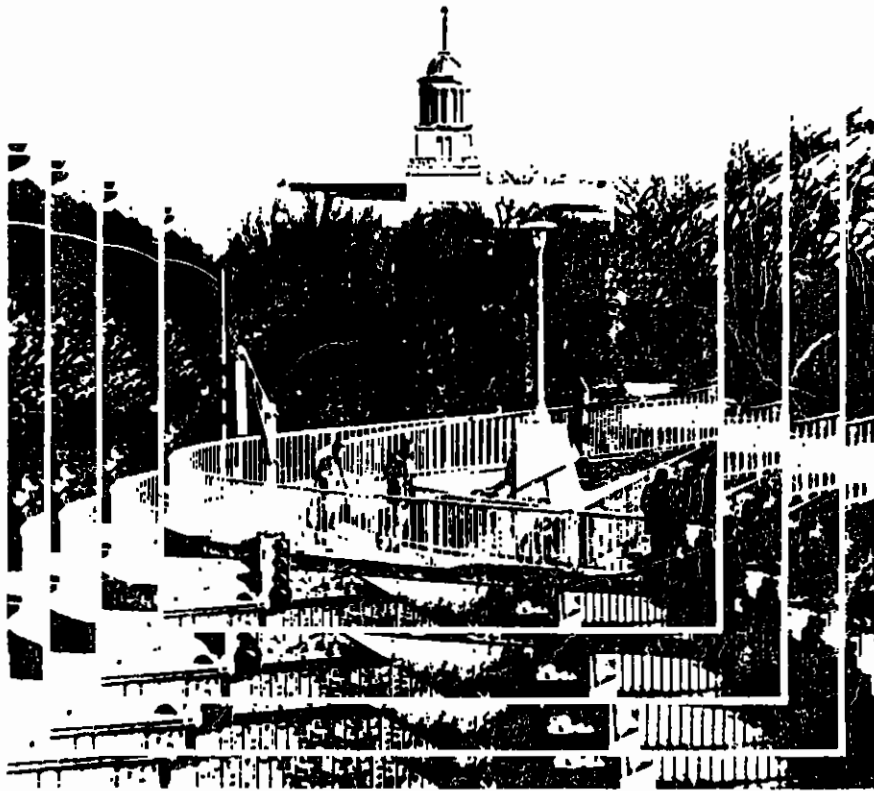


The University | 80 of Iowa | 82



General Catalog

microbial genetics, cell and developmental genetics, and quantitative and population genetics.

Even more important than formal coursework is the opportunity to do meaningful research. Students are encouraged to begin their own research as quickly as possible. Research interests of the participating faculty range from bacteriophage to human medical genetics. In each area of genetics there is a group of faculty members with closely related interests. The University is also strong in several related disciplines, including microbial physiology, enzymology, virology, protein biochemistry, and developmental, cell, and population biology, all of which contribute significantly to the overall training program.

In addition to completing research and coursework, students must also pass a comprehensive examination, which they usually should take within the first two years in the program.

Admission

The prospective doctoral student in genetics should have a strong undergraduate background in science, including courses in general genetics, organic chemistry, introductory physics, and mathematics, and a strong commitment to research and teaching in genetics. A student with deficiencies in a particular area can make them up during the first year of graduate study.

Admission to the program is based on assessment of the applicant's undergraduate academic record, performance on the Graduate Record Examination (GRE) verbal, quantitative, and analytic aptitude tests, and letters of recommendation. Requirements for admission are not rigid. Although almost all students currently working toward the Ph.D. in genetics at The University of Iowa have undergraduate grade-point averages greater than 3.2 and GRE totals (verbal plus quantitative) exceeding 1250, students with lower grade-point averages or GRE scores may be admitted depending on other indicators of academic potential.

The program accepts admission applications any time, but should receive them by February 15 to insure the

applicant's consideration for entrance the following academic year.

Financial Aid

The most highly qualified applicants will be supported as National Institutes of Health predoctoral trainees. Traineeships include stipends of \$5,040 for 12 months, complete tuition scholarships, and additional support for trainees' research. In addition, stipends may be supplemented by occasional teaching or research; trainees are encouraged to do some teaching as part of their development as scientists and teachers.

Students may also be supported by half-time teaching or research assistantships, with stipends in excess of \$5,000 per year. Students receiving assistantships may also apply for full or partial tuition scholarships.

Medical Scientist Training Program

Students may combine study toward an M.D. and a Ph.D. in genetics. Further information about this program can be obtained from the director of the Medical Scientist Training Program in the College of Medicine.

Departmental Ph.D. Programs

The departments of Biochemistry, Botany, Microbiology, and Zoology offer degree programs in which students may specialize in a particular aspect of genetics. See departmental descriptions elsewhere in the *Catalog* for further information about these programs.

Courses

The following are genetics courses available to graduate students.

99:223 Topics in Molecular Biology	1-2 s.h.
2:104 Cytogenetics	3 s.h.
2:160 Genetics and Biogenesis of Cell Organelles	arr.
2:215 Genetics Seminar	0-2 s.h.

50:175 Human Genetics	2 s.h.
61:170 Microbial Genetics	3 s.h.
61:175 Microbial Genetics Laboratory	1 s.h.
61:270 Topics in Molecular Biology	arr.
37:162 Population and Evolutionary Genetics	3 s.h.
37:163 Behavioral Genetics	3 s.h.
37:165 Quantitative Genetics	3 s.h.
37:170 Eukaryotic Molecular Biology	3 s.h.
37:171 Molecular Genetics	4 s.h.
37:172 Topics in Molecular Genetics	2 s.h.
37:175 Topics in Evolutionary Genetics	1-2 s.h.
37:176 Topics in Eukaryotic Molecular Biology	2 s.h.
37:178 Advanced Genetics	4 s.h.
37:260 Developmental Genetics	2 s.h.
37:263 Seminar: Behavioral Genetics	1 s.h.

Geography

Department chair: James B. Lindberg
 Faculty: *professors* John W. Fuller, James B. Lindberg, Michael L. McNulty, David R. Reynolds, Gerard Rushton
professors emeriti Clyde F. Kohn, H.H. McCarty
associate professors Rex D. Honey, R. Rajagopal
assistant professors Konstantinos Koutsopoulos, Russell Lee, Graham A. Tobin
affiliated faculty Jordan J. Louviere
 Degrees offered: B.A., B.S., M.A., Ph.D.

Modern geography is concerned mainly with the spatial aspects of human and physical geography and with the relationship of man to his environment. Students who elect courses in geography soon find that the insights and methods of inquiry they develop are applicable to the solution of many of the complex problems confronting modern societies, such as air and water pollution, transportation problems, the growth and development of large cities, distribution and consumption of natural resources, rapidly increasing populations, and conflicts between nations. Modern geography is scientific as well as humanistic in its approach to the solution of these problems.

Studies in geography provide students with concepts and methods for organizing such spatial units as urban areas, market regions, school districts, and health service areas. Thus, today's geography contributes to the decision-making processes involved in

determining how individuals or groups of individuals can improve the quality of life in this complex age.

Career opportunities for majors in geography exist in various branches of government and in business. There is a demand for persons capable of dealing with resource management, economic development, market area analysis, and other problems related to the distribution and spatial interaction of physical, economic, social, and political phenomena in the world as a whole or in major parts of it.

Courses in geography are commonly required of students preparing to enter the teaching profession at the elementary and secondary school levels, of students who want to work in urban and regional planning, and as a background for many related professions, including law, health care, environmental or transportation engineering, and business administration.

Undergraduate Program

The geography faculty has developed an undergraduate instructional program which provides educational opportunities for a variety of students: for the nonmajor interested in one or more elective courses as they relate to a liberal education; or for students interested in electing a cluster of courses in conjunction with another discipline or for the B.G.S. degree; and for students interested in acquiring a major in geography. The department also joins in significant interdepartmental programs involving global, urban, and environmental components.

Courses for the Nonmajor

Students in the College of Liberal Arts or other schools and colleges of the University may find geography courses meaningful to their own program of study. The beginning-level courses 44:1 Introduction to Human Geography, 44:2 Natural Environment and Man, 44:11 Introduction to Social Geography, 44:19 Natural Environmental Issues, and 44:30 Introduction to Economic Geography are available for core course credit in social science, and serve as part of a liberal education.

Other courses may also be attractive as individual electives. These include 44:15 Introduction to Political Geography, 44:33 Transportation in the U.S.A.: Issues and Problems, 44:35 World Cities, 44:115 Locational Conflict, 44:124 Introduction to the Global Environment, 44:162 The Third World, 44:191 Energy in Contemporary Society.

Students in several related disciplines and in the Bachelor of General Studies program may take clusters of courses leading perhaps to a minor in geography. The geography courses listed below under the different programs for the major in geography will serve as a guide to course selection. Additional information about a minor in geography is available in the department office.

Alternative Programs for the Undergraduate Major

Students majoring in geography may choose alternative programs depending on their interests. The substantive strengths of the department fall into three areas: environmental studies, urban and regional studies, and international development studies. Students may choose to develop expertise in one of these areas, or they may choose to develop an individualized program within the curriculum offered by the department.

Students planning advanced training or seeking careers in geography should elect the Bachelor of Science degree. Those who wish to pursue a liberal arts objective are advised to elect the Bachelor of Arts degree.

All geography majors must complete a minimum of 26 semester hours of geography coursework, at least 15 of which must be at the 100 level. Many students will find that they will need more than the minimum requirements for mastery of a specific subfield.

All majors must complete the course 22S:127 Applied Statistical Methods and Computations, or its equivalent as approved by the department, 44:110 Spatial Organization, and 44:150 Undergraduate Seminar for Geography Majors.

Bachelor of Science students must complete a mathematics requirement consisting of:
22M:10-11 Fundamentals of College Mathematics I-II

or
22M:25 Calculus I
or
An appropriate mathematics course approved by the adviser

They must also complete a computer science requirement consisting of:
22C:7 Introduction to Computing with FORTRAN
or
22C:16 Introduction to Programming with PL/1

Environmental Studies

The undergraduate program in environmental studies is designed for students with career expectations or personal interests in resource management or environmental protection, or who have interests in physical geography per se. The program provides a knowledge of physical processes in landform development, atmospheric conditions, soil development, and biotic communities. It stresses the interrelationships among those processes and gives the student knowledge necessary to assess the impact of human activities on physical systems. Training in field observation, quantitative analysis, computer methods, and cartographic representation are included in this concentration.

Required courses are:
22M:10-11 Fundamentals of College Mathematics I-II
or
22M:25 Calculus I

22S:127 Applied Statistical Methods and Computations

22C:7 Introduction to Computing with FORTRAN
or
22C:16 Introduction to Programming with PL/1

44:110 Spatial Organization
44:150 Undergraduate Seminar for Geography Majors

Students concentrating in environmental studies are advised to select substantive courses (at least 21 semester hours) from among the following:
44:1 Introduction to Human Geography
44:2 Natural Environment and Man

44:30 Introduction to Economic Geography
 44:101 Introduction to Weather and Climate
 44:115 Locational Conflict
 44:119 Natural Environmental Issues
 44:120 Natural Hazards
 44:121 Stream Processes and Water Resources
 44:123 Geography of Natural Resources
 44:124 Introduction to the Global Environment
 44:125 Environmental Impact Studies
 44:180 Field Techniques
 44:191 Energy in Contemporary Society
 44:107 Maps and Mapping and 44:109 Computer Methods in Geographical Analysis are strongly recommended.

Under the direction of an adviser, students should select courses (at least 12 semester hours) from among one of the following clusters:

Physical Systems

12:5 Introduction to Geology
 12:108 Introduction to Oceanography
 12:109 Geology of Iowa
 12:110 Introduction to Remote Sensing
 12:171 Geomorphology
 527:102 Technology of Environmental Pollution Control
 523:150 Principles of Environmental Engineering

Environmental Science

11:22 Ecology and Evolution
 11:25 Chemistry and Physics of the Environment
 11:26 Technology and Man
 2:11 Plant Diversity
 2:100 Plants and Human Affairs
 2:111 Plant Ecology
 2:119 Plant-Animal Interactions
 2:116 Field Ecology
 2:132 Ecology
 37:133 Topics in Ecology
 37:135 Quantitative Field Ecology
 37:169 Quantitative Methods in Biology

Environmental Management

6E:1 Principles of Economics
 6E:2 Principles of Economics
 6E:103 Microeconomics
 6E:119 Economics of the Government Sector
 6E:127 Natural Resources in the World Economy: Control and Conflict
 6E:133 Economic Growth and Environmental Decay
 6L:61 Administrative Management

6K:161 Individual Behavior in Organizations
 6K:163 Design and Management of Organizations
 102:101 Introduction to Planning and Policy Development
 102:102 Case Studies in Urban and Regional Planning
 102:111 Introduction to Urban Transportation
 or
 44:111 Introduction to Urban Transportation
 91:136 Resource Planning
 527:102 Technology of Environmental Pollution Control
 527:104 Environmental Planning and Assessment

Information Systems and Modeling

6L:61 Administrative Management
 6M:134 Marketing Research
 6K:183 Managerial Information Processing and Decision Behavior
 6K:176 Managerial Decision Models
 6K:177 Simulation Methods
 6K:178 Management Science Topics
 6K:180 Management Information Systems
 6K:181 Management Systems Design
 22C:31 Digital Systems and Computers
 22C:32 Introduction to Systems Software
 586:141 Operations Research II

Urban and Regional Studies

Students with interests in urban and regional analysis will find this concentration relevant, either as background training for graduate work or as preparation for entry-level positions in government and private businesses. This concentration focuses on the problems and potentials of towns, cities, and regions, and the decision-making processes of individuals and institutions. Dealing with such problems as assessing sites for development potential, locating public facilities, and gauging neighborhood change brings the student inside the dynamic of contemporary cities. Requisite skills in quantitative analysis, cartography, and computer usage are developed. Opportunities for experience in working with real problems are included.

Required courses are:
 22S:127 Applied Statistical Methods

and Computations
 or
 its equivalent
 44:110 Spatial Organization
 44:150 Undergraduate Seminar for Geography Majors
 22M:10-11 Fundamentals of College Mathematics I-II
 or
 both
 22M:25 Calculus I
 and
 22C:7 Introduction to Computing with FORTRAN
 or
 22C:16 Introduction to Programming with PL/I

Students concentrating in urban and regional studies are advised to select substantive courses (at least 21 semester hours) from among the following:

44:1 Introduction to Human Geography
 44:2 Natural Environment and Man
 44:11 Introduction to Social Geography
 44:15 Introduction to Political Geography
 44:30 Introduction to Economic Geography
 44:33 Transportation in the U.S.A.: Issues and Problems
 44:35 World Cities
 44:111 Introduction to Urban Transportation
 44:115 Locational Conflict
 44:116 Urban Political Geography
 44:125 Environmental Impact Studies
 44:130 Location of Services
 44:131 Medical Geography
 44:132 Industrial Location
 44:135 Urban Geography
 44:136 The Inner City
 44:137 Urban and Regional Modeling
 44:139 Urban Problems

Also strongly recommended:
 44:107 Maps and Mapping
 44:109 Computer Methods in Geographical Analysis

Under the direction of their advisers, students should select courses in related disciplines from the following:

113:119 Urban Anthropology
 16:187 Afro-American History 1914-Present
 30:111 Municipal Government and Politics
 34:172 Social Dynamics of Urban Life
 102:101 Introduction to Planning and Policy Development

- 102:102 Case Studies: Urban and Regional Planning
 102:108 Housing Analysis
 6E:113 Health Economics
 6E:135 Regional and Urban Economics
 6E:137 Problems in Urban Economics
 6M:134 Marketing Research

International Development Studies

The concentration in international development studies is designed for students interested in international affairs; in the economic, social, and political development of new and old nations; in the solution of regional problems that have global implications; and in cross-cultural comparisons of values. This concentration aims to give students a deeper understanding of the world in which they will live and work by emphasizing the variety of cultures and societies which exist outside of the United States and to which our country must relate.

Required courses include:

- 22S:127 Applied Statistical Methods and Computations
 44:110 Spatial Organization
 44:150 Undergraduate Seminar for Geography Majors
 22M:10-11 Fundamentals of College Mathematics I-II
 or
 both
 22M:25 Calculus I
 and
 22C:7 Introduction to Computing with FORTRAN
 or
 22C:16 Introduction to Programming with PL/1

Students concentrating in international development studies are advised to select courses (at least 21 semester hours) from among the following:
 44:1 Introduction to Human Geography
 44:2 Natural Environment and Man
 44:11 Introduction to Social Geography
 44:15 Introduction to Political Geography
 44:30 Introduction to Economic Geography
 44:35 World Cities
 44:115 Locational Conflict
 44:124 Introduction to the Global Environment
 44:161 African Development
 44:162 The Third World

- 44:165 The Changing World
 44:191 Energy in Contemporary Society

Under the direction of an adviser, students should select courses in related disciplines from among the following:
 30:60 Introduction to World Politics
 30:127 Policy Problems in Industrial Societies
 30:150 The Political Economy of the Third World
 30:160 International Politics
 30:166 Politics of War and Peace
 6E:123 Political Economy of the Military-Industrial Complex
 6E:129 Economic Development of Underdeveloped Areas
 16:89 Culture and Politics of Latin America
 16:147 Marxism and Social Thought
 16:170 Modern African History
 16:196 Modern China

Appropriate foreign language training might also be a part of the student's degree program.

The department cooperates in the interdisciplinary Global Studies Program.

Individual Programs

Students with more general interests who wish to pursue a Bachelor of Arts degree may design their own individual programs of instruction with the help of their advisers. Such programs must include 26 semester hours of geography, at least 15 of which must be at the 100 level. They also must include the following courses:
 44:110 Spatial Organization
 44:150 Undergraduate Seminar for Geography Majors
 22S:127 Applied Statistical Methods and Computations
 or
 equivalent

The 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 secure cooperative training assignments related to their academic programs.

Graduate Program

The goals of the department at the graduate level are to prepare students to carry on creative and productive research in geography involving the use of theory, modeling, and formal verification methods; to prepare students for positions in research, teaching, or some area of applied geography; and to help students develop their abilities to apply knowledge of facts, theories, and methodology to specific societal programs. The achievement of these goals is demonstrated in large measure by the demand for University of Iowa graduates to fill positions on college and university faculties, in research-oriented institutions, and in business and government.

The department offers specialized instruction in the teaching of geography at the college level (44:206 Teaching College Geography) for those interested in academic careers. Opportunities are provided for all graduate students to gain practical teaching experience through service as departmental teaching assistants or through other supervised teaching duties.

Master of Arts

The department offers an M.A. program that emphasizes the acquisition of problem-solving skills. Within an overall analytical framework, students develop a broad area of competence that can be tailored to meet the contemporary demands of business, government, or the teaching profession. Recent graduates have obtained positions in health planning, community planning, transportation, and market research. The M.A. degree is also frequently taken by students whose ultimate goal is the Ph.D. degree.

In consultation with their advisers, students declare a broad area of competence and, in consultation with the faculty, develop a program of study emphasizing three dimensions: the subject matter of their area and its literature, relevant problem-solving methods, and philosophy and epistemology in geography.

The M.A. degree requires a minimum of 30 semester hours of graduate work, of

which 15 semester hours must be 200-level courses or above. Specific requirements for the degree are:

At least 4 semester hours chosen from among the mini-courses 44:201-202 Geographical Analysis I-II;

Satisfaction of the department's B.S. degree requirements in mathematics, statistics, and computer programming or its equivalent (see above);

44:208 Quantitative Analysis I and

An additional 12 semester hours in geography.

Additional courses in geography or related fields complete the student's program.

Students who enter with sufficient background are frequently able to complete the program in one full year.

The M.A. degree is available with or without thesis. A maximum of 8 semester hours of credit may be earned for thesis work.

Students must pass a written and/or oral final examination.

Doctor of Philosophy

Students whose objective is the Ph.D. degree in geography are required to complete 8 semester hours of 44:201-202 Geographical Analysis I-II and 44:208-209 Quantitative Analysis I-II. The eight mini-courses comprising 44:201-202 should be taken within the first two years in residence, and must include mini-courses offered by at least six different faculty members. The courses 44:208-209 Quantitative Analysis I-II should be taken during the first year in residence. Students may meet these requirements with a satisfactory performance in written examinations during the first week of the first semester for which they register.

All doctoral students must also complete two research seminars, preferably during the second year in residence, under the direction of different faculty members. Unless excused by the faculty, Ph.D. candidates are also required to register for 44:350 Research Seminar: Staff each semester while they are in residence. One semester hour of credit will be awarded each semester on a satisfactory/unsatisfactory basis for this course.

The remainder of the Ph.D. program includes appropriate graduate courses, seminars, and research in geography chosen by students to reflect their areas of interest; courses in disciplines closely related to the student's objectives and interests; and courses which satisfy the tool requirements.

No later than the fourth semester in residence, doctoral students should declare a field of specialization within their general areas of interest and secure a faculty adviser to direct their programs of study.

Preferably during the second year in residence, and not later than the fifth semester, doctoral students who have been admitted to the graduate program without advanced credit must submit an original research paper to the faculty, with the approval of their advisers. Students who have been admitted with advanced graduate credit of 24 semester hours or more, or the equivalent, must meet this requirement no later than the third semester in residence. The faculty will pass upon the merits of the research thus demonstrated. Students become Ph.D. candidates when their qualifying papers have been accepted.

Research tool requirements for Ph.D. candidates are the course 44:209 Quantitative Analysis II and another appropriate course, as approved by the faculty at the time the student declares his or her specific area of specialization.

All doctoral candidates are expected to have supervised experiences as classroom instructors and research assistants before being awarded the Ph.D. degree.

Graduate Admission

In addition to the general rules and regulations set forth in the *Manual of Rules and Regulations of the Graduate College*, the department considers the applicant's undergraduate grade-point average, especially of his or her junior and senior years; scores on the Graduate Record Examination Aptitude 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.

An applicant with an undergraduate grade-point average between 2.3 and 2.75 will be admitted only for the M.A. degree and on the condition that he or she achieves a grade-point average of 2.75 or better on the first 12 semester hours of graduate work as approved by the department.

Foreign students, and those from undergraduate institutions that evaluate students on a basis other than grade-point averages, will be considered according to their relative academic standing in their respective institutions.

Financial Assistance

A number of graduate appointments as teaching or research assistants are available. Awards are based on merit and a student must ordinarily have achieved a combined score of 1100 on the Graduate Record Examination verbal and quantitative sections, and have a 3.0 undergraduate or graduate grade-point average, to be appointed to an assistantship. Applications for graduate appointments should ordinarily be received by February 15.

Special Facilities

The department possesses a unique complete graphics hardware system in the IMLAC PDS-4 mini-computer that supports a GRAF PEN GP-3 sonic digitizer. The PDS-4 is a 24K system with a CRT for on-line editing and an accompanying software support package, DIGIT SERIES, developed locally that allows for a broad range of computer graphic applications. This system is linked to one of the four HP 2000 systems in the Weeg Computing Center. Each HP 2000 supports 32 terminals, including a second terminal in the department, and is linked with the main computer—an IBM 370/168. Future interactive capabilities at The University of Iowa will center on four PRIME 750 systems each supporting 48 terminals and all linked to the IBM 370/168. Complementing these hardware systems are an increasing number of sophisticated software packages that will dramatically improve interactive computing capabilities.

The Map Library contains more than 75,000 maps, a total of 2,050 atlases

and reference works, and about 80,000 aerial photographs, primarily of Iowa. The library is a depository for maps of the U.S. Army Topographic Command, formerly Army Map Service.

The Geology Library contains approximately 50,000 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

Courses open to undergraduate students may be taken in any order or simultaneously. It is recommended, however, that majors take 44:110 and 44:150 in that sequence. All courses below the 100-level are open to freshmen; 44:1, 44:2, 44:11, 44:19, and 44:30 are available for social science core credit.

Primarily for Undergraduates

- 44:000 Cooperative Education Training Assignment 0 s.h.
- 44:1 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.
- 44:2 Natural Environment and Man 4 s.h.
Spatial distribution of the world's natural resources including climate, water, landforms, soils, vegetation, and minerals; human role in defining nature of resource base; regional problems in resource use; environmental pollution and natural hazards.
- 44:11 Introduction to Social Geography 4 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.
- 44:15 Introduction to Political Geography 3 s.h.
Geographic principles applied to political and economic problems at international, national, and local levels; topics include regional disparities in social well-being, service outputs of governments, political dimensions of environmental quality, spatial organization of political systems.
- 44:19 Natural Environmental Issues 2 s.h.
Problems associated with population growth, technology, and resource consumption; protection of natural, historic, and cultural resources; air pollution; water pollution; energy and environment; alternative approaches to the resolution of environmental problems; real world case studies.
- 44:30 Introduction to Economic Geography 3 s.h.
Location and spatial organization of world's major types of economies; agriculture, energy and minerals, manufacturing, transportation; trade and service centers.

- 44:33 Transportation in the U.S.A.: Issues and Problems 3 s.h.
Basic concepts of transportation and their relationship to geography; spatial processes and spatial structures associated with transportation. Same as 102:33.
- 44:35 World Cities 3 s.h.
Introductory course on urban geography examining urbanization as a process through lectures, films, readings, and discussions; examines specific concepts and theories of urbanization through global patterns, regional urban systems, and individual metropolitan areas. Offered spring semesters.
- 44:100 Readings for Undergraduates arr.
Supervised readings in geography. Prerequisite: consent of instructor.

For Undergraduates and Graduates

- 44:101 Introduction to Weather and Climate 3 s.h.
Spatial distribution of weather elements, wind circulation, air masses, storms, and general world climatic conditions, including air pollution and climatic change; laboratory work in study of weather maps and climatic data.
- 44:107 Maps and Mapping 2 s.h.
Qualities of a good map or diagram; types of maps or diagrams for particular uses; major types of cartographic presentations; available tools for constructing maps and diagrams; procedures for the compilation of maps and diagrams; laboratory experiences in compiling maps and diagrams.
- 44:108 Introduction to Quantitative Methods in Geography 3 s.h.
Applications of mathematical and statistical techniques in geography.
- 44:109 Computer Methods in Geographical Analysis 2 s.h.
Use of computer mapping as a tool in geographic analysis; various mapping programs including SYMAP, CALFORM, and others. Prerequisite: 22C:7 or consent of instructor.
- 44:110 Spatial Organization 3 s.h.
Approaches to spatial analysis of human activities and natural processes. Offered fall semesters.
- 44:111 Introduction to Urban Transportation 3 s.h.
Urban transportation defining the land use/transport system and the urban transportation planning process; transportation problems, especially as evidenced in Iowa City. Same as 102:111.
- 44:115 Locational Conflict 3 s.h.
Behavioral and institutional bases of locational conflict, with emphasis on microeconomic, public choice, and social justice perspectives, politicizing processes, strategies of resolution in selected contexts: environmental management problems, facility siting, service provision/taxation policy. Prerequisite: 44:15 or consent of instructor.
- 44:116 Urban Political Geography 3 s.h.
Relationships between individual political behavior and the functional and geographical organization of urban political systems; U.S. metropolitan areas and the satisfaction of citizen preferences for public goods and services.
- 44:119 Natural Environmental Issues 2 s.h.
Problems associated with population growth, technology, and resource consumption; protection of natural, historic, and cultural resources; air pollution; water pollution; energy and environment; alternative approaches to the resolution of environmental problems, real world case studies.
- 44:120 Natural Hazards 3 s.h.
Human-environment relationships under extreme environmental conditions; causes, characteristics, and consequences of extreme events such as earthquakes, tornadoes, blizzards, droughts, and floods; human adjustments to these events.

- 44:121 Stream Processes and Water Resources 3 s.h.
Water as a resource and as an agent in shaping the form of the land surface, characteristics of stream drainage basins and alluvial landforms, floods and their interrelationships with land use. Prerequisite: 44:2 or consent of instructor.
- 44:122 Natural Resources of the United States 3 s.h.
Nature and patterns of regional differences in the natural resource base for agriculture and industry, including land, water, and minerals; environmental problems and conflicts arising from resource development.
- 44:123 Geography of Natural Resources 3 s.h.
Definition, evaluation, and exploitation of natural resources as developed through time and within different cultural settings.
- 44:124 Introduction to the Global Environment 3 s.h.
Interdependence of the three major world ecosystems: land, atmosphere, and oceans. Problems resulting from the impact upon the natural environment of human activities in support of world society.
- 44:125 Environmental Impact Studies 4 s.h.
Information analysis for assessment of environmental impacts; problem solving for protection of air, water, land, animal, and human resources; environmental impacts and conflicts of resource development. Field trips. Prerequisite: 12 semester hours in geography or consent of instructor.
- 44:126 American Wilderness: Environments and Issues 2-3 s.h.
Environmental issues concerning land management strategies and trade-offs between wilderness and preservation and resource exploitation. Historical geography of American wilderness areas and discussion of their natural environments.
- 44:127 World Food Problems 2 s.h.
Nature of current world food problems and the global distribution of environmental resources which govern food production capabilities; includes processing and storage practices, global variations in agricultural systems and technologies, potential for and limitations on increasing quantity and quality of food production in context of environmental, political, and socioeconomic constraints.
- 44:130 Location of Services 3 s.h.
Problems in the effective spatial organization of public and private facilities; central place theory; modeling spatial choices between service sites; spatial outcomes of alternative behavioral strategies for reorganizing service systems; location-allocation algorithms and their use in planning and evaluating the spatial delivery of social and economic services.
- 44:131 Medical Geography 1-3 s.h.
Locational aspects of disease and health care. Section 1 (2 semester hours) deals with epidemiology, mortality trends, cancer, environmental risk factors, mental health, urban ecology, socioeconomic status; section 2 (1 semester hour) deals with distribution of and accessibility to primary health care, emergency medical services, health screening programs. Student may register for either or both sections.
- 44:132 Industrial Location 3 s.h.
Theory and practice of manufacturing location and its application to different industries and types of economy; investigations of selected case studies.
- 44:135 Urban Geography 3 s.h.
Models of urban growth and urban forms; spatial patterns of selected activities; processes that generate these patterns; current problems.
- 44:136 The Inner City 3 s.h.
Residential segregation of minorities, spatial structure of ghetto areas; environmental quality of inner city neighborhoods; spatial aspects of problems of economic and social stress. Same as 45:136.

- 44:137 Urban and Regional Modeling** 3 s.h.
Description, forecasting, and planning methodology applications to urban land use, population and employment projections, regional economic growth, transportation planning, and environmental management.
- 44:139 Urban Problems** 3 s.h.
Geographical perspective on problems of urban life; processes involved and policy implications of such topics as sprawl, redevelopment, housing, segregation, transportation, crime, health care, air pollution. Prerequisite: 44:135 or consent of instructor.
- 44:150 Undergraduate Seminar for Geography Majors** 2 s.h.
Participation in a term project and preparation of a documented report. Offered spring semester only. Prerequisites: 22S:127 and 44:110, or equivalents.
- 44:161 African Development** 3 s.h.
Problems of economic, political, and spatial integration in Africa; patterns and processes of economic development and nation-building. Same as 30:146, 45:162.
- 44:162 The Third World** 3 s.h.
Geographical patterns and processes of underdevelopment; spatial implications of colonialism and neocolonialism; alternate concepts of spatial planning in the Third World.
- 44:165 The Changing World** 3 s.h.
Conceptualization of the world as an increasingly interconnected system; similarities and differences in the ways diverse regions are participating in the changing world.
- 44:167 The Geography of the Soviet Union** 3 s.h.
- 44:170 The World of Wines** 2 s.h.
Production, distribution, and consumption of wines throughout the world with emphasis on quality of wine as related to landforms, soils, weather conditions; viticultural practices in the different grape-growing areas.
- 44:180 Field Techniques** arr.
Mapping and survey techniques; problem definition in field settings. Offered summer sessions.
- 44:191 Energy in Contemporary Society** 3 s.h.
Technical, legal, economic, and behavioral issues in energy production, delivery, and use; emphasis on cross-disciplinary implications of energy systems. Prerequisite: junior, senior, professional, or graduate status. Same as 627:101, 12:114, and 91:191.
- 44:200 Readings** arr.
Graduate students interested in pursuing specific topics of their choice may do so by registering for supervised readings in geography. Prerequisite: consent of instructor.
- 44:201 Geographical Analysis I** 1-4 s.h.
Four mini-courses on selected topics of current interest to faculty; focus is on methodological, theoretical, and substantive issues.
- 44:202 Geographical Analysis II** 1-4 s.h.
Four mini-courses on selected topics of current interest to faculty. Continuation of 44:201.
- 44:206 Teaching College Geography** 2 s.h.
Roles of college faculties; goals and objectives of geography teaching; alternative instructional methods; evaluation systems; emphasis on application in the college classroom.
- 44:208 Quantitative Analysis I** 3 s.h.
Problems of drawing inferences from data in studies using simple measures; research design; commonly used measures of statistical and spatial association; logic of statistical inference and hypothesis testing; simple correlation and regression analysis; Introduction to computer modeling. Prerequisite: introductory statistics or consent of instructor.
- 44:209 Quantitative Analysis II** 3 s.h.
Statistical and mathematical analysis in current geographical research with emphasis on problem formulation and research design; multiple correlation and regression; analysis of variance; testing causal models; selected topics in multivariate analysis, scaling, and network analysis. Continuation of 44:208. Prerequisite: 44:208 or consent of instructor.
- 44:216 Behavioral Analysis in Geography** 2 s.h.
Various behavioral model-building strategies pertaining to spatial behavior and spatial structure, with emphasis on environmental perception approaches. Prerequisite: 44:208 or consent of instructor.
- 44:219 Stream Processes and Water Resources** 1-3 s.h.
Same as 44:121, but for graduate students.
- 44:221 Advanced Landforms** 2-3 s.h.
Recent problems and theoretical developments in selected geomorphic topics and regions.
- 44:225 Environmental Systems Analysis** 3 s.h.
Resource and environmental problem solving by the methods of systems analysis; topics include recent applications of linear optimization, network analysis, dynamic optimization, decision analysis, inventory theory, and simulation of resource and environmental problems in space and time.
- 44:226 Seminar: Transportation Planning Issues** 3 s.h.
Process and policy considerations related to transportation planning; investigation of current issues and methodologies employed in transportation planning. Prerequisite: 44:111 or consent of instructor. Same as 102:226.
- 44:227 Geographic Information Systems** 3 s.h.
Application of information system concepts to spatial analysis and planning; data processing of small-area data to support research and planning. Prerequisite: consent of instructor. Same as 102:227
- 44:230 Locational Analysis of Economic Behavior** 3 s.h.
Classical theories for location of economic activities contrasted with alternate approaches of spatial analysis school of economic geography; contemporary efforts to develop behavioral models of decision making contrasted with mathematical programming and heuristic programming approaches to solutions of spatial allocation problems. Prerequisite: 44:130, 44:209, or consent of instructor.
- 44:236 Travel Behavior in Urban Areas** 3 s.h.
Theoretical and conceptual basis of urban travel behavior; current models of travel behavior; interaction between intraurban spatial structure and travel behavior; new research strategies and experimental behavior models helpful in gaining insight into urban travel behavior processes. Prerequisite: 44:208 or consent of instructor.
- 44:237 Urban Spatial Analysis** 2 s.h.
Research issues, findings, and methodologies in urban geography; spatial aspects of economic, social, and political processes in urban settings; preparation of review papers.
- 44:261 Geographic Perspectives on Development** 3 s.h.
Theoretical and empirical studies of the development process, with special emphasis on spatial implications of socioeconomic changes attendant upon development. Prerequisite: 44:208 or consent of instructor.
- 44:265 Transportation Regulation and Finance** 3 s.h.
Same as 6E:265, 102:265.
- 44:275 Urban Growth in Developing Countries** 3 s.h.
Cross-cultural and interdisciplinary analysis of problems associated with urbanization and development in the developing nations. Same as 113:275, 6E:275, 42:275, 34:275, 102:275, 7F:275.
- 44:280 Field Techniques in Physical Geography** arr.
Sampling procedures and collection of field data in physical geography together with laboratory analysis of data.
- 44:300 Seminar in Applied Problems** 4 s.h.
Geographic skills, knowledge, and analytical methods needed to solve real world problems presented in a case studies format, including problems in human geography, locational analysis, and human-environment interactions. Prerequisites: 44:208, 44:107, and 22C:7, or their equivalents.
- 44:308 Research Seminar: Quantitative Methods, Computer Methods, and Modeling** arr.
- 44:315 Research Seminar: Locational Analysis of Political Behavior** arr.
- 44:316 Research Seminar: Space Perception** arr.
- 44:318 Research Seminar: Pleistocene** arr.
- 44:319 Research Seminar: Physical Geography** arr.
- 44:321 Research Seminar: Urbanization and Environment** arr.
- 44:323 Research Seminar in Natural Resources** arr.
- 44:330 Research Seminar: Geographic Analysis of Economic Behavior** arr.
- 44:331 Research Seminar: Location Theory** arr.
- 44:335 Research Seminar: Urban** arr.
- 44:336 Research Seminar: Urban Travel Behavior** arr.
- 44:350 Research Seminar: Staff** arr.
- 44:382 Research Seminar: Perspectives on Development** arr.
- 44:380 Field Seminar** arr.
- 44:406 Research: The Teaching of Geography** arr.
- 44:419 Research: Physical Geography** arr.
- 44:440 Research: Environment and Behavior** arr.
- 44:441 Research: Locational Analysis** arr.
- 44:442 Research: Models of Spatial Behavior** arr.
- 44:450 Thesis** arr.

Geology

Department chair: Richard A. Hoppin
Faculty: *professors* Kenneth F. Clark, Lon D. Drake, Brian F. Glenister, Philip H. Heckel, Richard A. Hoppin, Gilbert Klapper, George R. McCormick, Holmes Semken, Keene Swett, Sherwood D. Tuttle
professor emeritus William M. Furnish
associate professors Richard G. Baker, Robert S. Carmichael, Jeffrey Schabillon
assistant professors Robert L. Brenner, C. Thomas Foster, Jr.
adjunct professors Matthew Avcin, Brian Bailey, Stanley Grant, George Hallberg
adjunct assistant professor Ann B. Foster
adjunct instructor James A. Munter
research associate Harrell Strimple
Degrees offered: B.A., B.S., M.S., Ph.D.

Geology is the basic study and practical application of all scientific disciplines as 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, the locating of economic and energy resources, and how man is changing the earth for future generations. The Department of Geology