

All students enrolled in the program are required to take the following courses.

127:150 Genetic Analysis of Biological Systems	3 s.h.
127:200 Special Topics in Genetics (Seminar Course)	1 s.h.
002:171 Molecular Genetics	4 s.h.
or	
142:210 Molecular Biology I	4 s.h.
One of these:	
002:131 Evolution	4 s.h.
002:168 Developmental Genetics	4 s.h.
127:191 Human Molecular Genetics	3 s.h.

Course work in molecular and microbial genetics, cell and development genetics, or human genetics 8 s.h.  
Seminar courses approved by the program 5 s.h.

Even more important than formal course work is the opportunity to do significant research in genetics. Students are encouraged to begin their own research as quickly as possible. Research interests of the participating faculty include virtually all areas of genetics, ranging from bacteriophage genetics to human medical genetics. In each area of genetics, there is a group of faculty members who have closely related interests.

The University is also strong in several related disciplines, including microbial physiology, enzymology, virology, protein biochemistry, and developmental and cell biology, all of which contribute significantly to the overall training program.

In addition to completing research and course work, students must pass a comprehensive examination, usually at the end of their second year in the program.

## Admission

Prospective doctoral students in genetics should have a strong undergraduate background in science, including courses in general genetics, organic chemistry, biochemistry, introductory physics, and mathematics, as well as a strong commitment to genetic research and teaching. Students can make up deficiencies in a particular area during their first year of graduate study.

Admission to the program is based on assessment of applicants' undergraduate academic record, performance on the Graduate Record Examination (GRE) Aptitude Test, and letters of recommendation. Admission requirements are not rigid. Most students currently working toward the Ph.D. in genetics at The University of Iowa have undergraduate grade-point averages higher than 3.50, and their GRE Aptitude Test scores (verbal and quantitative) exceed 1250. Students with lower grade-point averages or GRE scores may be admitted, depending on other indications of academic potential.

Students generally begin graduate work during the fall semester.

## Financial Aid

All genetics graduate students will receive a financial stipend of \$16,277 in 1998-99 plus tuition. By April 1, nearly all financial aid is committed for students entering in the fall.

Financial support comes from research assistantships, teaching assistantships, scholarships, individual research grants, or other departmental or college funds. All students are required to do some teaching as part of their development as future scientists and faculty members.

## Medical Scientist Training Program

Students may combine study toward an M.D. and a Ph.D. in genetics. Information about this program is available from the director of the Medical Scientist Training Program in the College of Medicine.

## Dental Scientist Training Program

Students with a D.D.S. degree may be candidates for the dental science program. Information is available through the College of Dentistry.

## Departmental Ph.D. Programs

The Departments of Anatomy, Biochemistry, Biological Sciences, Physiology and Biophysics, and Microbiology offer degree programs in which students may specialize in a particular aspect of genetics. See the appropriate departmental sections in the Catalog for Information about these programs.

## Associated Courses

The following genetics courses are open to graduate students. Not all courses are offered every year.

002:131 Evolution	4 s.h.
002:164 Topics in Plant Molecular Biology	1-2 s.h.
002:168 Developmental Genetics	4 s.h.
002:171 Molecular Genetics	4 s.h.
002:176 Topics in Eukaryotic Molecular Biology	2 s.h.
002:205 Graduate Lectures in Genetics	1 s.h.
002:232 Seminar: Molecular Genetics	2 s.h.
061:268 Molecular Biology of Animal Viruses	3 s.h.
063:265 Advanced Topics in Genetic Data Analysis	3 s.h.
072:245 Developmental Neurobiology	2 s.h.
099:237 Topics in Biochemistry	1 s.h.
142:210 Molecular Biology I (prokaryotic)	4 s.h.
142:215 Molecular Biology II (eukaryotic)	3 s.h.
142:220 Cell Biology I	3 s.h.
142:225 Cell Biology II	3 s.h.

## Courses

127:150 Genetic Analysis of Biological Systems 3 s.h.  
Genetic techniques and approaches for analysis of biological processes; comparison of strengths, weaknesses of a variety of experimental systems.

127:191 Human Molecular Genetics 3 s.h.  
Molecular genetic approaches to human disease; the human genome project, linkage analysis, candidate gene screening, special features of inbred populations, triplet repeat expansions, mitochondrial genetics, genetics of complex traits; literature-based. Prerequisites: fundamental genetics, molecular biology, or consent of instructor.

127:200 Special Topics in Genetics 1 s.h.  
Current research in a selected field of genetics; different topic each year; companion to a genetics seminar series.

127:301 Graduate Research in Genetics arr.

## GEOGRAPHY

Chair: Rebecca S. Roberts  
Professors: Marc P. Armstrong, John W. Fuller, 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: Hong Jiang, David McGinnis, Tad Mutersbaugh, Claire Pavlik  
Adjunct associate professors: David E. Osterberg, Paul Densham  
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, those who want to pursue careers in urban and regional planning, and as 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

Each student majoring in geography selects one of two programs of study: geography and social change, or environmental studies. 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 or environmental studies. 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 Emphasis

The University has established a Geographic Information System (GIS) Instructional facility. Housed in the Department of Geography, the facility consists of a networked system of student workstations. Students 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. The GIS emphasis is available to students in either of the department's two programs.

### General Requirements

Requirements for the undergraduate programs in geography have changed. Students who declare

a major in geography on the first day of fall semester 1998 or after must complete the requirements listed here. Those who declared a major before the first day of fall semester 1998 may choose to complete the old requirements (see the 1996-98 General Catalog) or the new requirements. Students who chose the old requirements must complete the major and graduate by August 2002.

All geography majors must complete the following courses.

044:001 Introduction to Human Geography	4 s.h.
044:019 Contemporary Environmental Issues	3 s.h.
044:003 Introduction to Earth Systems Science	4 s.h.
or	
044:020 Global Environmental Change	3 s.h.
044:075 Introduction to Cartography	2 s.h.
044:085 Introduction to Economic and Social Statistics (or any other statistics course currently approved by the department)	3 s.h.
044:150 Undergraduate Seminar for Geography Majors	3 s.h.
or	
044:151 Senior Thesis	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	8 s.h.
22M:021-022 Calculus and Modeling I-II	8 s.h.
22M:025-026 Calculus I-II	8 s.h.
22M:035-036 Engineering Calculus I-II	8 s.h.
22M:045-046 Accelerated Calculus with Applications I-II	8 s.h.
22M:047-048 Accelerated Calculus I-II	8 s.h.

All majors are encouraged to satisfy part of the General Education Program requirement in natural science 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 two programs of study described under "Geography and Social Change" or "Environmental Studies," as follows. 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. Electives should be chosen from the "Related Course Work" clusters. Electives also may be chosen from geography courses, but students should remember that there is a limit on the number of semester hours from one department that can be applied toward the 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, business, graduate programs in geography or planning, or professional programs such as law, business administration, 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: 108)	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

044:108 Introduction to Geographical Computing	3 s.h.
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### INTERMEDIATE COURSES

At least one of these:	
044:132 Geography of Postindustrial Economies	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.  
 044:163 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.  
 044:171 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 clusters. Other relevant courses may be substituted for the courses listed here, with the adviser's consent.

**Social Theory, Cultural Perspectives**

008:100 Introduction to Criticism and Theory 3 s.h.  
 16A:107 American Cultural History 1820-1920 3 s.h.  
 16A:142 American Labor in the Twentieth Century 3 s.h.  
 16A:159 The Transformation of America 1815-1896 3 s.h.  
 16E:148 Society and Gender in Europe 1750 to the Present 3 s.h.  
 16W:119 African and African American Interactions 3 s.h.  
 026:132 Introduction to Political Philosophy 3 s.h.  
 030:118 Law and Social Change 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 Mass Media and Mass Society 3 s.h.  
 113:153 Cultural Politics 3 s.h.  
 113:154 Anthropologies and Sexualities 3 s.h.  
 131:101 Introduction to Women's Studies 4 s.h.  
 131:151 Feminist Theory 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:119 Economics of the Government Sector 3 s.h.  
 06E:135 Regional and Urban Economics 3 s.h.  
 06E:176 Public Sector Economics 3 s.h.  
 06J:047 Introduction to Law 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.  
 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.  
 113:133 Race and Cultural Identity in the United States 3 s.h.  
 113:155 Race and Ethnic Relations 3 s.h.  
 131:101 Introduction to Women's Studies 4 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.  
 030:147 Ethnicity and Nationalism in the Former U.S.S.R. 3 s.h.  
 030:148 The Politics of Southern Africa 3 s.h.  
 030:150 Political Economy in Developing Countries 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.  
 113:120 Peoples and Cultures of Africa 3 s.h.  
 113:131 Latin American Economy and Society 3 s.h.  
 113:151 Sociology of the Third World 3 s.h.  
 113:156 Women's Roles in Cross-Cultural Perspective 3 s.h.  
 113:175 Gender and Development Studies 3 s.h.  
 113:184 Political Economy of Health and Nutrition 3 s.h.  
 131:101 Introduction to Women's Studies 4 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.  
 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.  
 131:101 Introduction to Women's Studies 4 s.h.  
 131:151 Feminist Theory 3 s.h.

**Geographic Information Analysis**

06K:176 Managerial Decision Models 3 s.h.  
 06K:180 Management Information Systems 2 s.h.  
 012:154 Advanced Geocomputing 2 s.h.  
 012:178 Geostatistics Seminar 3 s.h.  
 22C:016 Computer Science I 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.  
 044:109 Analytical Cartography 3 s.h.  
 044:113 Principles of Geographical 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 intermediate or advanced course requirements.

**Environmental Studies**

The undergraduate program in environmental studies is designed for students interested in the environment from physical and socio-cultural 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.

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:  
 044:108 Introduction to Geographical Computing 3 s.h.  
 \*044:128 GIS for Environmental Studies: Applications 3 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.
- 044:121 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.
- 044:129 Water Resources Management 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, 044:128, 044:180) can be counted toward the 15-semester-hours requirement in intermediate and advanced courses. Students who choose 044:128 to fulfill the methods requirement cannot also use it to fulfill the advanced courses requirement. Those who use 044:128 to satisfy either the methods or the advanced courses requirements cannot also count it toward the 12-semester-hours requirement in related course work.

**RELATED COURSE WORK**

Under the direction of an adviser, students should choose at least 12 semester hours of courses from one of the following clusters. Other relevant courses may be substituted for the courses listed here, with the adviser's consent.

**Biophysical Systems**

- 002:100 Plant Diversity and Evolution 4 s.h.
- 002:111 Plant Ecology 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.
- 012:132 Sedimentology 3 s.h.
- 012:138 Drainage Basin: Form and Process 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.

**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.
- \*\*044:128 GIS for Environmental Studies: Applications 3 s.h.
- 044:133 Introduction to Economics of Transportation 3 s.h.
- 091:291 International Environmental JAW 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 and Nationalism in the Former U.S.S.R. 3 s.h.
- 030:148 The Politics of Southern Africa 3 s.h.
- 030:150 Political Economy Developing Countries 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.
- 113:120 Peoples and Cultures of Africa 3 s.h.
- 113:131 Latin American Economy and Society 3 s.h.
- 113:151 Sociology of the Third World 3 s.h.
- 113:156 Women's Roles in Cross-Cultural Perspective 3 s.h.
- 113:175 Gender and Development Studies 3 s.h.
- 113:184 Political Economy of Health and Nutrition 3 s.h.
- 131:101 Introduction to Women's Studies 4 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.
- 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.
- 131:101 Introduction to Women's Studies 4 s.h.
- 131:151 Feminist Theory 3 s.h.

**Geographic Information Analysis**

- 06K:176 Managerial Decision Models 3 s.h.
- 06K:180 Management Information Systems 2 s.h.
- 012:154 Advanced Geocomputing 2 s.h.
- 012:178 Geostatistics Seminar 3 s.h.
- 22C:016 Computer Science I 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.
- 044:109 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.

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

**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.)

**GEOGRAPHY AND SOCIAL CHANGE**

The B.A. degree requires 19 courses, the B.S. requires 20; in these checkpoints the lower number indicates courses for the B.A., and the higher number indicates courses for the B.S.

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

Before the seventh semester begins: 13 or 14 courses in the major and at least three-quarters of the semester hours required for graduation

Before the eighth semester begins: 16 or 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

**ENVIRONMENTAL STUDIES**

The B.A. requires 19 courses, the B.S. requires 20; in these checkpoints the lower number indicates courses for the B.A., and the higher number indicates courses for the B.S.

Before the third semester begins: B.S.-one or two courses in the major and one-quarter of the semester hours required for graduation

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

Before the seventh semester begins: 13 or 14 courses in the major and at least three-quarters of the semester hours required for graduation

Before the eighth semester begins: 16 or 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 3.20 in all University work and a 3.40 in geography. They also must prepare and successfully defend an honors thesis, which consists of original research under the direction of a faculty member. The thesis is assessed 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 Undergraduate Seminar for Geography Majors 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 100-level courses. Minors are encouraged to choose 'one of the department's areas of concentration-geography and social change, or environmental studies-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 &man-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, 044:020 Global Environmental Change, 044:124 Gender and the Environment, 044:126 Wetlands: Function, Geography, and Management, and 044:132 Geography of Postindustrial Economies.

**Graduate Programs**

The department's graduate programs prepare students to carry on creative and productive research in selected areas of geography involving the use and further elaboration of theory. They also prepare students for positions in research, teaching, or applied geography. Success in achieving these goals has been demonstrated by the strong demand for University of Iowa graduates to fill positions on college and university faculties, in private research organizations, and in business and government. The department provides opportunities for all 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. degree, 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 in 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. This course work consists of at least one course in each of the three areas of departmental specialization (social-spatial theory, environmental systems, and geographic information science). Students who come to the program with a degree in geography already may have met this requirement. In addition, students must enroll in 044:210 Philosophy and Epistemology in Geography during their first year of residence and 044:350 Geography Colloquium every semester 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 for thesis work.

Competence in a specific area of geography, across the breadth of geography, and in geographical methods is demonstrated by completion of appropriate course work, and completion of an M.A. exam, or completion and defense of an M.A. thesis, or completion of 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 6 semester hours in geography courses numbered 200 or above, conducted as seminars, and taught by two different faculty members. In addition, competence in a specific area of geography, across the breadth of geography, and in geographical methods is demonstrated by the completion of an original research paper, the writing of an area review paper, passing comprehensive examinations, and completion and defense of a dissertation.

Before students can be admitted formally to candidacy for the Ph.D., they must submit an original research paper to the faculty for its 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 the requirement. Prior to taking the comprehensive examination, which consists of both written and oral components, the 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. As such, it is a culminating step in a student's program of study as well as a statement of future research directions. 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 applicant's undergraduate grade-point average, especially of his or her 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 the reasons for wanting to study geography at The University of Iowa.

## Financial Aid

A number of graduate appointments as teaching or research assistants are available. In addition, a number of fellowships are available 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 complete 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, ARC/VIEW, 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 (HP, SGI, Sun). 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 spring 1998. A cluster of PCs and Macs is also 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.

044:011 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, social services; diffusion of ideas and traits over space. GE: social sciences.

041:015 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.

044:020 Global Environmental Change 3 s.h.  
Relationships between earth system components (geosphere, hydrosphere, atmosphere, cryosphere, biosphere) and how changes occur on global to regional spatial scales; focus on specific regions, how the environment has experienced natural variation and change; environmental changes and human concerns.

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.

044:075 Introduction to Cartography 2 s.h.  
Cartography and map analysis; history of cartography, map projections and scale, symbolization, data collection and cartometry, computer mapping, remote sensing, geographic information systems.

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.

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 (Latin America, Africa, South and East Asia) case studies; 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.
- 044:108 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. Prerequisites: 044:075 and 044:085.
- 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: 044:075 or 044:080.
- 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: 044:075 or 044:080.
- 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; U.S. 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: 002:111 or 044:101 or 044:103.
- 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 or geographical, economic, cultural accessibility to health services; disease ecology, prospective payment systems, privatization, medical pluralism. Same as 152:131.
- 044:132 Geography of Postindustrial Economies 3 s.h.  
Structural economic change in developed nations; industrial restructuring, service sector development, impact of new technologies, regional and global economic integration.
- 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 044:015.
- 044:137 Location Theory 3 s.h.  
Behaviorally-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 competitive 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: 044:108 or 044:113.
- 044:150 Undergraduate Seminar for Geography Majors 3 s.h.  
Participation in a term project and preparation of a documented report. Offered spring semesters. Open only to seniors. Prerequisites: 044:075, 044:085, and 044:108.
- 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 perspectives; 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 are manifested on local, regional, international scales. Prerequisites: 044:003, 044:020 or 159:008, and 044:109; or consent of instructor.
- 044:180 Field Methods 2-4 s.h.
- 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.
- 044:197 Special Topics arr.  
Contemporary fields of enquiry, such as political economy, regional/African development, biophysical systems, GIS, 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/postmodernist theories, political ecology, environmental history. Prerequisite: 044:121 or consent of instructor.
- 044:222 Environmental Social Movements 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 Advanced Industrial Geography 3 s.h.  
 The new industrial geography, economic growth processes, industrial organization, theory of the firm; current research.

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.

044:270 Geography and Public Policy 3 s.h.  
 In-depth examination of literatures dealing with geographical aspects of jurisdictional organization, provision of public services, location of public-facilities, geography of elections, public policy.

044:272 Community Conflict, Space, and Politics 3 s.h.  
 issues of structure and agency; the state and local state and community organization; the politics of place in studying community conflict and urban social change in western democracies.

044:273 Social Theory and Human Geography 3 s.h.  
 Assumption that space is a socially produced and reproduced commodity that gains value as it enters the production process; how space enters production vis-a-vis forces that circumscribe larger societal relationships; production and reproduction of social space in a capitalist economy.

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.

044:280 Advanced Field Methods: Environmental 2-4 s.h.  
 Problem definition and research design in a field setting; sampling theory and procedures, collection of primary data using different sensor and recording methods, data analyses and interpretation of physical and environmental processes in geomorphic, climatic, biogeographic, and environmental research. Prerequisite: 12 semester hours of courses in geography or consent of instructor.

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.

044:285 Methods of Regional Analysis: Regional Science 3 s.h.  
 Problem definition and research design in a selected area of geographic research conducted in a field setting; sampling procedures, collection of primary data, data analyses and interpretation; techniques and methodologies specific to the selected area. Consent of instructor required.

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 enquiry, such as political economy, regional/African development, biophysical systems, GIS, locational analysis, water resources, economic geography, demographic analysis, environment, urbanization, transportation.

044:308 Research Seminar: Quantitative Methods, Computer Methods, and Modeling 2-3 s.h.

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 arr.  
 Critique of the contemporary location theory literature; discussion of solutions to the problems identified. Prerequisite: 044:137.

044:350 Geography Colloquium arr.

044:394 Research Seminar: Regional Development 3s.h.

044:415 Research: Political Geography arr.  
 Graduate-level research for Ph.D. students, generally post-comprehensive.

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.

## GEOLOGY

Chair: Ann Budd  
 Professors: Richard G. Baker, Ann F. Budd, Robert S. Carmichael, Lon D. Drake, Philip H. Heckel, George R. McCormick, Holmes A. Semken  
 Professors emeriti: William M. Furnish, Brian F. Glenister, Richard A. Hoppin, Gilbert Klapper, Keene Swett, Sherwood D. Tuttle  
 Adjunct professors: George R. Hallberg, Donald L. Koch, H. Richard Lane  
 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, Carol A. Thompson, Brian J. Witzke  
 Assistant professor: Jane A. Gilotti  
 Adjunct assistant professors: Ray Anderson, A. Umrans Dogan, R. Sanders Rhodes II, Donald P. Schwert  
 Visiting assistant professor: E. Arthur Bettis III  
 Adjunct instructor: Julia Golden  
 Undergraduate degrees: B.A., B.S. in Geology  
 Undergraduate nondegree program: minor in Geology  
 Graduate degrees: M.S., Ph.D. in Geology  
 Web site: <http://www.geology.uiowa.edu>

Geology is the basic study and practical application of scientific disciplines related to understanding the earth. Geological concerns include the earth's origin, 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. The Department of Geology 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 to professional geologists 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 in geology. However, an undergraduate degree is fully satisfactory in certain teaching, federal, and industrial situations.

Many of The University of Iowa's geology 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. Geology is good preparation for all of these.

Each year more than 700 students enroll in 012:003 Earth History and Resources and 012:008 Introduction to Environmental Science, laboratory-lecture 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 geology and several intermediate courses with few prerequisites-paleontology, oceanography, historical geology of Iowa, remote sensing, earth surface processes (geomorphology), energy and the environment, and geological hazards.

## Undergraduate Programs

Geology 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 geology must meet the General Education Program requirements 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 Geology for either the B.S. or the B.A. degree.