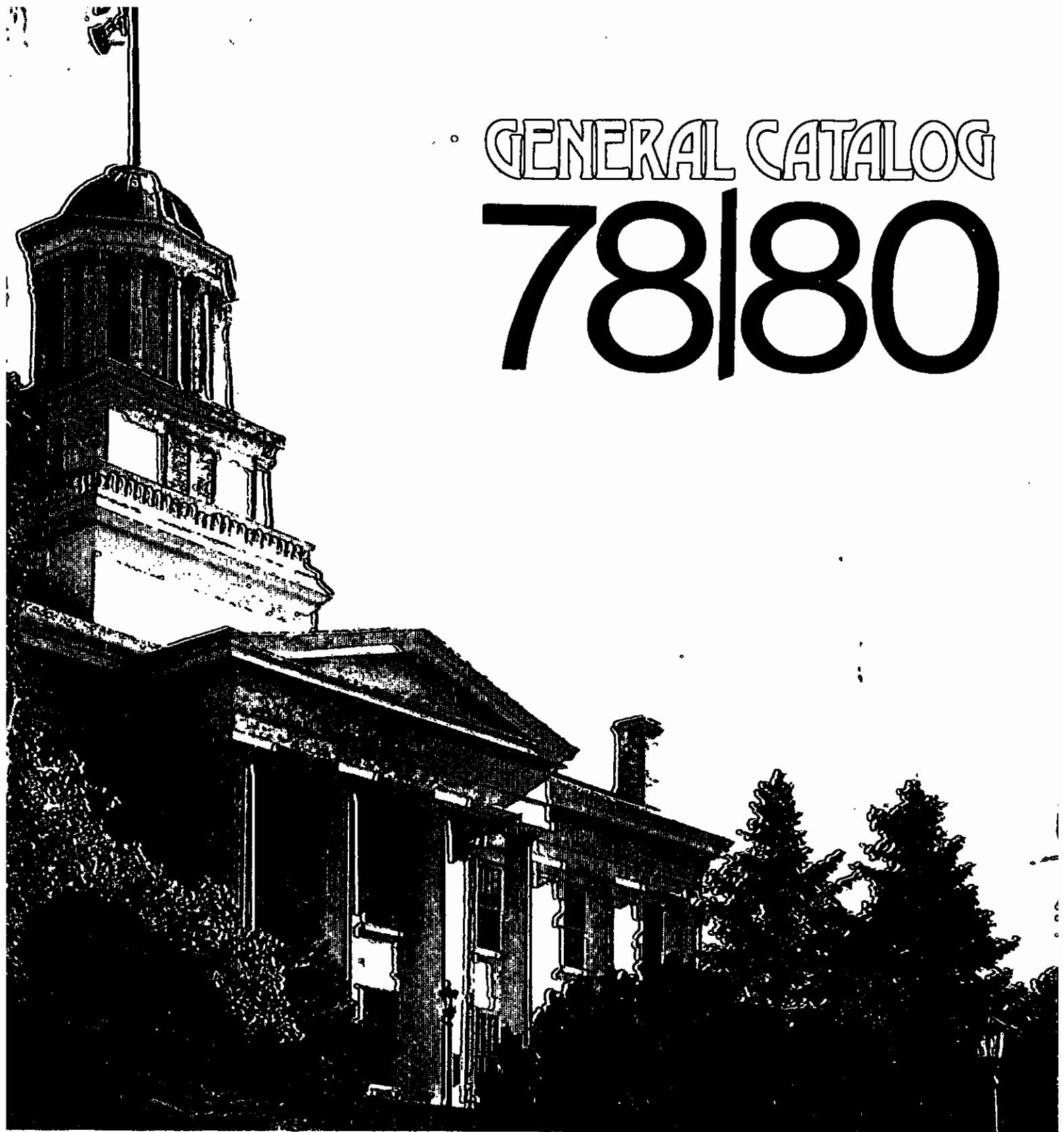


GENERAL CATALOG

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THE UNIVERSITY OF IOWA

Geography

Department chair: James B. Lindberg
 Faculty: professors Kenneth J. Dueker, Clyde F. Kohn, James B. Lindberg, Michael L. McNulty, David R. Reynolds, Gerard Rushton, Neil E. Salisbury
 associate professors William Graf, Rex D. Honey
 assistant professors Konstantinos Koutsopoulos, Russell Lee
 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 man/environment relations. 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 development of ghettos in large cities, distribution and consumption of natural resources, rapidly increasing populations and conflicts between nations. Studies in geography provide students with concepts and methods for organizing such spatial units as urban areas, market regions, school districts and other kinds of 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.

Much of modern geography is problem-oriented. It is scientific as well as humanistic in its approach to the solution of these problems. It is involved with two types of analytical considerations: the best means to obtain accurate facts or data; and the tools and techniques necessary for analyzing these data to see if they verify or alter existing explanations for the facts as they are observed.

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.

There is also a growing demand for young people concerned with human perception of, and subsequent interactions with, the total environment. 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 delivery systems and transportation engineering.

The Undergraduate Program

The Geography faculty has developed an undergraduate instructional program which provides educational opportunities for a variety of students: (1) for the nonmajor interested in one or more elective courses as they relate to a liberal education, or for those interested in electing a cluster of courses in conjunction with another discipline or for the B.G.S. degree; and (2) for those interested in acquiring a major in geography. The Department also joins in significant interdepartmental programs involving regional, urban, and environmental components.

Courses for the Nonmajor

Students in the College of Liberal Arts or other schools and colleges of the University who do not plan to major in geography may find meaningful such courses as 44:116 Urban Political Geography, 44:126 American Wilderness: Environments and Issues, 44:136 The Inner City, 44:139 Urban Problems, 44:162 The Third World, 44:165 The Changing World and 44:191 Energy in Contemporary Society.

Students in several related disciplines and in the Bachelor of General Studies program take clusters of courses in geography according to their individual interests.

Those specializing in environmental studies might elect such upper-level courses as 44:101 Introduction to Weather and Climate, 44:119 Natural Environmental Issues, 44:120 Natural Hazards, 44:121 Stream Processes and Water Resources, 44:122 Natural Resources of the United States, 44:123 Geography of Natural Resources, 44:125 Environmental Impact Studies and 44:180 Field Techniques in Natural Environmental Problems.

For students interested in a cluster of advanced courses in urban studies, the Department offers 44:111 Introduction to Urban Transportation, 44:116 Urban Political Geography, 44:135 Urban Geography, 44:136 The Inner City, 44:137 Metropolitan Growth and Development and 44:139 Urban Problems.

Students in business may benefit from taking such locational analysis courses as 44:30 Introduction to Economic Geography, 44:130 Location of Services and 44:132 Industrial Location.

Alternative Programs for the Undergraduate Major

Students electing to major in geography will be exposed to concepts and methods of inquiry in physical, economic, social and political geography. They will be taught how to state problems from a geographic point of view, where and how to find relevant data for analyzing these problems, how to relate their findings to existing theories and how to apply their findings to real world situations.

Students majoring in geography may choose alternative programs depending on their interests. The substantive strengths of the Department fall into four areas: environmental studies, urban and regional studies, locational analysis, 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 departmental chair on recommendation of the student's adviser, and 44:150 Undergraduate Seminar for Geography Majors. Other than these two courses, the requirements vary with the specific program selected by the student.

Bachelor of Science students must complete either 22C:7 Introduction to Computing with FORTRAN or 22C:16 Introduction to Programming with PL/1 with consent of adviser, or 22M:25 Calculus I.

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 include 22S:127 Applied Statistical Methods and Computations, 44:150 Undergraduate Seminar for Geography Majors, 44:180 Field Techniques in Natural Environmental Problems and 22C:7 Introduction to Computing with FORTRAN or 22C:16 Introduction to Programming with PL/1 with consent of adviser, or 22M:25 Calculus I.

Students concentrating in environmental studies are advised to select substantive courses from among the following:

- 44:1 Introduction to Human Geography
- 44:2 Natural Environment and Man
- 44:101 Introduction to Weather and Climate
- 44:119 Natural Environmental Issues
- 44:120 Natural Hazards
- 44:121 Stream Processes and Water Resources
- 44:122 Natural Resources of the United States
- 44:123 Geography of Natural Resources
- 44:125 Environmental Impact Studies

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

Under the direction of an adviser, students should select courses in related disciplines from among the following:

- 12:5 Introduction to Geology
- 12:6 Evolution of the Earth
- 12:110 Geologic Remote Sensing
- 12:108 Introduction to Oceanography

- 12:110 Geologic Remote Sensing
- 12:112 Geologic Field Methods
- 12:171 Geomorphology
- 34:170 Population and Society or
- 34:175 Introduction to Demography
- 6E:133 Economic Growth and Environmental Decay
- 37:125 A Planet in Crisis
- 527:102 Technology of Environmental Pollution Control

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:131 Statistical Methods with Applications
- 44:138 Spatial Organization
- 44:150 Undergraduate Seminar for Geography Majors
- 22C:7 Introduction to Computing with FORTRAN or
- 22C:16 Introduction to Programming with PL/1 (with consent of adviser) or
- 22M:25 Calculus I

Students concentrating in urban and regional analysis are advised to select substantive courses from the following:

- 44:1 Introduction to Human Geography
- 44:2 Natural Environment and Man
- 44:11 Introduction to Social Geography
- 44:30 Introduction to Economic Geography
- 44:33 Transportation in the USA:

- Issues and Problems
- 44:35 Introduction to Urban Geography
- 44:111 Introduction to Urban Transportation
- 44:116 Urban Political Geography
- 44:130 Location of Services
- 44:132 Industrial Location
- 44:135 Urban Geography
- 44:136 The Inner City
- 44:137 Metropolitan Growth and Development
- 44:139 Urban Problems

Also recommended:

- 44:107 Maps and Mapping
- 44:109 Computer Methods in Geographical Analysis

Under the direction of an adviser, students should select courses in related disciplines from among the following:

- 113:119 Urban Anthropology
- 16:187 The City in American History
- 30:111 Municipal Government and Politics
- 34:172 Social Dynamics of Urban Life
- 102:102 Case Studies: Urban and Regional Planning
- 102:108 Housing Analysis
- 6E:135 Regional and Urban Economics
- 6E:137 Problems in Urban Economics

Locational Analysis

The concentration in locational analysis is designed for students who wish to gain expertise in this more traditional problem-solving field within human geography. Students learn to use modern technology to help them calculate solutions to such locational problems as selecting the best site for a store or public facility, estimating demand in an area, developing models of consumer behavior and gauging the impact of locational decisions.

The required professional courses include:

- 22S:127 Applied Statistical Methods and Computations
- 44:138 Spatial Organization
- 44:150 Undergraduate Seminar for Geography Majors
- 44:109 Computer Methods in Geographical Analysis
- 22C:7 Introduction to Computing with FORTRAN

or
22M:25 Calculus I

Students concentrating in locational analysis are advised to select substantive courses from the following:

44:1 Introduction to Human Geography
44:30 Introduction to Economic Geography
44:33 Transportation in the USA: Issues and Problems
44:111 Introduction to Urban Transportation
44:130 Location of Services
44:132 Industrial Location
44:137 Metropolitan Growth and Development
44:139 Urban Problems

One additional technique course is also recommended:

44:107 Maps and Mapping

Under the direction of an adviser, students should select courses in related disciplines from among the following:

6E:103 Microeconomics
6E:113 Health Economics
6E:141 Industrial Organization
586:141 Introduction to Operations Research
6B:134 Marketing Research
102:108 Housing Analysis

International Development Studies

The concentration in international 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 different 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
44:138 Spatial Organization
44:150 Undergraduate Seminar for Geography Majors

Students interested in this area of study are advised to select courses from among the following:

44:1 Introduction to Human Geography
44:2 Natural Environment and Man
44:19 Natural Environmental Issues
44:30 Introduction to Economic Geography
44:35 Introduction to Urban Geography
44:124 Introduction to the Global Environment
44:127 World Food Problems
44:132 Industrial Location
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
30:150 Politics of Modernization
30:160 International Politics
30:166 Politics of War and Peace
30:127 Policy Problems in Industrial Societies
6E:123 Political Economy of the Military-Industrial Complex
6E:129 Economic Development of Underdeveloped Areas
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 training.

Individual Programs

If none of these four alternatives is appropriate, students may design their own individual programs of instruction with the help of their advisers. Such programs, however, must include 22S:127, 44:138, and 44:150.

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.

The 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 ability 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 Iowa graduates to fill positions on college and university faculties, in research-oriented institutions and in business and government.

The graduate program at Iowa is concerned with the locational analysis of physical, economic, social and political phenomena; the spatial aspects of human behavior; and the interaction of humans and their environment.

The Department offers specialized instruction in the teaching of geography at the college level (44:206 Teaching College Geography and 44:306 Research Seminar: The Teaching of 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. Graduate students who plan to become college teachers are strongly encouraged to complete 44:206 Teaching College Geography.

Master of Arts Programs

The Department offers two programs leading to the Master of Arts degree, with and without thesis. Within this framework, there are two major tracks: one for students who wish to prepare for positions in research or teaching; the other for students who are interested in some area of applied geography.

Students whose objective is the Master of Arts degree leading to a career in teaching or research are required to complete a minimum of 30 semester hours of graduate work, of which 15 semester hours must be 200-level courses or above, including a minimum of two units of 44:201-202 Geographical Analysis I-II, and 44:208 Quantitative Analysis I. The remainder of

their programs must be composed of graduate-level courses or research seminars as approved by the faculty or the student's adviser. A maximum of six semester hours of credit may be earned by the satisfactory completion of a thesis for those who wish to take the Master of Arts degree with thesis. All students must pass a final examination.

Students whose objective is the Master of Arts degree leading to a career in some area of applied geography (commonly referred to as the Master of Arts program in applied geography) are required to complete a minimum of 30 semester hours of graduate work, of which 15 semester hours must be 200-level courses or above, including a minimum of two units of 44:201-202 Geographical Analysis I-II, 44:208 Quantitative Analysis I, and 44:300 Seminar in Applied Problems. A computer language course, a cartography course or its equivalent and 44:208 Quantitative Analysis I, are required as prerequisites for 44:300. The remainder of the program will be composed of courses in geography and related departments as approved by the student's faculty adviser. Students are advised that it is possible to complete the Master of Arts program in applied geography in one year if they enter with sufficient background. Those whose background is not adequate should plan additional time. All students must pass a final oral and/or written examination. The coordinator of the program will conduct an initial screening and advising of incoming students. An appropriate adviser in the student's specified area of interest will be assigned to assist in tailoring a program to suit the needs of the student. Suggested sample programs have been formulated and may be used as guidelines. Students should inquire about the internship program.

Doctor of Philosophy

Students whose objective is the Doctor of Philosophy degree are required to complete eight 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. The courses 44:208-209 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 their second year in residence, under the direction of different faculty members. Unless excused by the faculty, they are also required to register for 44:350 Research Seminar: Staff each semester while 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 area of interest; courses in disciplines closely related to the student's objectives and interests; and courses which satisfy the tool requirements.

No later than their 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 program of study.

Preferably during their 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 adviser. 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 their third semester in residence. The faculty will pass upon the merits of the research thus demonstrated. Students become Ph.D. candidates when their qualifying paper has 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.

Upon passing the comprehensive examination, the doctoral candidate will prepare a research design to be presented before the staff seminar. After receiving the critical comments of faculty and students, the candidate is expected to conduct the necessary research and to present his or her findings in a dissertation which must be defended in a final oral examination.

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 during his or her junior and senior years; scores on the Graduate Record Examination Aptitude Test; letters of recommendation from those with whom he or she has taken courses; 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 hours of graduate work as approved by the Department.

Foreign students and others from undergraduate institutions which 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, to be appointed to a teaching or research assistantship, a student must ordinarily have achieved a combined score of 1100 on the GRE Verbal and Quantitative examinations and have a 3.0 undergraduate or graduate grade-point average. Applications for graduate appointments are usually considered at the end of the second week in February.

Special Facilities

The Department possesses substantial equipment in the computer-mapping area, including a Graf pen digitizer supported by the IMLAC-PDS-4 mini-computer with a CRT for on-line editing of digitizing work and a hard copier. The University has an IBM 360 Model 65 computer, a Cyber 71 computer, and a CALCOMP plotter available to the Department. In addition, an HP 2000F system with beehive terminals is available for instructional use. The Map Library contains more than 75,000 maps, a total of 2050 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 44:136 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.
- 44:19 Natural Environmental Issues** 2-3 s.h.
Issues arising from human use of natural environment and related problems resulting from expanding world population; air, water and land pollution; population pressures on agricultural resources; energy and mineral resource requirements versus quality of environment.
- 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 USA: Issues and Problems** 3 s.h.
Basic concepts of transportation and their relationship to geography; spatial processes and spatial structures associated with transportation.
- 44:35 Introduction to Urban Geography** 3 s.h.
Processes of urbanization and city growth; spatial structure and pattern of urban activities; geographic considerations of contemporary urban problems; the city and its physical setting; comparative urban studies.
- 44:100 Readings for Undergraduates** arr.
Supervised readings in geography. Prerequisite: consent of instructor.

Courses 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 completion 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 equivalent.
- 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.
- 44:115 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** 2-3 s.h.
Issues arising from human use of the natural environment and related problems resulting from an expanding world population; air, water and land pollution; population pressures in agricultural resources; energy and mineral resource requirements versus the quality of the environment.
- 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** 3 s.h.
Writing, attacking and defending environmental impact assessments; sources of environmental information; photo interpretation for impact assessment. Prerequisite:
- Geography major, or 12 semester hours in geography, 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 and limitations for 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.
- 44:132 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 Metropolitan Growth and Development** 3 s.h.
Historical and contemporary forces affecting the development of metropolitan areas; contextual and spatial perspective on forces of change; population processes and spatial population forecasting; value orientation, change and conflict; policy issues.
- 44:138 Spatial Organization** 3 s.h.
Approaches to spatial analysis of human activities and natural processes. Fall.
- 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. Prerequisites: 44:108 and 44:136, or equivalents. Spring.
- 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 in Natural Environmental Problems arr.

Mapping and survey techniques as applied to natural resources; problems in resource evaluation and management in their field settings. Summer.

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. Prerequisites: junior, senior, professional or graduate status. Same as 527:101, 12:114, and 91:191.

Courses for Graduates Only

44:200 Readings arr.

Graduate students who have interest 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. A continuation of 44:208. Prerequisite: 44:208 or consent of instructor.

44:215 Political-Economic Analysis in Geography 2 s.h.

Theories of the political-economic organization of space at the subnational level, with an emphasis on public choice, social welfare, and collective decision-making approaches; locational conflict, philosophical and methodological issues in public policy analysis. Prerequisite: 44:201 or 44:202 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.

44:226 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 2 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 intra-urban 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.

44:275 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, and 102:275.

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: 44:206, 44:107, and 22C:7, or their equivalents.

44:306 Research Seminar: The Teaching of Geography arr.

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.

44:320 Research Seminar: Natural Hazards and Problems 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.

44:362 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 Brian Glenister, Richard A. Hoppin, Gilbert Klapper, George R. McCormick, Holmes Semken, Keene Swett, Sherwood Tuttle
emeritus professor William M. Furnish
associate professors Richard Baker, Robert S. Carmichael, Kenneth Clark, Lon Drake, Philip Heckel, Jeffrey Schabillon
assistant professors Robert L. Brenner, C. Thomas Foster
adjunct professors Stanley Grant, Matthew Avcin, George Hallberg, Walter Steinhilber, James Teranik
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 Geology Department has the customary subfields—mineralogy, petrology, stratigraphy, structural geology, paleontology, sedimentology, economic geology, geomorphology, environmental geology—and also includes applied geophysics, geochemistry, and paleobiology.

Career opportunities are available to professional geologists in industry (especially as related to the search for petroleum and minerals), teaching, urban planning, state and federal geological surveys, and government, resource, and research organizations. The master's degree is regarded by