciences/Calculus for the Biological Sciences a s.h.
- 22M:021-022 Calculus and Modeling I-II a s.h.
- 22M:025-026 Calculus I-II a s.h.
- 22M:035-036 Engineering Calculus I-II a s.h.
- 22M:045-046 Accelerated Calculus with Applications I-II a s.h.

All majors are encouraged to complete the General Education Program natural science component with 029:005 Chemistry and Physics of the Environment or a more advanced course in chemistry or physics.

All geography majors must complete one of the three programs of study described under "Geography and Social Change," "Environmental Studies," or "Geographic Information Science." Students should pay close attention to prerequisites for the intermediate and advanced courses in each sequence so that they can develop and complete their programs in a timely fashion. They also should choose electives from the "Related Course Work" cognate clusters to avoid exceeding the College of Liberal Arts 50-semester-hour limit on the amount of credit earned in the major department that can be counted toward the bachelor's degree.

Geography and Social Change

The undergraduate program in geography and social change is designed for students preparing for positions in government, nongovernmental organizations, international development agencies, and business. It also provides preparation for graduate programs in geography or planning, or for professional programs such as law, business, or policy analysis. The program provides an understanding of the increasing globalization of the modern world, including processes of urban and regional development or underdevelopment; the roles of elites, classes, institutions, social movements, and the natural environment in effecting social change in different parts of the world; and the processes through which policy decisions are reached. Courses cover social and economic theories of location and regional formation, methods of spatial analysis and geographic modeling, global and regional political economy, and theories of community conflict and social change.

Students develop requisite skills in quantitative analysis and the development, management, and application of geographic information systems and computer methods. They have opportunities to work on applied problems, such as assessing sites for their growth potential, identifying the best locations for service facilities, evaluating the impact of major projects, and forecasting the populations of small areas. This concentration also gives students interested in international development the opportunity to examine and evaluate competing theories intended to explain international and regional inequalities on a global scale.

In addition to taking the courses required of all geography majors, students in geography and social change must complete the following.

- Introductory geography courses (see list that follows) 6 s.h.
- The methods course (044:112) 3 s.h.
- Intermediate and advanced geography courses (see lists) 15 s.h.
- Electives (see "Related Course Work") 12 s.h.

INTRODUCTORY COURSES

- At least two of these:
- 044:011 Population Geography 3 s.h.
- 044:015 Introduction to Political Geography 3 s.h.
- 044:030 The Global Economy 3 s.h.
- 044:094 International Development 3 s.h.

METHODS COURSE

- 044:112 GIS: Urban, Social, and Economic Applications 3 s.h.

INTERMEDIATE COURSES

- At least one of these:
- 044:114 Mexico!: Environment, Politics, and Society 3 s.h.
- 044:132 Geography of Contemporary Europe 3 s.h.
- 044:133 Introduction to Economics of Transportation 3 s.h.
- 044:135 Urban Geography 3 s.h.
- 044:162 Work, Gender, and Development 3 s.h.
- 044:170 Geography of Justice 3 s.h.
- 044:172 Development Planning and Policy 3 s.h.

At least one of these:

- 044: 101 Climatology 3 s.h.
- 044: 103 Biogeography 3 s.h.
- 044: 104 Environment and Development 3 s.h.
- 044: 121 Natural Resources Policy 3 s.h.
- 044:122 Environmental Conservation in the U.S. 3 s.h.

ADVANCED COURSES

At least one of these:

- 044: 129 Water Resources Management 3 s.h.
- 044: 137 Location Theory 3 s.h.
- 044: 139 Locational Models and Spatial Decision Support Systems 3 s.h.
- 044: 163 Geography of the Newly Industrializing Countries 3 s.h.
- 044:176 Social Consequences of Global Change 3 s.h.

At least one of these:

- 044:124 Gender and the Environment 3 s.h.
- 044:131 Medical Geography 2-3 s.h.
- 044:171 Regions and Regionalism in North American Society 3 s.h.
- 044:178 Consequences of Global Environmental Change 3 s.h.
- 044:194 Geographic Perspectives on Development 3 s.h.

RELATED COURSE WORK

Under the direction of an adviser, students choose at least 12 semester hours of courses from one of the following cognate clusters. Other relevant courses may be substituted for the courses listed here, with the adviser's consent. Students also may satisfy this requirement by earning a second major or a minor in another department or by completing the requirements for a certificate in an interdisciplinary program.

Social Theory, Cultural Perspectives

- 008:100 Introduction to Criticism and Theory 3 s.h.
- 008:138 Post-Colonial Studies 3 s.h.
- 16A:107 American Cultural History, 1820-1920 3 s.h.
- 16A:142 American Labor in the Twentieth Century 3 s.h.
- 16E:148 Society and Gender in Europe 1750-Present 3 s.h.
- 16W:119 African and African American Interactions 3 s.h.
- 026: 132 Introduction to Political Philosophy 3 s.h.
- 030:133 Postmodern Political Theory 3 s.h.
- 030:138 Current Political Theory 3 s.h.
- 034:150 Political Sociology 3 s.h.
- 034:160 American Society 3 s.h.
- 034:166 Social Inequality 3 s.h.
- 36C:085 Communication and Conflict 3 s.h.
- 36M:025 Media and Society 3 s.h.
- 113:144 Culture and Consumption 3 s.h.
- 113:153 Cultural Politics 3 s.h.
- 131:101 Introduction to Women's Studies 4 s.h.
- 131:151 Feminist Theory 3 s.h.
- 131:155 Gender and Ethnography 3 s.h.

Urban and Regional Change

- 06E:001 Principles of Microeconomics 4 s.h.
- 06E:100 Economics for Business Decision Making 3 s.h.
- 06E:104 Microeconomic Theory 3 s.h.

06E:135 Regional and Urban Economics	3 s.h.
06E:176 Public Sector Economics	3 s.h.
06J:048 Introduction to Management	3 s.h.
16A:144 American Economic History	3 s.h.
16A:166 The Progressive Era in America	3 s.h.
030:120 Public Administration and Bureaucratic Politics	3 s.h.
030:137 Introduction to Political Economy	3 s.h.
030:155 Social Movements and Collective Action	3 s.h.
034:155 Sociology of Race and Ethnicity	3 s.h.
044:131 Medical Geography	3 s.h.
102:101 Introduction to Planning and Policy Development	3 s.h.
102:146 Women and the City	3 s.h.
113:155 Race and Ethnic Relations	3 s.h.
129:124 Black Culture and Experience	3 s.h.
131:101 Introduction to Women's Studies	4 s.h.
131:155 Gender and Ethnography	3 s.h.

International Development

06E:105 Macroeconomics	3 s.h.
06E:129 Economic Growth and Development	3 s.h.
06J:146 International Business Environment	3 s.h.
008:138 Post-Colonial Studies	3 s.h.
030:147 Ethnicity, Nationalism, and States in Transition	3 s.h.
030:148 The Politics of Southern Africa	3 s.h.
030:150 The Politics of Emerging Market Economies	3 s.h.
030:161 International Organizations and World Order	3 s.h.
030:179 Transitions to Democracy	3 s.h.
044:157 Third World Development Support	3 s.h.
044:161 African Development	3 s.h.
113:104 Inside/Outside The Middle East	3 s.h.
113:131 Latin American Economy and Society	3 s.h.
113:145 Economic Anthropology of the Third World	3 s.h.
113:151 Sociology of the Third World	3 s.h.
113:175 Gender and Development Studies	3 s.h.
131:101 Introduction to Women's Studies	4 s.h.
131:155 Gender and Ethnography	3 s.h.

Nature/Society Interactions

01H:165 Landscape in American Art	3 s.h.
06E:001 Principles of Microeconomics	4 s.h.
06E:133 Environmental and Natural Resource Economics	3 s.h.
008:100 Introduction to Criticism and Theory	3 s.h.
008:143 American Landscape	3 s.h.
16A:134 Great Plains	3 s.h.
16A:135 American West in the Twentieth Century	3 s.h.
026:102 Introduction to Ethics	3 s.h.
026:104 Introduction to Philosophy of Science	3 s.h.
026:132 Introduction to Political Philosophy	3 s.h.
030:133 Postmodern Political Theory	3 s.h.
030:138 Current Political Theory	3 s.h.
033:153 Hard Cases: Science Policy and Values	3 s.h.

033:155 Risk Technology and the Public	2-4 s.h.
091:291 International Environmental Law	3 s.h.
113:143 Environment and Culture	3 s.h.
113:144 Culture and Consumption	3 s.h.
131:101 Introduction to Women's Studies	4 s.h.
131:151 Feminist Theory	3 s.h.

Geographic Information Analysis

06K:070 Computer Analysis	3 s.h.
06K:176 Managerial Decision Models	3 s.h.
06K:182 Applications of Database Management Systems	3 s.h.
012:178 Geostatistics Seminar	3 s.h.
22C:005 Problem Solving and Computing	3 s.h.
22C:016 Computer Science I	4 s.h.
22C:020 Computer Science II	4 s.h.
22C:030 Computer Science III	3 s.h.
044:080 GIS for Environmental Studies: Introduction	3 s.h.
044:105 Introduction to Environmental Remote Sensing	3 s.h.
044:107 Thematic Cartography	3 s.h.
044:109 Analytical Cartography	3 s.h.
044:113 Principles of Geographic Information Systems	3 s.h.
044:128 GIS for Environmental Studies: Applications	3 s.h.
044:139 Locational Models and Spatial Decision Support Systems	3 s.h.

Environmental Studies

The undergraduate program in environmental studies is designed for students interested in the environment from physical and sociocultural perspectives. These students may have career expectations or personal interests in resource management, physical geography, climatology, environmental policy or law, global environmental change, sustainable development, or other complex environmental issues. Career goals may involve one of the environmental professions, such as landscape ecology or climatology; environmental planning and regulation; or environmental law, policy, and politics. The program stresses the interrelationships among social and natural processes that affect the environment.

Training in field observation, remote sensing, geographical information systems, quantitative analysis/computing, and cartographic representation are included in this concentration. The program also provides a sound foundation for graduate or professional-level studies in either the natural or social aspects of the environment.

In addition to taking the courses required of all geography majors, students in environmental studies must complete the following. Those who have taken high school chemistry or physics should substitute a more advanced course for 029:005.

029:005 Chemistry and Physics of the Environment (or a more advanced chemistry or physics course)	3 s.h.
An introductory geography course (see list)	3 s.h.
One methods course (see list)	3 s.h.

Five courses chosen from the following lists of intermediate and advanced courses (at least two from each list) 15 s.h.
Electives (see "Related Course Work") 12 s.h.

INTRODUCTORY GEOGRAPHY COURSES

At least one of these:

044:011 Population Geography	3 s.h.
044:015 Introduction to Political Geography	3 s.h.
044:030 The Global Economy	3 s.h.
044:094 International Development	3 s.h.

METHODS COURSES

One of these:

*044:080 GIS for Environmental Studies: Introduction	3 s.h.
*044:105 Introduction to Environmental Remote Sensing	3 s.h.
*044:128 GIS for Environmental Studies: Applications	3 s.h.
*044:180 Field Methods	2-4 s.h.

INTERMEDIATE COURSES

At least two of these:

*044:080 GIS for Environmental Studies: Introduction	3 s.h.
044:101 Climatology	3 s.h.
044:103 Biogeography	3 s.h.
044:104 Environment and Development	3 s.h.
*044:105 Introduction to Environmental Remote Sensing	3 s.h.
044:114 Mexico!: Environment, Politics, and Society	3 s.h.
044:121 Natural Resources Policy	3 s.h.
044:122 Environmental Conservation in the U.S.	3 s.h.

ADVANCED COURSES

At least two of these:

044:123 Landscape Ecology	3 s.h.
044:124 Gender and the Environment	3 s.h.
044:125 Environmental Impact Analysis	4 s.h.
044:126 Wetlands: Function, Geography, and Management	3 s.h.
044:127 Environmental Quality: Science, Technology, and Policy	3 s.h.
*044:128 GIS for Environmental Studies: Applications	3 s.h.
044:129 Water Resources Management	3 s.h.
044:131 Medical Geography	2-3 s.h.
044:178 Consequences of Global Environmental Change	3 s.h.
*044:180 Field Methods	2-4 s.h.

*Only one of these (044:080, 044:105, 044:128, 044:180) can be counted toward the 15-semester-hours requirement in intermediate and advanced courses.

A course chosen to fulfill one requirement cannot be used to fulfill a second.

RELATED COURSE WORK

Under the direction of an adviser, students should choose at least 12 semester hours of courses from one of the following cognate clusters. Other relevant courses may be substituted for the courses listed here, with the adviser's consent. Students also may satisfy this requirement by earning a second major or a minor in another department or by completing the requirements for a certificate in an interdisciplinary program.

Biophysical Systems

002:100 Plant Diversity and Evolution	4 s.h.
002:116 Field Ecology	4 s.h.
002:119 Plant-Animal Interactions	4 s.h.
002:134 Ecology	4 s.h.
012:108 Introduction to Oceanography	2 s.h.
012:128 Quaternary Palynology and Paleobotany	4 s.h.
012:138 Fluvial Geomorphology	3 s.h.
012:140 Geological Hazards	3 s.h.
012:154 Advanced Geocomputing	2 s.h.
012:166 Hydrogeology	3 s.h.
012:172 Glacial and Pleistocene Geology	3 s.h.
012:173 Quaternary Environments	3 s.h.
012:179 Engineering Geology	3 s.h.
159:102 Earth Surface Processes	3 s.h.
Summer courses offered through Iowa Lakeside Laboratory	arr.

Environmental Management

06E:001 Principles of Microeconomics	3-4 s.h.
06E:100 Economics for Business Decision Making	3 s.h.
06E:104 Microeconomic Theory	3 s.h.
06E:105 Macroeconomics	3 s.h.
06E:119 Economics of the Government Sector	3 s.h.
06E:133 Environmental and Natural Resource Economics	3 s.h.
06J:047 Introduction to Law	3 s.h.
06J:048 Introduction to Management	3 s.h.
012:139 Integrated Watershed Analysis	3 s.h.
030:118 Law-and Social Change	3 s.h.
033:153 Hard Cases: Science Policy and Values	3 s.h.
033:155 Risk Technology and the Public	2-4 s.h.
044:133 Introduction to Economics of Transportation	3 s.h.
091:291 International Environmental Law	3 s.h.
102:101 Introduction to Planning and Policy Development	3 s.h.
102:123 Introduction to Environmental Policy and Planning	3 s.h.

Environment and Development

06E:105 Macroeconomics	3 s.h.
06E:129 Economic Growth and Development	3 s.h.
06J:146 International Business Environment	3 s.h.
030:147 Ethnicity, Nationalism, and States in Transition	3 s.h.
030:148 The Politics of Southern Africa	3 s.h.
030:150 The Politics of Emerging Market Economies	3 s.h.
030:161 International Organization and World Order	3 s.h.
044:133 Introduction to Economics of Transportation	3 s.h.
044:157 Third World Development Support	3 s.h.
044:161 African Development	3 s.h.
044:162 Work, Gender, and Development	3 s.h.
044:163 Geography of the Newly Industrializing Countries	3 s.h.
044:172 Development Planning and Policy	3 s.h.
044:194 Geographic Perspectives on Development	3 s.h.
113:104 Inside/Outside the Middle East	3 s.h.

113:131 Latin American Economy and Society	3 s.h.
113:145 Economic Anthropology of the Third World	3 s.h.
113:151 Sociology of the Third World	3 s.h.
113:175 Gender and Development Studies	3 s.h.
131:101 Introduction to Women's Studies	4 s.h.
131:155 Gender and Ethnography	3 s.h.

Nature and Society

01H:165 Landscape in American Art	3 s.h.
06E:001 Principles of Microeconomics	3-4 s.h.
06E:133 Environmental and Natural Resource Economics	3 s.h.
008:100 Introduction to Criticism and Theory	3 s.h.
008:143 American Landscape	3 s.h.
16A:134 Great Plains	3 s.h.
16A:135 American West in the Twentieth Century	3 s.h.
026:102 Introduction to Ethics	3 s.h.
026:104 Introduction to Philosophy of Science	3 s.h.
026:132 Introduction to Political Philosophy	3 s.h.
030:133 Postmodern Political Theory	3 s.h.
030:138 Current Political Theory	3 s.h.
033:153 Hard Cases: Science Policy and Values	3 s.h.
033:155 Risk Technology and the Public	2-4 s.h.
091:291 International Environmental Law	3 s.h.
113:143 Environment and Culture	3 s.h.
113:144 Culture and Consumption	3 s.h.
131:101 Introduction to Women's Studies	4 s.h.
131:151 Feminist Theory	3 s.h.

Geographic Information Analysis

06K:070 Computer Analysis	3 s.h.
06K:176 Managerial Decision Models	3 s.h.
06K:182 Applications of Database Management Systems	3 s.h.
012:178 Geostatistics Seminar	3 s.h.
22C:005 Problem Solving and Computing	3 s.h.
22C:016 Computer Science I	4 s.h.
22C:020 Computer Science II	4 s.h.
22C:030 Computer Science III	3 s.h.
**044:080 GIS for Environmental Studies: Introduction	3 s.h.
**044:105 Introduction to Environmental Remote Sensing	3 s.h.
044:107 Thematic Cartography	3 s.h.
044:109 Analytical Cartography	3 s.h.
044:112 GIS: Urban, Social, and Economic Applications	3 s.h.
044:113 Principles of Geographic Information Systems	3 s.h.
**044:128 GIS for Environmental Studies: Applications	3 s.h.
044:139 Locational Models and Spatial Decision Support Systems	3 s.h.

**These courses cannot be used to fulfill this requirement if they have been used to satisfy the program's methods, intermediate, or advanced course requirements.

Geographic Information Science

The undergraduate program in geographic information science is designed for students who are preparing for positions in government agencies, nongovernmental organizations, international development agencies, and business. It also provides preparation for graduate work in geography, planning, and other disciplines. Students in this program develop an understanding of the design, implementation, and use of geographic information systems. Courses address how geographic data are acquired, stored, accessed, displayed, managed, and analyzed.

Geographic information science students learn to address problems such as modeling environmental systems, identifying the best locations for service facilities, assessing environmental impacts, and forecasting the populations of small areas. The Geographic Information Systems Instructional Laboratory (GISIL) is used extensively in courses to enable students to develop their expertise in the use of GIS software.

Core geographic information science courses covers methods of spatial analysis and geographical modeling and include database management and computer programming. Students supplement their work in GIS core courses through 12 semester hours of additional geography course work. Those who choose to focus on GIS for environmental analyses select supplementary geography courses from the department's environmental studies program, while those whose main interests are in socioeconomic analyses select supplementary course work from the department's geography and social change program.

In addition to the courses required of all geography majors, students in the geographic information science program must complete the following.

044:080 GIS for Environmental Studies: Introduction	3 s.h.
044:105 Introduction to Environmental Remote Sensing	3 s.h.
044:112 GIS: Urban Social, and Economic Applications	3 s.h.
044:113 Principles of Geographic Information Systems	3 s.h.

One of these:

044:107 Thematic Cartography	3 s.h.
044:109 Analytical Cartography	3 s.h.
044:128 GIS for Environmental Studies: Applications	3 s.h.
044:131 Medical Geography	2-3 s.h.
044:139 Locational Models and Spatial Decision Support Systems	3 s.h.

All of these:

06K:070 Computer Analysis	3 s.h.
06K:176 Managerial Decision Models	3 s.h.
22C:016 Computer Science I	4 s.h.

Geography courses chosen from the intermediate and advanced courses listed for the appropriate GIS emphasis (geography and social change, or environmental studies) 12 s.h.
Courses from the department's programs in geography and social change, or

environmental studies, chosen in consultation with the adviser

GIS EMPHASIS ON GEOGRAPHY AND SOCIAL CHANGE

Students who elect to concentrate additional geography course work in the geography and social change program choose courses from the following three lists.

Introductory Geography Courses

At least one of these:

- 044:011 Population Geography 3 s.h.
- 044:015 Introduction to Political Geography 3 s.h.
- 044:030 The Global Economy 3 s.h.
- 044:094 International Development 3 s.h.

Intermediate Geography Courses

At least one of these:

- 044:114 Mexico!: Environment, Politics, and Society 3 s.h.
- 044:132 Geography of Contemporary Europe 3 s.h.
- 044:133 Introduction to Economics of Transportation 3 s.h.
- 044:135 Urban Geography 3 s.h.
- 044:162 Work, Gender, and Development 3 s.h.
- 044:170 Geography of Justice 3 s.h.
- 044:172 Development Planning and Policy 3 s.h.

Advanced Geography Courses

At least one of these:

- 044: 124 Gender and the Environment 3 s.h.
- 044: 170 Georaphy of Justice 3 s.h.
- 044:178 Consequences of Global Environmental Change 3 s.h.
- 044: 194 Geographic Perspectives on Development 3 s.h.
- 044:129 Water Resources Management 3 s.h.
- 044:137 Location Theory 3 s.h.
- 044:163 Geography of the Newly Industrializing Countries 3 s.h.
- 044:176 Social Consequences of Global Change 3 s.h.

GIS EMPHASIS ON ENVIRONMENTAL STUDIES

Students who elect to concentrate additional geography course work in the environmental studies program should choose courses from the following two lists.

Intermediate Geography Courses

At least one of these:

- 044:101 Climatology 3 s.h.
- 044:103 Biogeography 3 s.h.
- 044:104 Environment and Development 3 s.h.
- 044: 121 Natural Resources Policy 3 s.h.
- 044: 122 Environmental Conservation in the U.S. 3 s.h.

Advanced Geography Courses

At least two of these:

- 044: 123 Landscape Ecology 3 s.h.
- 044: 124 Gender and the Environment 3 s.h.
- 044: 125 Environmental Impact Analysis 4 s.h.
- 044: 126 Wetlands: Function, Geography, and Management 3 s.h.
- 044: 127 Environmental Quality: Science, Technology, and Policy 3 s.h.
- 044: 129 Water Resources Management 3 s.h.

- 044:178 Consequences of Global Environmental Change 3 s.h.
- 044:180 Field Methods 3 s.h.

Four-Year Graduation Plan

The following checkpoints list the minimum requirements students must complete by certain semesters in order to stay on the University's four-year graduation plan. (Courses in the major are those required to complete the major; they may be offered by departments other than the major department.)

Bachelor of Arts

(The B.A. degree requires 19 courses.)

Before the third semester begins: one of the introductory courses in the major and at least one-quarter of the semester hours required for graduation

Before the fifth semester begins: six courses in the major and at least one-half of the semester hours required for graduation

Before the seventh semester begins: 13 courses in the major and at least three-quarters of the semester hours required for graduation

Before the eighth semester begins: 16 courses in the major

During the eighth semester: enrollment in all remaining course work in the major, all remaining General Education courses, and a sufficient number of semester hours to graduate

Bachelor of Science

(The B.S. degree requires 20 courses.)

Before the third semester begins: two of the introductory courses in the major and at least one-quarter of the semester hours required for graduation

Before the fifth semester begins: eight courses in the major and at least one-half of the semester hours required for graduation

Before the seventh semester begins: 14 courses in the major and at least three-quarters of the semester hours required for graduation

Before the eighth semester begins: 17 courses in the major

During the eighth semester: enrollment in all remaining course work in the major, all remaining General Education courses, and a sufficient number of semester hours to graduate

Honors

The honors major is for students of superior ability who want to pursue studies beyond the typical undergraduate level. To graduate with honors in geography, students must be admitted to both the University Honors Program and the honors program in geography by the first semester of the senior year. They must maintain a grade-point average of at least 3.20 in all University work and at least 3.40 in geography. They also must prepare and present an honors thesis, which consists of original research under

the direction of a faculty member. The thesis is reviewed by a three-member faculty committee.

Students complete the thesis through a year-long tutorial in 044:198 Honors Tutorial and 044:199 Honors Thesis. The senior course 044:150 Senior Project Seminar may be substituted for 044:199 Honors Thesis, provided the student continues work on the thesis under the direction of a faculty member.

Minor

To minor in geography, a student must complete at least 15 semester hours in geography courses with a grade-point average of at least 2.00. Twelve of the 15 semester hours must be taken at The University of Iowa in 1001-level courses. Minors are encouraged to choose one of the department's areas of concentration-geography and social change, environmental studies, or geographic information science-and to take courses listed in that concentration. Minors who wish further assistance in selecting courses may contact the department secretary to request assignment of a minor adviser.

Cooperative Education Program

The Department of Geography is a participant in the University's Cooperative Education Program, which provides opportunities for both undergraduate and graduate students to participate in cooperative training assignments related to their academic programs.

Courses for Nonmajors

Students in the College of Liberal Arts as well as other areas of the University may find geography courses meaningful to their own programs of study. The beginning-level courses 044:001 Introduction to Human Geography, 044:011 Population Geography, 044:019 Contemporary Environmental Issues, and 044:030 The Global Economy are approved by the College of Liberal Arts for General Education in social sciences; 044:157 Third World Development Support is approved for General Education in foreign civilization and culture; 044:161 African Development is approved for General Education in social sciences and foreign civilization and culture; and 044:003 Introduction to Earth Systems Science is approved for General Education in natural sciences. These courses serve as part of a liberal education.

Other courses may be attractive as individual electives. These include 044:015 Introduction to Political Geography, 044:124 Gender and the Environment, 044:126 Wetlands: Function, Geography, and Management, and 044:132 Geography of Contemporary Europe.

Graduate Programs

The department's graduate programs prepare students to carry on creative and productive research in selected areas of geography. University of Iowa graduates hold positions on college and university faculties, in private

research organizations, and in business and government. The department provides opportunities for graduate students to gain practical teaching experience through service as departmental teaching assistants or graduate instructors.

Programs of Study

Faculty members in the Department of Geography specialize in three broad areas of geographic inquiry: social-spatial theory, environmental systems, and geographic information science. By choosing appropriately from these three areas, students can develop programs in areas such as economic geography, political geography, biogeography and climatology, environment and society, regional development, and GIS and spatial analysis. For the M.A. and Ph.D. degrees, students are required to attain and demonstrate competence in a specific area of geography, across the breadth of geography, and in geographical methods.

Competence in a specific area of geography is achieved by appropriate course work chosen in consultation with an adviser and committee. Work may include courses in cognate fields; students coming to the program with degrees in disciplines other than geography already may have cognate strength. Students achieve competence across the breadth of geography through appropriate course work in areas outside their specific area. Students must enroll in 044:210 Philosophy and Epistemology in Geography at some time during their course of study, and they must enroll in 044:350 Geography Colloquium every semester that they are in residence.

Competence in methods is achieved by appropriate course work in an area related to the student's specialty. This competence must be in an area broader than that needed to complete a research paper or dissertation alone—it must be broad enough to provide a base for understanding the literature in the area now and in the future.

The B.A. or B.S. degree in geography is not a prerequisite for entry into the program, but students are expected to have an undergraduate background relevant to pursuing graduate work in geography. A strong background in any of the social or environmental sciences and an interest in exploring the regional and spatial perspectives characterizing modern geography are more important than the particular disciplinary orientation of the student's baccalaureate degree. Depending on the strength and suitability of their prior training, however, students may be required to take courses that are prerequisites for courses in their elected areas. Credit received for such courses cannot be applied to the requirements for a degree.

Master of Arts

The M.A. is designed to be completed in four semesters. It requires a minimum of 30 semester hours of graduate work, of which 15 semester hours must be earned in courses numbered 200 and above (including thesis, research, and readings hours, but not more than 2 semester hours of 044:350). At least

3 semester hours for the M.A. must be chosen from geography courses numbered 200 or above that are conducted as seminars.

Most students accumulate 40-48 semester hours of graduate credit in completing the M.A. Students are advised to use these additional hours to increase their breadth of knowledge in geography and to tailor their programs of study to their individual interests. A maximum of 6 semester hours may be earned in thesis work.

Graduate students demonstrate competence by completing appropriate course work; and completing an M.A. exam, or completing and defending an M.A. thesis, or completing the comprehensive exams for the Ph.D.

Doctor of Philosophy

The Doctor of Philosophy program is designed to prepare students for positions in college and university teaching and in advanced research. It provides programs of study leading to broad knowledge of a field of geography and its literature and special expertise in a specific subfield. The former usually represents the general area in which the Ph.D. holder seeks employment, whereas the latter represents his or her area of most active research involvement.

The Ph.D. is a four- to five-year postbaccalaureate program. Students can enter the program directly from the B.A. or B.S. or with advanced standing corresponding to their previous graduate education. Students must fulfill all departmental requirements for the M.A. except for the M.A. examination or thesis. Students must earn at least 18 semester hours in geography courses numbered 200 or above, conducted as seminars, and taught by two different faculty members. In addition, Ph.D. students demonstrate competence in a specific area of geography, across the breadth of geography, and in geographical methods by completing an original research paper, writing an area review paper, passing comprehensive examinations, and completing and defending a dissertation.

Before students can be admitted formally to candidacy for the Ph.D., they must submit an original research paper to a faculty committee for approval. Students who complete the M.A. with thesis can submit the M.A. thesis to fulfill this requirement. Students entering the program with an M.A. from another institution can submit theses or research papers completed elsewhere to fulfill this requirement. Before taking the comprehensive examination, which consists of both written and oral components, each student must submit an area review paper to his or her Ph.D. committee. This paper, which must be approved by the student's Ph.D. adviser, consists of a critical review of research in the student's area of concentration.

The comprehensive examination covers both the student's area of concentration and his or her more general field in the discipline. After obtaining the approval of a dissertation supervisor, the student must submit a dissertation proposal to his or her dissertation committee for its critical comments and approval. The student then must complete and defend the dissertation.

Admission

The department adheres to the general rules and regulations set forth in the *Manual of Rules and Regulations of the Graduate College* and evaluates the following for each applicant: undergraduate grade-point average, especially for the junior and senior years; scores on the Graduate Record Examination (GRE) General Test; three letters of recommendation; and an essay in which the applicant sets forth his or her reasons for wanting to study geography at The University of Iowa.

Financial Support

A number of graduate appointments as teaching or research assistants are available. In addition, there are several fellowships for outstanding applicants and underrepresented minorities. Awards are based on merit. In making awards, the department pays particular attention to grade-point average, GRE score, letters of recommendation, and how well the student's objectives fit with departmental specializations. Applications for graduate appointments must be received by February 1. Applicants for fellowships should submit their applications by January 15.

Facilities

The department houses three geographic information computational laboratories. These specialized laboratories support a variety of GIS software packages, including ARC/INFO, ARCMW, MGE, Idrisi, MAP/INFO, Transcad, and Maptitude.

The Geographic Information Systems Instructional Laboratory (GISIL) is equipped with 20 networked NT workstations, instructional support technology (e.g., CRT projection), and a suite of peripherals. The GISIL also contains high-end visualization equipment in the form of an ImmersaDesk, which provides users with access to full 3-D immersion for work in virtual environments.

GIS research laboratories contain Wintel machines. An environmental modeling and GIS lab includes a heterogeneous collection of UNIX workstations. Digitizers, scanners, plotters, and printers are also available in the department.

The department also participates in an advanced GIS and modeling facility in the Center for Global and Regional Environmental Research. The University of Iowa is a charter member of Internet2, and a high-performance network link to the Department of Geography was established recently. A cluster of PCs and Macs is available for graduate student word processing and internet connection.

For studies in water resources and physical geography, the department has a laboratory for analysis of vegetation, sediment, soil, and water quality; a digital tree-ring bench; and a variety of field equipment.

The map collection in the University's Main Library contains more than 115,500 maps, a total of 3,600 atlases and reference works, and about 100,000 aerial photographs, primarily of Iowa. The library is a depository for maps of the

U.S. Army Topographic Command (formerly the Army Map Service).

The Geology Library contains approximately 70,000 maps, including both geologic maps and U.S. Geological Survey topographic maps. The Department of Geography has its own collection of topographic maps, maps of large urban centers, and aerial photographs for use by students in laboratory exercises.

Courses

Primarily for Undergraduates

- 044:000 Cooperative Education Training Assignment 0 s.h.
- 044:001 Introduction to Human Geography 4 s.h.
Application of geographic principles to contemporary social, economic, and political problems; urban growth; problems of the ghetto; diffusion of innovations; territoriality and perception. GE: social sciences.
- 044:003 Introduction to Earth Systems Science 4 s.h.
Elementary principles of physical geography: physics of weather and climate, hydrological systems, geomorphological and geological forces, pedological processes, and ecological processes and patterns; geographic explanation of physical environment, with principles applied to the human use system; environmental pollution and natural hazards. GE: natural sciences.
- 044:005 Foundations of GIS 3 s.h.
Cartography, map analysis, and geographic information systems; map projections and scale; data collection, remote sensing, and GPS; data structures and organization; cartometry; symbolization and visualization.
- 044:010 The Contemporary Global System 4 s.h.
Problems of the global system and ways to address them; global economy and environment, state and security, social justice and human rights. GE: foreign civilization and culture or social sciences. Same as 047:010.
- 044:011 Population Geography 3 s.h.
Spatial considerations of population growth and distribution; minorities within a population; poverty; housing; social organization and disorganization; social systems, including education, religion, recreation, medical and social services; diffusion of ideas and traits over space. GE: social sciences.
- 044:015 Introduction to Political Geography 3 s.h.
Emphasis on application of geographical and economic theory in understanding historical development and restructuring of political economies at global, national, and local levels; development of nation states, nationalism, imperialism, geopolitics, economic restructuring, electoral geography.
- 044:019 Contemporary Environmental Issues 3 s.h.
Political, economic, cultural, technologic, ecological, and ethical issues associated with natural resource and environmental problems, including population, global climate change, food production, tropical deforestation, soil erosion, waste management. GE: social sciences.
- 044:029 First-Year Seminar 1 s.h.
Small discussion class taught by a faculty member; topics chosen by instructor; may include outside activities (e.g., films, lectures, performances, readings, visits to research facilities). Open only to first- and second-semester students.
- 044:030 The Global Economy 3 s.h.
Location and spatial organization of the world's major types of economies; agriculture, energy and minerals, manufacturing, transportation; trade and service centers. GE: social sciences.
- 044:035 World Cities 3 s.h.
Urbanization as a process; specific concepts and theories of urbanization through global patterns, regional urban systems, individual metropolitan areas. Offered spring semesters. Same as 047:035.
- 044:080 GIS for Environmental Studies: Introduction 3 s.h.
Methods of managing and processing geographic information for environmental analysis; basic concepts, structures, theories of Geographic Information System (GIS), basic analytical techniques, and hands-on experience in GIS operations.

- 044:085 Introduction to Economic and Social statistics 3 s.h.
Statistical methods applied to problems in economics, other social sciences; graphical methods, descriptive statistics, sampling and inference, regression analysis, simple forecasting methods. Same as 06E:050.
- 044:094 International Development 3 s.h.
Theories of international development, political economy, development policy and planning; empirical analysis of conditions, policies, experiences of selected Third World countries. Prerequisite: social science GE.
- 044:100 Readings for Undergraduates arr.
Supervised readings in geography. Consent of instructor required

For Undergraduate and Graduate Students

- 044:101 Climatology 3 s.h.
Boundary layer processes that drive atmospheric dynamics; exchanges of energy and water at simple and complex surfaces; global climate change records, theories, models; impacts of climate on society. Prerequisite: 044:003 or consent of instructor. Same as 012:104.
- 044:103 Biogeography 2.3 s.h.
Distribution and abundance of plants and animals, spatial patterns and processes, and temporal dynamics of succession, response to climate change, and evolution; methods applied to the study of vegetation and plant community patterns. Prerequisite: 044:003 or 002:001 or consent of instructor. Same as 002:103.
- 044:104 Environment and Development 3 s.h.
Environmental impacts of industrial and rural development explored through Third World case studies (Latin America, Africa, South and East Asia); environmental degradation from perspectives of political economy and ecology; class, gender, and indigenous peoples' issues; industry-agriculture linkages
- 044:105 Introduction to Environmental Remote Sensing 3 s.h.
Basic concepts and principles of remote sensing; sources of data; georegistration; digital processing and classification of remotely sensed images for extraction of environmental information; linkage of remote sensing techniques with GIS analysis
- 044:107 Thematic Cartography 3 s.h.
Selection of map projections, cartographic design, point-symbol maps, network representations, choropleth maps and data classification, multivariate maps, map animation, multimedia. Prerequisite: 044:005 or consent of instructor.
- 044:108 Introduction to Geographical Computing 3 s.h.
Computer use for spatial problem solving; representation of geographical data, sampling and spatial statistics, overview of GIS and its use in human and physical geography. Prerequisite: 044:005 or consent of instructor.
- 044: 109 Analytical Cartography 3 s.h.
Design and implementation of computer algorithms for processing digital geographical data; map projections and conversion, affine transformations, data capture programs, cartographic data structures, generalization, fractals, interpolation. Prerequisite: 044:005 or 044:080 or consent of instructor.
- 044:112 GIS: Urban, Social, and Economic Applications 3 s.h.
Concepts in the analysis of geo-referenced data sources, digital data structures, data organization; introduction to analyses of spatial data, including geodemographic and network analysis. Prerequisite: 044:005 or consent of instructor.
- 044: 113 Principles of Geographic Information Systems 3 s.h.
Issues in establishment of geographic information systems: spatial data encoding, raster-vector options, spatial and attribute resolution, cartographic data models, linkages to spatial analysis procedures, display techniques for decision support, institutional setting. Prerequisite: 044:005 or 044:080 or consent of instructor.
- 044:114 Mexico!: Environment, Politics, and society 3 s.h.
Contemporary trends and issues in Mexico, including environmental change, gender and indigenous peoples' politics, social movements, democracy, industrialization and urbanization, social and economic impacts of NAFTA and economic restructuring.
- 044:115 Cultural Geographies of North America 3 s.h.
Historical and contemporary perspectives on the contested cultural geographies of North America; processes underlying the social construction and reproduction of place, region, and place-based identities. Prerequisite: 044:001 or consent of instructor.
- 044:121 Natural Resources Policy 3 s.h.
Geographic, cultural, political, economic, and ethical dimensions of natural resources policy; substantive and theoretical insights from the natural sciences, social sciences, and humanities as parts of a conceptual framework for analyzing current resource problems from a geographic perspective; US natural resource problems and policy questions
- 044:122 Environmental Conservation in the U.S. 3 s.h.
Varied natural environments of the United States; problems arising from conflicting land uses; consideration of public land use policy, environmental impacts of different land uses, problems of habitat preservation and endangered species. Prerequisite 044:003 or 044:019 or consent of instructor.
- 044:123 Landscape Ecology 3 s.h.
Effects of spatial pattern on spatial processes in ecology; characteristics of matrix, patch, corridor; fragmentation, deforestation, habitat loss; spatial flows of energy, matter, genetic information; relationship to human impact, global climate change. Prerequisites: 044:103 or a 100-level course in ecology, and 044:085.
- 044:124 Gender and the Environment 3 s.h.
Relationships between gendered human activities and environmental problems in developed and less-developed regional contexts; women's work, environment, development, role of women's activism in environmental movements; science, gender, knowledge of the environment; ecofeminist perspectives. Prerequisite: an introductory environmental studies or women's studies course. Same as 131:124.
- 044:125 Environmental Impact Analysis 4 s.h.
Environmental impact assessment methodologies; emphasis on cost-benefit-risk, cost-effectiveness and incremental analysis, and overlay and graphic techniques; optimal resource use, system simulation; field trips to local environmental control facilities. Prerequisites: 044:019, and 029:005 or equivalent.
- 044:126 Wetlands: Function, Geography, and Management 3 s.h.
Biotic aspects of water resources production; geographical basis of biophysical processes in drainage basins; spatial aspects of stream ecology; regional characterization of wetland structure and process. Prerequisite: 044:101 or 044:103. Same as 012:126.
- 044:127 Environmental Quality: Science, Technology, and Policy 3 s.h.
Geographical perspectives in the study and interpretation of chemicals in the environment; environmental standards under existing laws; local, regional, national, international case studies in environment and health; socioeconomic and institutional considerations in designing environmental protection strategies. Prerequisite: 044:085 or equivalent or consent of instructor.
- 044:128 GIS for Environmental Studies: Applications 3 s.h.
Applications of Geographic Information System (GIS) techniques in environmental change analysis (especially land use/cover change), environmental assessment, hazard/risk analysis, environmental decision making. Prerequisite: 044:080 or 044:108 or consent of Instructor.
- 044:129 Water Resources Management 3 s.h.
Application of hydrological information in water resources management; aspects of water quantity and quality, groundwater availability, water use and treatment, resource development, political and administrative issues; basin management problems-forestry, agriculture, urbanization, floods, droughts. Prerequisite: 044:121 or 044:122 or equivalent.
- 044:131 Medical Geography 1-3 s.h.
Provision of health care in selected countries, with particular reference to the Third World; focus on problems of geographical, economic, cultural accessibility to health services; disease ecology, prospective payment systems, privatization, medical pluralism. Same as 152:131.
- 044:132 Geography of Contemporary Europe 3 s.h.
Physical demographic, and ethnic/cultural landscapes of contemporary Europe; national economies and European economic and social integration; transformation of Eastern Europe; comparison of European and U.S. economic development and social policies.

- 044:133 Introduction to Economics of Transportation 3 s.h.
Overview of transportation markets (intercity, rural, urban) and transportation modes (railroads, highways, air carriage, waterways); regulation, finance, physical distribution issues. Same as 06E:145, 102:133.
- 044:135 Urban Geography 3 s.h.
Central ideas of modern urban geography, their links to social theory; focus on interrelation between social change, urban environment; evolution of urban systems, emergence of the capitalist city, urban social and residential differentiation, local politics of uneven development. Prerequisite: 044:001 or 044:010 or 044:015.
- 044:137 Location Theory 3 s.h.
Behavior-based location theories for social and economic activities traced from their classical origins to the contemporary literature where both descriptive (e.g., central place theory) and prescriptive [e.g., location-allocation] models of multiple location decisions exist: relationship between location-allocation models and competition location theory. Prerequisite: 06E:001 or 044:030.
- 044:139 Locational Models and Spatial Decision Support Systems 3 s.h.
Application of location models within GIS environments to support decision making; small area demographic forecasting, location-allocation models, regionalization problems, shortest path models, other spatial analysis methods used to support spatial decisions. Prerequisite: 044:005.
- 044:150 Senior Project Seminar 3 s.h.
Development of a research project and preparation of a research report. Offered spring semesters. Open only to seniors.
- 044:151 Senior Thesis 3 s.h.
Original research. Open only to seniors. Consent of instructor required.
- 044:157 Third World Development Support 3 s.h.
Critical analysis of theories, policies, programs, practices of Third World development; nature of the social scientific support needed to understand and accelerate the process; analysis of historical trends in the administration of organized development aid since its inception in 1945. GE: foreign civilization and culture. Same as 019:157.
- 044: 161 African Development 3 s.h.
Problems of economic, political, spatial integration in Africa; patterns and processes of economic development and nation building. GE: foreign civilization and culture or social sciences. Prerequisite: 044:094. Same as 030:146, 141:146.
- 044:162 Work, Gender, and Development 3 s.h.
Gender and class considered through political economy, gender-development theory, and institutional economics; global processes of First/Third World development analyzed; focus on class, gender, and collective action in cooperative enterprises, factory workplaces, and social movements. Prerequisite: 044:094 or graduate standing.
- 044:163 Geography of the Newly Industrializing Countries 3 s.h.
Newly industrializing countries (NICs) in geographic and historical perspective; U.S. manufacturing base as a backdrop in NICs industrialization: off-shore industrial production, women in development, import-substitution industrialization [ISI], export-led industrialization, theories of industrial location, high-technology industries. the international division of labor: regional profiles taken from the Pacific Rim, Chile, Brazil, Mexico. Prerequisite: 044:094 or another introductory geography and social change requirement.
- 044:170 Geography of Justice 3 s.h.
Geographical analysis of social and environmental justice; justice from various cultural perspectives; cultural struggles over human rights.
- 044:171 Regions and Regionalism in North American Society 3 s.h.
Historical and contemporary perspectives on place, regions, regionalism in North American society. Prerequisites: 044:015 or 044:135 or senior standing or consent of instructor.
- 044:172 Development Planning and Policy 3 s.h.
Explicit and implicit strategies for economic and social development: origins, goals, formulation, execution, results; policy analysis methods. Prerequisites: 044:085 and 044:094.
- 044:176 Social Consequences of Global Change 3 s.h.
Social consequences of economic, political transformation; urbanization, technological change, and penetration of global capital. their impacts on gender relations, ethnic identity and significance, other social structures.
- 044:178 Consequences of Global Environmental Change 3 s.h.
Physical components of global change, their relationship to environmental policy concerns; consequences manifested on local, regional, international scales. Prerequisites: 044:003, 044:109, and 159:008; or consent of instructor.
- 044:180 Field Methods 2-4 s.h.
- 044:183 Quaternary Environments 3 s.h.
Same as 012:173.
- 044:186 Soil Genesis and Geomorphology 3 s.h.
Same as 012:136.
- 044:188 Geostatistics Seminar 3 s.h.
Same as 012:178.
- 044:190 Geographies of Popular Music and cultural Politics 3 s.h.
The changing geographies of various genres of American popular music; cultural politics of their social origins, transformation, production, and reproduction. Prerequisite: 044:001 or 044:010 or consent of instructor
- 044:194 Geographic Perspectives on Development 3 s.h.
Theoretical and empirical studies of the regional development process, with emphasis on developing countries; alternative regional development theories and changes in development theories in the literature of geography, related disciplines. Prerequisite: satisfaction of introductory geography and social change requirements
- 044: 195 Undergraduate Research arr.
Supervised research in geography. Consent of instructor required.
- 044: 197 Special Topics arr.
Contemporary fields of inquiry, such as political economy, regional/African development, biophysical systems, CIS, locational analysis, water resources, economic geography, demographic analysis, environment, urbanization, transportation. May be repeated.
- 044:198 Honors Tutorial arr.
Individual study. May be repeated.
- 044:199 Honors Thesis arr.
Original research. Open only to honors students.
- ## For Graduate Students
- 044:200 Readings arr.
Supervised readings by graduate students in topics of their choice. Consent of instructor required.
- 044:210 Philosophy and Epistemology in Geography 3 s.h.
Analysis of philosophies and methodologies of modern geography, with emphasis on epistemological and ontological issues; discussion of positivism (empiricism), its variants, and its alternatives in light of past and current research.
- 044:221 Nature-Society Theory 3 s.h.
Theoretical bases for understanding the relationship between human society and the natural environment; social construction of nature-ecological models, ecomarxism, culture theory, ecofeminism, poststructural/posunodernist theories, political ecology, environmental history. Prerequisite: 044:121 or consent of instructor.
- 044:222 Environmental Social Movements 2-3 s.h.
Processes of mobilization and resolution in environmental conflicts, from perspectives of public choice, liberal, radical, post-structuralist theory; relationships to new social movements; applications to environmental movements in First and Third Worlds.
- 044:223 Human Dimensions of Global Change 3 s.h.
Human impacts, driving forces, societal responses to global environmental change, both global systemic change (e.g., climate change) and regional cumulative change (e.g., land degradation). Prerequisite: introductory course in environmental problems or issues.
- 044:225 Environmental/Social Systems Analysis 3 s.h.
Linear optimization and related models; recent applications in water resources management, pollution control, economics, public policy; potential future applications in designing water quality monitoring networks. Consent of instructor required.
- 044:226 Advanced Biogeography 3 s.h.
Current questions on spatial distribution of organisms, spatial patterns of biodiversity, environmental gradients.
- 044:227 Environmental Quality: Science, Technology, and Policy 3 s.h.
Geographical perspectives in the study and interpretation of chemicals in the environment; environmental standards under existing laws; local, regional, national, international case studies in environment and health; socioeconomic and institutional considerations in designing environmental protection strategies.
- 044:232 Topics in Economic Geography 1.3 s.h.
Contemporary research in economic and industrial geography; qualitative and quantitative approaches; implications for economic policies.
- 044:246 Advanced Landscape Ecology 3 s.h.
Current questions of effects of spatial structure on ecological processes; ecotones and boundaries, metapopulations, pattern metrics.
- 044:262 Political Economy of Regional Development 3 s.h.
The "unequal" relationship between Third World countries and the industrial world; contemporary development problems of Third World societies; form and function of the Third World/industrial world relationship, in both external and internal dimensions. Consent of instructor required.
- 044:263 Agrarian Transitions in the Third World 3 s.h.
Indigenous people, peasant and rural development; gender development theory, agriculture/industrial links, state policy and rural politics, cooperative rural development, rural social movements, (bio) technological change and environmental degradation.
- 044:265 Transportation Regulation and Finance 3 s.h.
Public policy options for improving passenger and commodity movements within and between cities; air, water, land-based transportation modes. Same as 102:265.
- 044:274 Seminar: Social Change arr.
Social consequences of economic and political transformations; impacts of rural-urban migration; gender and ethnicity as the products and consequences of systems transformation. Same as 07D:300, 034:274, 042:274.
- 044:275 Development Policy and Planning in the Third World 3 s.h.
Development policies and planning in Third World countries; important development problems and alternative perspectives on problems and proposed solutions; interdisciplinary seminar. Same as 07F:275, 034:275, 042:275, 102:275, 113:275.
- 044:276 Special Topics in Political Geography 3 s.h.
Current topics in political geography or geopolitics; intensive readings.
- 044:281 Medical Geography 3 s.h.
Geographical information systems for health surveillance; spatial patterns of mortality, morbidity; ways of evaluating geographical accessibility problems of special populations. Same as 152:281.
- 044:285 Crossing Borders Seminar: Introductory 3.4 s.h.
Same as 008:230, 016:293, 030:241, 048:230, 113:230.
- 044:286 Crossing Borders Seminar 3-4 s.h.
Same as 008:231, 016:247, 030:242, 048:247, 113:247.
- 044:293 Advanced Location Theory 3 s.h.
Economics of location; location of the firm; transportation cost and location; location-allocation models; spatial price theory. Consent of instructor required. Prerequisite: 06E:203.
- 044:296 Topics in Geographic Information Science 3 s.h.
Current theoretical research issues in geographic information science; intensive readings. Prerequisite: 044:113 or consent of instructor.
- 044:297 Special Topics arr.
Contemporary fields of inquiry, such as political economy, regional/African development, biophysical systems. GIS. Location analysis, water resources, economic geography, demographic analysis, environment, urbanization, transportation.
- 044:300 Geography in Higher Education 2 s.h.
Professional development seminar; faculty roles in colleges and universities, curricular issues, students.
- 044:315 Research Seminar: Political Geography arr.
- 044:327 Research Seminar: Environment and Society arr.
- 044:328 Research Seminar: Physical Geography arr.
- 044:329 Research Seminar: Water Resources arr.

044:330 Research Seminar: Location Theory Critique of the contemporary location theory literature; discussion of solutions to the problems identified. Prerequisite: 044:137.	arr.
044:350 Geography Colloquium	arr.
044:394 Research Seminar: Regional Development	3 s.h.
044:415 Research: Political Geography Graduate-level research for Ph.D. students generally post-comprehensive.	arr.
044:440 Research: Environmental Systems Analysis	arr.
044:441 Research: Locational Analysis	arr.
044:445 Research in Political Geography/ Economy	arr.
Graduate-level research for Ph.D. students, generally post-comprehensive.	
044:450 Thesis	arr.

GEOSCIENCE

Chair: Ann F. Budd
Professors: Ann F. Budd, Robert S. Carmichael, Philip H. Heckel
Professors emeriti: Richard G. Baker, Lon D. Drake, William M. Furnish, Brian F. Glenister, Richard A. Hoppin, Gilbert Klapper, George R. McCormick, Holmes A. Semken, Keene Swett, Sherwood D. Tuttle
Adjunct professors: Reza Moussavi-Harami, Donald L. Koch
Associate professors: Robert L. Brenner, C. Thomas Foster Jr., Luis A. Gonzalez, Mark K. Reagan, Frank H. Weirich, You-Kuan Zhang
Adjunct associate professors: Gregory A. Ludvigson, Brian J. Witzke
Assistant professors: Jonathan M. Adrain, Christopher A. Brochu, Jane A. Gilotti
Adjunct assistant professors: Ray Anderson, A. Umran Dogan, Paul H. Liu, R. Sanders Rhodes II
Visiting assistant professors: Martin S. Appold, Matthew R. Saltzman, Andrew H. Wulff
Adjunct instructor: Julia Golden
Undergraduate degrees: B.A., B.S. in Geoscience
Undergraduate nondegree program: minor in Geoscience
Graduate degrees: M.S., Ph.D. in Geoscience
Web site: <http://www.geology.uiowa.edu>

Geoscience is the basic study and practical application of scientific disciplines related to understanding the earth. It examines the earth's origin, its history, its present appearance and character internally and at the surface, its alteration with time, location of mineral and energy resources, and how mankind is changing the earth for future generations. Geoscience has several subfields—mineralogy, petrology, stratigraphy, structural geology, paleontology, paleoecology, sedimentology, earth surface processes (geomorphology), glacial geology, environmental geology—as well as geophysics, geochemistry, hydrogeology, paleoclimatology, paleobiology, engineering geology, and remote sensing.

Career opportunities are available in industry (especially related to resource exploration and environmental concerns), education, urban planning, state and federal geological surveys, and government resource and research organizations. The master's degree is regarded by most hiring agencies as the working degree. The doctoral degree is required for college and university teaching positions. However, an undergraduate degree is fully satisfactory in

certain teaching, government, and industrial situations.

Many of The University of Iowa's geoscience graduates find employment with resource companies, environmental corporations, and educational institutions. Others continue in graduate school or take jobs with government or conservation agencies. Some intend to enter law, business, or fields such as urban planning, environmental studies, engineering, archaeology, science education, or oceanography as advanced areas. Geoscience is good preparation for all of these.

Each year more than 800 students enroll in 012:003 Earth History and Resources, 012:004 Evolution and History of Life, 012:005 Introduction to Geology, 012:008 Introduction to Environmental Science, and 012:114 Energy and the Environment, all courses approved by the College of Liberal Arts for General Education in natural sciences.

For nonmajors, the department offers a lecture sequence featuring a general survey of geoscience and several intermediate courses with few prerequisites—paleontology, oceanography, remote sensing, earth surface processes (geomorphology), and energy and the environment.

Undergraduate Programs

Geoscience majors receive at least an academic year's work in three allied scientific areas—physics, chemistry, and mathematics—and a semester of biological sciences in addition to a course in each major area of geology.

Students majoring in geoscience must complete the General Education Program of the College of Liberal Arts. It is recommended that they satisfy the foreign language requirement with French, German, Spanish, or Russian, and the social sciences requirement with an approved course in economics, geography, or anthropology. The department offers the Bachelor of Science and the Bachelor of Arts.

Transfer students must complete a minimum of 15 semester hours of course work in the Department of Geoscience for either the B.S. or the B.A. degree.

Bachelor of Science

The Bachelor of Science professional program in geoscience is designed to prepare students for immediate employment after graduation or for entering a graduate program in geology. The B.S. requires a minimum of 38 semester hours of departmental work, including the following course work.

One of these:	
012:003 Earth History and Resources	4 s.h.
012:005 Introduction to Geology (preferred)	4 s.h.
All of these:	
012:004 Evolution and the History of Life	4 s.h.
012:041 Mineralogy	4 s.h.
012:052 Petrology	4 s.h.

012:092 Structural Geology	4 s.h.
012:093 Geologic Field Methods	2 s.h.
012:113 Summer Field Course	6 s.h.
At least two geoscience electives	6-7 s.h.

One of these:

012:121 Principles of Paleontology	3 s.h.
012:124 Invertebrate Paleontology	4 s.h.

At least 10 semester hours of college-level mathematics, including one of these:

22M:022 Calculus and Modeling II	4 s.h.
22M:026 Calculus II	4 s.h.
22M:036 Engineering Calculus II	4 s.h.
22M:046 Accelerated Calculus with Applications II	4 s.h.

Courses in mathematics, computer science, and statistics can be used to satisfy the mathematics requirement.

B.S. students must complete the following course work in chemistry, physics, and biological sciences (these are minimum requirements).

At least 8 semester hours of college-level chemistry including the following, or equivalents, or more advanced courses; chemistry courses numbered below 004:013 cannot be used to satisfy the chemistry requirement for the B.S. in geoscience.

004:013-014 Principles of Chemistry I-II	6 s.h.
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004:016 Principles of Chemistry Laboratory	2 s.h.
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or

012:141 Analytical Methods Seminar	2 s.h.
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At least 8 semester hours of college-level physics, as follows; physics courses numbered below 029:011 cannot be used to satisfy the physics requirement for the B.S. in geoscience.

029:011-012 College Physics	8 s.h.
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or

029:017-018 Introductory Physics I-II	8 s.h.
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At least one biological science course that includes a laboratory

RECOMMENDED OPTIONS

All B.S. candidates should take elective courses from the following groups in order to broaden their undergraduate experiences and prepare themselves for graduate study or professional employment. Students who have clear career goals are advised to take three or more elective courses from the group that fits their needs most closely. Students also may seek a broad education in geoscience by choosing elective courses from a number of groups.

Quaternary Geology

012:102 Earth Surface Processes	3 s.h.
012:110 Introduction to Applied Remote Sensing	4 s.h.
012:130 Sedimentary Geology	3 s.h.
012:136 Soil Genesis and Geomorphology	3 s.h.
012:138 Fluvial Geomorphology	3 s.h.
012:149 Elements of Geochemistry	3 s.h.
012:153 Geocomputing	1-3 s.h.
012:172 Glacial and Pleistocene Geology	3 s.h.
012:173 Quaternary Environments	3 s.h.