

Department of Geography



**Undergraduate Study
in**

**Geography
and
Atmospheric Science**



KU THE UNIVERSITY OF
KANSAS

Welcome to the Geography Department

Undergraduate Guide

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Geography Department: History and General Information

Welcome to the Geography Department at the University of Kansas. This handbook is intended to provide undergraduates general information about Geography, Atmospheric Science, the Geography Department at the University of Kansas, and the four undergraduate degrees offered by the Department. It also includes worksheets to assist you in scheduling the course requirements for your degree.

Geography and weather are some of humankind's oldest curiosities and long established branches of modern science. The scientific discipline of Geography strives to explore and to understand the variety that exists in the world's landscapes and cultures. The study has several interlocking approaches, including area or regional studies, analysis of the interconnecting elements and processes of the natural environment (e.g. climate, landforms, plant communities, soils), interaction between people and the environment, and the study of historical, cultural, economic, and other factors that underlie the spatial organization of human beings and their activities on the planet. A central theme to geographic studies includes the study of spatial analytic techniques. This includes studies related to map making and cartography, remote sensing of the environment, methods for displaying and analyzing spatial data and the use of Geographic Information Systems to perform these techniques.

Atmospheric Science (including meteorology) has always had a close relationship with Geography. Both disciplines share an interest in maps and spatial analytical techniques. In more recent times, both Geography and Atmospheric Science have used remote sensing techniques to provide us with information on our environment. Geography and Atmospheric Science share the discipline of Climatology. Atmospheric Science strives to understand the physical processes taking place in the atmosphere. These processes have many consequences among which are weather and the distribution of air pollutants.

Instruction in geography and meteorology at KU began within the Geology Department when Professor C.J. Posey, the University's long-time weather observer, offered several courses in meteorology and regional geography. The current programs trace their foundation to 1946 when Walter Kollmorgen arrived with the charge to establish a department. The University's enrollment was growing rapidly during the post-war years, and students were eager to learn about different regions of the world. The department expanded to four staff members by 1950 and expanded to its present size in the early 1970's. Teaching and research interests of the staff have always been broad, but the department has come to national prominence especially for its work in cultural/regional studies, geographic information science and physical geography. The Department also emphasizes the integration of these sub-disciplines, especially when combined with the prominent regional studies programs at KU

The baccalaureate degrees offered closely follow the research strengths of the Department. In addition, majors follow the overall educational goals of the University. As part of these goals, Geography and Atmospheric Science majors emphasize theoretical knowledge together with experimental field and laboratory work. Geography students learn to apply their knowledge through use of geographic information science in cartography, spatial analysis, and environmental analysis. Atmospheric Science students focus on analysis of atmospheric data with its applications to weather forecasting and air pollution and are introduced to some of the basics of computer modeling. In the last few decades, computer-based geographic information systems (GIS) and remote sensing techniques have come to play a major role in geographic analysis and computer based analysis and simulation has become standard in Atmospheric Science. As part of our curriculum, we have made great efforts to be able to offer students hands-on opportunities in these emerging areas of spatial analysis with well-equipped laboratory resources. Ideally, at graduation our students will have a much better understanding of the natural and human forces that create the landscape we live in. Furthermore, students should be equipped to know how we accumulate, display, analyze and interpret the data we collect to understand the relationships between the earth and its human inhabitants.

Undergraduate Majors in Geography and Atmospheric Science

The Department of Geography offers four undergraduate degrees. Since each degree offers a different educational experience, students should carefully consider which degree is most appropriate to meet their educational goals. In all of the degrees, students have to meet two general sets of requirements: the general education requirements set by the College of Liberal Arts and Sciences, and the specific requirements for the majors set by the Geography Department.

1. **The Bachelor of Arts in Geography (B.A.)** offers students a broad liberal arts education touching on all aspects of Geography. As part of this degree students need to meet a number of requirements set by the College of Liberal Arts and Sciences. Students are required to complete three courses in each of the Principal Course categories (humanities, social sciences, and natural sciences) as well as obtain proficiency in a foreign language. Geography requirements are the same as those for the Bachelor of General Studies degree, and require a minimum of 29-30 credit hours in Geography. Course work includes 14-15 hours of fundamentals courses and 15 additional hours selected from four topical groups: physical, human, geographic information science and regional.
2. **The Bachelor of General Studies in Geography (B.G.S.)** is unique to the University of Kansas. The intent of the degree is to allow for more specialization in the student's main area of interest while still maintaining a liberal arts program. Compared to the B.A. degree, there are fewer principal course requirements: there are only two required courses in each of the humanities, social sciences, and natural sciences. Another difference is that this degree has no foreign language requirement. It does, however, require students to complete a concentration (3 upper division courses) or a minor in a second field of study (usually 18 credit hours). Geography core requirements are the same as those for the B.A. degree, and require a minimum of 29-30 credit hours in Geography. Course work includes 14-15 credit hours of fundamentals courses and 15 additional credit hours selected from the four topical groups: physical, human, geographic information science and regional.
3. **The Bachelor of Science in Geography (B.S.)** is a much more specialized degree, with fewer general education requirements and a much more concentrated specialization in one of two aspects of Geography. There are two B.S. degree options:
 - a. **PHYSICAL GEOGRAPHY OPTION.**
Students prepare for a career in environmental assessment and problem solving. Basic requirements include preparation in chemistry, biology, physics and mathematics. Advanced course work includes the study of the processes that affect the physical environment (soils, vegetation, climate and geomorphology), and techniques for performing statistical and computational analysis of these processes (statistics, GIS and remote sensing).
 - b. **GEOGRAPHICAL INFORMATION AND ANALYSIS OPTION.**
Students prepare for a career in the area of geographic information science and problem solving using a variety of spatial analysis techniques. Basic requirements include preparation in mathematics, science and computer science. Advanced course work includes work in cartography, GIS, remote sensing, spatial statistics, spatial analysis and data presentation and visualization. In addition, students are expected to take some coursework in one of the other areas of geography (physical, human, and regional).

Beyond the basic requirements listed under each option, both Geography B.S. degrees have a common set of general education requirements, including courses in English, mathematics, communications, humanities, social sciences and a history or philosophy of science course. Some courses are shared by the two options; however, different course selection menus apply for the remaining requirements. Specific requirements are shown in the worksheets for each option.

4. **The Bachelor of Science in Atmospheric Science (B.S.)** is designed to meet the recommendations of the American Meteorological Society for a bachelor's degree in meteorology/atmospheric science. There are four options, each of which meet these recommendations.

a. GENERAL OPTION

This option is for students who want a broad background in atmospheric science. It is also the most suitable option for those who are aiming at a career in weather forecasting. It includes a third semester of synoptic meteorology as well as an air pollution course.

b. AIR POLLUTION OPTION

Students prepare for a career emphasizing environmental aspects of meteorology. This option includes an additional semester of chemistry as well as environmental studies.

c. HYDROMETEOROLOGY OPTION

Students prepare for a career involving the interface between meteorology and hydrology. These studies have important applications to flash floods, droughts and water supply. This option includes additional courses on fluid flow and hydrology from the School of Engineering.

d. NEWS MEDIA OPTION

This option is for students who wish to enter careers whose main function is to provide information to the general public. It requires additional courses from the School of Journalism.

All four degrees prepare the student for advanced work at the graduate level, although students taking the B.A. and the B.G.S. degrees should note that most Geography graduate programs require a statistics course, *e.g.*, GEOG 316, and we highly recommend a basic course in GIS, *e.g.*, GEOG 358.

This guide uses worksheets to show the course requirements for each degree. It is highly recommended that students consult a faculty advisor when preparing their course of study. Members of the undergraduate committee are always available for advising and to help solve program and curriculum problems. We also recommend that, at the outset of their studies, students talk to a number of faculty members in the department about their interests. This will help in the selection of courses that best match individual interests. It will also help identify special courses or research opportunities that might enhance the overall educational experience at the University of Kansas. Finally, the University has special scholarships for undergraduate research programs, and we highly recommend you consider the Study Abroad Program for a semester or summer. You should consider this before your junior year.

During the final year in the program, students are required to do a graduation check. Final degree checks are done by the Undergraduate Services staff of the College of Liberal Arts and Sciences (109 Strong Hall). As part of this check, students will also need to meet with the Undergraduate Advisor in the Geography Department to check the Geography or Atmospheric Science major requirements. It is strongly recommended that students consult with a Geography advisor on a regular basis to make certain that, at each stage in their program, they are meeting all of the requirements for the degree. It is important to be certain that the major requirements and those of the College of Liberal Arts and Sciences are correct on the ARTS (Academic Requirements Tracking System) form.

Honors

Any of the degrees offered by the Geography Department can be completed with honors, although the BS degrees in Atmospheric Sciences have slightly different requirements compared to the degrees in Geography. To complete a degree with honors students must fulfill the following requirements.

Atmospheric Science

To be accepted as a candidate for honors, a major must have completed at least 9 hours of upper-division credit in Atmospheric Science with a grade-point average of 3.50 in all Atmospheric Science courses and an overall average of at least 3.25. In addition to outstanding work in Atmospheric Science classes, the program requires ATMO 499, an independent study course consisting of the creation of an honors paper. The student will present the results of this paper in an oral examination to a committee consisting of a minimum of two faculty, normally from the Geography Department, and chaired by the ATMO 499 supervisor. To graduate with honors, the student must complete the paper and the examinations and maintain the 3.50 and 3.25 grade point averages.

Geography

To be accepted as a candidate for honors, a major must have completed at least 9 hours of upper-division credit in geography with a grade-point average of 3.50 in all geography courses and an overall average of at least 3.25. In addition to outstanding work in geography classes, the program requires GEOG 499, an independent study course consisting of the creation of an honors paper. The student will present the results of this paper in an oral examination to a committee consisting of a minimum of two faculty, normally from the Geography Department, and chaired by the GEOG 499 supervisor. To graduate with honors, the student must complete the paper and the examinations and maintain the 3.50 and 3.25 grade point averages.

Minor Degrees Offered

The Geography Department offers three undergraduate minors. The first minor is a general minor in Geography. The second is specifically designed to provide students with a background in Geographic Information Science. The third minor is in atmospheric sciences. You should carefully consider which minor best meets your academic goals before choosing one.

Minor in Geography

Requires 18 hours of Geography courses with at least 12 hours numbered 300 or above and a minimum grade point average of 2.0 in courses taken for the minor

Minor in Geographic Information Science

Requires the following:

- 1) GEOG 111 or GEOG 210, and GEOG 316 and GEOG 358
- 2) **Three** additional courses from the Geographic Information Science group (300 or above)
- 3) A minimum grade point average of 2.0 in courses taken for the minor

Minor in Atmospheric Science

Requires a minimum grade point average of 2.0 in courses taken for the minor

Requires the following courses:

- ATMO 105 Introductory Meteorology
- ATMO 220 Unusual Weather **or** ATMO 321/GEOG 321 Climate and Climate Change
- ATMO 505 Weather Forecasting

Requires three courses from the following choices:

- ATMO 521 Microclimatology
- ATMO 525 Air Pollution Meteorology
- ATMO 630 Synoptic Meteorology
- ATMO 640 Dynamic Meteorology
- ATMO 642 Remote sensing of the Atmosphere
- ATMO 680 Physical Meteorology

Departmental Facilities for Education and Research

The Geography Department has a number of research and educational facilities. Geography faculty members are also closely affiliated with a number of other campus departments, facilities, and resources. Within the Department, undergraduate students have free access to Departmental computer laboratories for GIS and Weather information (310 and 405 Lindley Hall). Software available includes the Microsoft Office suite, all ESRI GIS products, ERDAS Imagine (remote sensing) software and SPSS statistical software, as well as other mapping, scanning, and graphing software packages. Student-accessible hardware includes scanners, digitizers, printers, and plotters. A large-size plotter for posters and other printing is available through Cartographic Services. A second Remote Sensing laboratory specifically equipped with Remote Sensing and GIS software facilities is available for upper division classes. The weather laboratory is open to all students. It has computers for acquiring various atmospheric data over the Internet. It also contains readouts of several weather instruments on campus. Among the data obtained around the world are: surface observations, upper air soundings, output from numerical models, and satellite data. From the United States we also have profiler data, Doppler radar data, soundings taken by aircraft, and forecasts and discussions by the National Weather Service. Students interested in honors thesis projects and special research problems have access to other Department resources, including advanced computer resources for visualization and Global Positioning System (GPS) instrumentation.

The Department also houses other specialized laboratories. There are several physical geography laboratories for soil and geomorphological studies, plant ecology and dendrochronology, and palynology research. In addition there is a wide array of equipment for microclimatology and physical geography field projects. Much of this equipment is available for the biannual summer field camp held in the Rocky Mountains of Colorado. Advanced undergraduate students are eligible to participate in this class. Additional research opportunities and resources are provided through the Cartographic Services laboratory housed in the Department. This laboratory is a production cartography facility where students can intern to learn the art of production cartography.

Other campus resources are also available to students. Different faculty members have links to all the regional studies programs and their resources on campus. In addition, several faculty are linked with the Kansas Applied Remote Sensing (KARS) Center which is part of the NASA data depository program that provides numerous Remote Sensing and other digital data resources. Other data resources include the Kansas Geological Survey and its DASC program which houses numerous digital maps and data for the State of Kansas, and the T.R. Smith Map Library which is one of the top ten research map libraries in the country.

Undergraduate Geography Club

The Undergraduate Geography Club is an academic organization for geography majors and other students interested in geography. Educational, social, and career-related activities are planned by the officers for the twice-a-month meetings. Notices of meetings are posted in the department and put in student mailboxes in 218 Lindley.

Gamma Theta Upsilon

Gamma Theta Upsilon is an international honorary society for geography undergraduate majors and graduate students. To be eligible, a student must have a 3.0 grade point average in geography courses, have taken three courses in geography, and completed three semesters of college courses. Invitations to join GTU are issued annually.

AMS Student Chapter

There is a student chapter of the American Meteorological Society, which is open to anyone interested in meteorology. The chapter sponsors social and career-related activities. Meetings are announced in atmospheric sciences classes and through email.

Career Opportunities

A major in geography may lead to a career in cartography, environmental analysis, physical geography, regional analysis, urban and regional planning, or to employment that requires some combination of geographic sub-fields. A major in Atmospheric Science may lead to careers in weather forecasting, environmental consulting and air pollution specialists.

For information about particular career planning and counseling, students can contact :

University Career Center
110 Burge Union
(785) 864-3624
<http://ucc.ku.edu>

In addition, when students have narrowed their career options, they can contact faculty about counseling on careers in specific fields. Below are listed faculty contacts for some possible career choices within the Department of Geography:

ATMOSPHERIC SCIENCES: Donna Tucker, 404 Lindley; David Braaten, 413C Lindley; Nathaniel Brunsell, 417 Lindley; David Mechem, 230 Lindley, or Richard McNulty, 413A Lindley.

CARTOGRAPHY: George McCleary, 219 Lindley; or Terry Slocum, 215 Lindley.

GIS: Xingong Li, 409 Lindley; Terry Slocum, 207 Lindley; George McCleary, 219D Lindley; Stephen Egbert, 217C Lindley; or Jerome Dobson, 214 Lindley.

HUMAN AND CULTURAL GEOGRAPHY: Pete Shortridge, 209 Lindley; Garth Myers, 201 Lindley; Chris Brown, 223 Lindley; Peter Herlihy, 202 Lindley; Shannon O’Lear, 219B Lindley; So-Min Cheong, 221 Lindley; Barney Warf, 219C Lindley; or Jay Johnson, 402 Lindley.

PHYSICAL AND ENVIRONMENTAL GEOGRAPHY: William Johnson, 420 Lindley; Dan Hirmas, 415A Lindley; Johannes Feddema, 204 Lindley; or Kees van der Veen, 203 Lindley.

REGIONAL GEOGRAPHY AND AREA STUDIES: Chris Brown, 223 Lindley; So-Min Cheong, 221 Lindley; Peter Herlihy, 202 Lindley; Garth Myers, 201 Lindley; Shannon O’Lear, 219B Lindley; or Jay Johnson, 402 Lindley.

REMOTE SENSING/ENVIRONMENTAL AND LAND USE ANALYSIS: Stephen Egbert, 217C Lindley; or Jerome Dobson, 214 Lindley.

The following two pages show some of the possible job opportunities and skill sets associated with degrees in Atmospheric Science and Geography:

Atmospheric Science Occupational Possibilities

Atmospheric science majors possess skills applicable to numerous work settings. While many graduates pursue careers with the National Weather Service or in broadcasting, many other career options are available.

The following list, compiled from national data and from Major Options by Nicholas Basta (1991, New York: The Stonesong Press), presents a sampling of such positions that atmospheric science majors sometimes accept. Some of the listed occupations, such as special effects artist, require additional skills, knowledge, or training. Advanced graduate study is generally expected for those positions marked with a * on the list.

Research and Technical

*Aerospace engineer
Instrument maker
Photographer
*Research scientist
Computer programmer
*Optical design specialist
Mathematical technician
Air traffic controller

Education and Government

*Professor
National Weather Service forecaster
*Special librarian
Museum exhibits planner
Cartographer
Military officer
Aquarist

Communications

Technical writer
Educational television advisor
System support representative
Information specialist
Newspaper science writer
Broadcaster, television/radio

Business

Navigation equipment specialist
Flight management analyst
Special effects artist
Sales, technical equipment
*Environmental scientist/engineer
Agricultural consultant
Media specialist

Skills and Abilities

The study of atmospheric science includes the development of skills in a variety of areas. Technical and communication skills, knowledge of mathematics, chemistry, and physics, and forecasting and expectation are all examples of fields which may be included in an atmospheric science major. The skills listed below are representative of those developed by atmospheric science majors that are transferable to various occupational fields.

Investigation

Defining a research problem
Developing a research model
Establishing hypotheses
Gathering/analyzing data
Evaluating ideas
Seeing relationships among factors
Drawing meaningful conclusions
Projecting outcomes based on data

Communication

Developing and writing research proposals
Reviewing technical literature
Summarizing research findings
Informing/explaining/instructing
Preparing technical reports
Public speaking

Computation and Mathematical

Measuring distances/sizes/relationships
Performing calculations
Mathematical modeling
Maintaining records
Utilizing mathematical formulas

Technical

Designing equipment
Identifying and classifying materials/specimens
Observing data/things
Establishing and controlling experimental designs
Designing/using computer simulations
Using instruments

Geography Occupational Possibilities

Through study of culture areas, physical and human landscapes, and interaction between people and environment, geography majors develop skills applicable to a wide range of occupations. The list below is only a sample of suitable careers for majors in geography, selected from national data and from Major Options by Nicholas Basta (1991, New York: The Stonesong Press), which is available for use at University Career and Employment Services.

Some occupations, such as demographer, may require specialized skills or additional training. Additional graduate study is generally required for listings marked with an *.

Research and Technical

*Archaeologist
 *Cartographer
 *Computer simulation model designer
 Demographer
 Marketing researcher
 *Climatologist
 *Paleontologist
 *Soil scientist
 *Geologist
 *Seismologist
 Land-use planner
 *Civic engineer
 *Aquarist
 *Petroleum engineer
 *Meteorologist
 *Botanist
 *Systems engineer
 *Manufacturing engineer
 Geographer
 Funeral director
 *Medical assistant

Education and Government

*Public administrator
 Bicultural program specialist
 Museum education director
 Congressional committee staff director
 Teacher
 State/federal government policy analyst
 Urban/regional planner
 *College administrator
 *Social worker
 Foreign service officer
 Military officer
 Restoration carpenter
 Wildlife biologist
 Transportation planner
 Community development analyst

Communications

Editor
 Technical writer
 International agency representative
 National/state park interpreter
 Journalist/travel writer
 Market analyst
 Pastor
 Statistician
 *Therapist: group or recreation
 Vocational guidance assistant

Business

*Attorney
 Environmental impact assessment researcher
 Travel agent/guide
 Human resources manager
 Marketing manager
 Advertising account executive
 Executive search consultant
 Salesperson
 *Environmental scientist/engineer
 Navigation equipment specialist
 Airline pilot
 Farmer
 Real estate developer
 Banker/trust officer

Skills and Abilities

Students of geography develop general and technical skills and abilities applicable to diverse occupational paths. While many continue their education in graduate or law school, many other possibilities exist. The representative skills below may be used in a variety of careers. For example, cross-cultural observational skills may be equally useful for a travel planner, a human resources manager, or a freelance journalist.

Project Development

Planning long-term projects
 Developing project designs
 Writing grant proposals
 Evaluating and
 Maintaining records

Interpersonal Relations

Interviewing
 Understanding group dynamics
 Observing human interactions
 Recognizing cultural differences/similarities
 Surveying and sampling
 Identifying value systems

Analysis and Research

Gathering and organizing data
 Examining data
 Conducting field studies
 Applying non-intrusive methods
 Computer modeling
 Reaching new conclusions through comparative study
 Utilizing statistical applications
 Reading/constructing maps/graphs

Communication

Summarizing results
 Writing clearly
 Presenting/defending a position
 Communicating across cultures/languages
 Understanding societal development

FACULTY

2009-10

REGULAR FACULTY

DAVID A. BRAATEN (Professor): Atmospheric Science, remote sensing, climate change. Research on polar ice sheet characteristics and snow accumulation processes.

J. CHRISTOPHER BROWN (Associate Professor): Political ecology, biogeography, tropical environments, Latin America. Research on issues of sustainability in the Amazon.

NATHANIEL A. BRUNSELL (Assistant Professor): Land-atmosphere interactions, remote sensing, micrometeorology. Research on the spatial and temporal variability of water, carbon, and energy cycling.

SO-MIN CHEONG (Assistant Professor): Economic, sustainable resources, East Asia. Research on integration of science and policy.

JEROME E. DOBSON (Professor): Geographic information science, cultural geography. Research on the integration of remote sensing, geographical information science, and geography.

STEPHEN L. EGBERT (Associate Professor): Remote Sensing, geographic information science. Research in phenologically-based land cover mapping and change detection strategies using multi-temporal satellite imagery.

JOHANNES J. FEDDEMA (Professor): Climatology, water resources, geographic information science. Research on global climate change, African water resources and watershed modeling.

PETER H. HERLIHY (Associate Professor): Cultural and historical geography, Latin America. Research on indigenous peoples, conservation, and participatory mapping in Central America.

DANIEL R. HIRNAS (Assistant Professor): Pedology, soil geomorphology, soil mineralogy. Research on soil-landscape relationships, biogeochemical cycling of desert soils, and pedogenic modeling.

JAY T. JOHNSON (Assistant Professor): Cultural geography, comparative Indigenous Nations studies, post-colonialism. Research on Indigenous peoples' self-determination, Indigenous peoples' knowledge systems and the philosophies and politics of place.

WILLIAM C. JOHNSON (Professor): Fluvial geomorphology, geoarchaeology, palynology. Research on historic and prehistoric changes in river systems and Late Quaternary environments.

XINGONG LI (Assistant Professor): Geographic information science, spatial analysis. Research on computational methods of analysis of spatial data.

GEORGE F. MCCLEARY, JR. (Associate Professor): Cartography, behavioral systems, human factors. Research on map design, map use, and cognitive mapping.

DAVID B. MECHEM (Assistant Professor): Physical meteorology, cloud and mesoscale dynamics. Research on cloud microphysics and dynamics, mesoscale processes, numerical modeling, and boundary layer clouds.

GARTH A. MYERS (Professor): Cultural and political geography, development, Sub-Saharan Africa. Research on urban and regional development in Eastern Africa, cultural studies, and social theory in geography.

SHANNON R. O'LEAR (Associate Professor): Cultural and political geography, environmental policy, Russia, the Caucasus and Central Asia. Research on resource conflict in Azerbaijan.

JAMES R. SHORTRIDGE (Professor): Cultural and historical geography, North America. Research on American regionalism and sense of place.

TERRY A. SLOCUM (Associate Professor): Cartography, geographic information science, quantitative methods. Research on visualization and animation.

DONNA F. TUCKER (Associate Professor): Atmospheric science. Research on numerical modeling and mesoscale precipitation systems.

KEES VAN DER VEEN (Professor): Glaciology, ice-climate interactions, global environmental change. Research on dynamics and mass balance of fast-moving ice streams and outlet glaciers in Greenland and Antarctica, remote sensing applications for glacial geomorphology.

BARNEY L. WARF (Professor): Economic geography, social theory, urban geography. Research on telecommunications, cyberspace, elections.

WILLIAM I. WOODS (Professor): Cultural ecology, historical, soils, Latin America. Research on Amazonian anthrosols.

AFFILIATED FACULTY:

STEVE BOZARTH (Adjunct Assistant Professor): Paleoenvironmental reconstruction, phytolith analysis, landscape evolution.

ROBERT W. BUDDEMEIER (Courtesy Professor): Hydrologic systems, water resources, climate change.

RICHARD MCNULTY (Lecturer): Weather forecasting and thunderstorms.

MARK JAKUBAUSKAS (Courtesy Associate Professor): Remote sensing, geographic information systems, plant geography.

KYLE JURACEK (Adjunct Assistant Professor): Hydrology, fluvial geomorphology, geographic information systems.

ROLFE MANDEL (Adjunct Associate Professor): Soils, geoarcheology, quaternary sediments.

EDWARD MARTINKO (Courtesy Professor): Applied remote sensing, ecological systems, environmental studies.

BARBARA G. SHORTRIDGE (Lecturer): Cultural, gender, urban.

GEOGRAPHY COURSE CLASSIFICATION.

Beyond the core introductory courses (GEOG 100, 102, 104, 105, 148 and their honors equivalents) the Geography Department has classified its course offerings into four major categories including Physical, Human, Techniques and Regional Studies. These general categories are used to set some of the degree requirements.

Physical Studies

GEOG 148 Principles of Environmental Studies
GEOG 304 Environmental Conservation
GEOG 321 Climate and Climate Change
GEOG 331 Regional Geomorphology of the US
GEOG 332 Glaciers and Landscape
GEOG 335 Introduction to Soil Geography
GEOG 338 Introduction to River Systems
GEOG 339 Topics in Physical Geography: ____
GEOG 350 Physical Geography of Africa
GEOG 410 Human Biogeography, Honors
GEOG 521 Microclimatology
GEOG 531 Topics in Physical Geography: ____
GEOG 532 Geoarchaeology
GEOG 535 Soil Geography
GEOG 536 Landscape Ecology
GEOG 537 Elements of Plant Geography
GEOG 538 Environmental Soil Physics & Chemistry
GEOG 541 Geomorphology
GEOG 731 Topics in Physical Geography: ____
GEOG 735 Soil Geomorphology
GEOG 741 Advanced Geomorphology
GEOG 749 Gas Source Stable Isotopes

Geographic Information Science

GEOG 111 Maps and Mapping
GEOG 210 Computers, Maps and Geographical Analysis
GEOG 311 Map Conception and Development
GEOG 316 Methods of Analyzing Geographical Data
GEOG 319 Topics in Techniques: ____
GEOG 357 History & Philosophy of GIS
GEOG 358 Principles of Geographic Information Systems
GEOG 418 Internship in Production Cartography
GEOG 433 Biogeography Field & Laboratory Techniques
GEOG 458 Geographic Information Systems: ____
GEOG 511 Intermediate Cartography: ____
GEOG 513 Cartographic Design
GEOG 514 Visualizing Spatial Data
GEOG 516 Applied Multivariate Analysis in
 Geography
GEOG 517 Data Handling and Map Symbolization
GEOG 526 Remote Sensing of Environment I
GEOG 558 Intermediate Geographic Information Systems
GEOG 560 GIS Application Programming
GEOG 573 Advanced Geographic Analysis
GEOG 658 Topics in Geographic Information Science: ____
GEOG 711 Advanced Cartography: ____
GEOG 713 Practicum in Cartography
GEOG 714 Field Experience
GEOG 716 Advanced Geostatistics
GEOG 726 Remote Sensing of Environment II
GEOG 733 Adv. Biogeog. Field & Lab Tech.
GEOG 758 Geographic Information Science

Human Studies

GEOG 150 Environment and Society
GEOG 352 Economic Geography

GEOG 370 Introduction to Cultural Geography
GEOG 371 Environmental Geopolitics
GEOG 375 Intermediate Human Geography
GEOG 377 Urban Geography
GEOG 379 Topics in Cultural Geography: ____
GEOG 510 Human Factors
GEOG 515 Behavioral Systems
GEOG 519 History of Cartography
GEOG 551 Intermediate Economic Geography
GEOG 552 Topics in Urban/Economic Geog: ____
GEOG 556 Geography of the Energy Crisis
GEOG 557 Cities and Development
GEOG 570 Geography of American Indians
GEOG 571 Topics in Cultural Geography: ____
GEOG 572 Political Geography
GEOG 575 Geography of Population
GEOG 576 Cultural Geography of the United States
GEOG 579 Geography of American Foodways
GEOG 601 Indigenous Peoples of the World
GEOG 657 Geographic Models
GEOG 670 Cultural Ecology
GEOG 710 Information Design
GEOG 719 Development of Geographic Thought
GEOG 751 Analysis of Regional Development
GEOG 752 Topics in Urban/Economic Geog: ____
GEOG 756 Energy Problems & the Economic-Physical
 Environment
GEOG 771 Topics in Cultural Geography: ____
GEOG 772 Problems in Political Geography
GEOG 773 Humanistic Geography
GEOG 775 Proseminar in Population Geography

Regional Studies

GEOG 351 Africa's Human Geographies
GEOG 390 Geography of the United States and Canada
GEOG 395 Environmental Issues of: ____
GEOG 396 China's Geographies
GEOG 397 Geography of Kansas and the Plains
GEOG 399 Topics in Regional Studies: ____
GEOG 550 Environmental Issues in Africa
GEOG 553 Geography of African Development
GEOG 591 Geography of Latin America
GEOG 592 Middle American Geography
GEOG 593 Central American Peoples and Lands
GEOG 594 Geography of the Former Soviet Union
GEOG 595 Geography of Eastern Europe
GEOG 596 Geography of China
GEOG 597 Geography of Brazil
GEOG 790 North American Regions: ____
GEOG 791 Latin American Regions: ____
GEOG 794 Regions of the Former USSR
GEOG 795 European Regions: ____
GEOG 796 Asian Regions: ____

Courses with a ____ at the end of their title are typically topics or seminar courses and may be repeated for credit. Usually these courses will offer different topics of study each time they are offered. Students should check with the course instructor to see what the requirements are to take the course and what the topic will be when it is offered.

BACHELOR OF ARTS IN GEOGRAPHY

College requirements	Credit Hrs
..... ENGL 101	0-3
..... ENGL 102	0-3
..... ENGL 203, 205, 209, 210 or 211	3
..... COMS 130, 131, 230 or PHIL 148, 310 or exemption	0-3
..... MATH 101 or 104 or exemption	0-3
..... MATH 105, 106, 111, 115, 121, 365 or BIOL 570	3
..... Non-Western Culture _____	3
..... HWC 204 or 114	3
..... HWC 205 or 115	3
Language:	16
..... 1. _____	
..... 2. _____	
..... 3. _____	
..... 4. _____	

Principal Course Requirement

..... HT _____	3
..... HL _____	3
..... HR _____	3
..... SC _____	3
..... SI _____	3
..... SF _____	3
Physical Science (3 of the 4 categories – NB, NE, NM, NP)	
..... 1. _____	3
..... 2. _____	3
..... 3. _____	3

Geography Course requirements

..... GEOG 104 Principles of Physical Geography (or GEOG 107)	3
..... GEOG 105 Introductory Laboratory in Physical Geography	2
..... GEOG 102 Principles of Human Geography (or GEOG 103)	3
..... GEOG 111 (4) or 311 (4) or 316 (4) or 358 (4)	4
..... GEOG 100 World Regional Geography (or GEOG 101) or other regional course	3

15 additional credit hours selected from at least 3 of the 4 major categories (see course offerings):

..... 1. _____	Category _____	
..... 2. _____	Category _____	
..... 3. _____	Category _____	
..... 4. _____	Category _____	
..... 5. _____	Category _____	15+

Hour and GPA requirements

Total Credit hours (≥ 124)	CC Transfer credits (≤ 64)	Overall GPA (≥ 2.0)
CLAS hours (≥ 99)	Other KU Schools (≤ 25)	Geography GPA (≥ 2.0)
Junior Senior hours (≥ 45)	Hrs Music Org. (≤ 6)	
KU Res hours (≥ 30)	Hrs Phys Ed (≤ 4)	

BACHELOR OF GENERAL STUDIES IN GEOGRAPHY

College requirements	Credit Hrs
..... ENGL 101	0-3
..... ENGL 102	0-3
..... ENGL 203, 205, 209, 210 or 211	3
..... COMS 130, 131, 230 or PHIL 148, 310 or exemption	0-3
..... MATH 101 or 104 or exemption	0-3
..... MATH 105, 106, 111, 115, 121, 365 or BIOL 570	3
..... Non-Western Culture _____	3
..... HWC 204 or 114	3
..... HWC 205 or 115	3

Principal Course requirements	Credit Hrs
..... Two Humanities categories _____	3
..... _____	3
..... Two Social Science categories _____	3
..... _____	3
..... Two Physical Science categories _____	3
..... _____	3

Minor Course requirements OR three course concentration (upper division)	Credit Hrs
..... 1. _____	
..... 2. _____	
..... 3. _____	
..... _____	
..... _____	
..... _____	
	9-18

Geography Course requirements	Credit Hrs
..... GEOG 104 Principles of Physical Geography (or GEOG 107)	3
..... GEOG 105 Introductory Laboratory in Physical Geography	2
..... GEOG 102 Principles of Human Geography (or GEOG 103)	3
..... GEOG 111 (4) or 311 (4) or 316 (4) or 358 (4)	4
..... GEOG 100 World Regional Geography (or GEOG 101) or other regional course	3

15 additional credit hours selected from at least 3 of the 4 major categories (see course offerings):	Credit Hrs
..... 1. _____ Category _____	
..... 2. _____ Category _____	
..... 3. _____ Category _____	
..... 4. _____ Category _____	
..... 5. _____ Category _____	
	15+

Hour and GPA requirements			
Total Credit hours (≥ 124)	CC Transfer credits (≤ 64)	Overall GPA (≥ 2.0)	
CLAS hours (≥ 99)	Other KU Schools (≤ 25)	Geography GPA (≥ 2.0)	
Junior Senior hours (≥ 45)	Hrs Music Org. (≤ 6)		
KU Res. hours (≥ 30)	Hrs Phys Ed (≤ 4)		

BACHELOR OF SCIENCE IN GEOGRAPHY: PHYSICAL GEOGRAPHY OPTION

General Requirements		credit hrs
..... English - ENGL 101 (or exemption)		0-3
..... ENGL 102 (or 105 or exemption)		0-3
..... 200-level English course (ENGL 362 recommended)		3
..... COMS 130 (COMS 230, PHIL 148, PHIL 310, exemption)		0-3
..... History or philosophy of science		3
Choose one of the following or approval of Undergraduate committee		
HIST 103, 136, 305, 306, 311, 347, 360, 407		
PHIL 370, 375, 380, 620, 622		
GEOG 357		
..... Two principal courses in the Humanities		3
.....		3
..... Two principal courses in the Social Sciences		3
.....		3
Preparation for the major		
..... MATH 121 and MATH 122 (recommended) or MATH 115 and MATH 116		6-10
..... PHSX 211 and PHSX 212 (recommended) or PHSX 114 and PHSX 115		6-8
..... BIOL 152 and BIOL 414		7
..... CHEM 184 and CHEM 188		10
..... EECS 128 or equivalent		3
Geography Requirements		
Overview Courses		
..... GEOG 104 Principles of Physical Geography or GEOG 107 (Honors)		3
..... GEOG 105 Introductory Laboratory in Physical Geography		2
..... GEOG 100 or GEOG 102 (or honors equivalent)		3
Foundation Courses:		
a. Physical: Choose three of the following		9-10
..... GEOG 304 Environmental Conservation		
..... GEOG 321 Climate and Climate Change		
..... GEOG 331 Regional Geomorphology of the United States		
..... GEOG 335 Introduction to Soil Geography (or GEOG 535 Soil Geography)		
..... GEOG 338 River Systems		
b. Geographic Information Science: The following are required		12
..... GEOG 316 Methods of Analyzing Geographical Data		
..... GEOG 358 Principles of Geographic Information Systems		
..... GEOG 526 Remote Sensing of the Environment I		
c. Field Experience: Choose one of the following		3
..... EVRN 460 Field Ecology		
..... GEOG 433 Biogeography Field and Laboratory Techniques		
..... GEOG 714 Field Experience		
Elective Courses:		
a. 6 additional hours from the Physical geography course list (300 or above)		6
.....		
.....		
b. 6 additional hours of Geography (any group, 300 or above)		6
.....		
.....		
c. 6 additional hours in Allied Field (ATMO, BIOL, EVRN or GEOL)		6
.....		
.....		
Hour and GPA requirement		
Total Credit hours (≥124)	CC Transfer credits (≤64)	Overall GPA (≥ 2.0)
CLAS hours (≥ 99)	Other KU Schools (≤25)	Geography GPA (≥2.0)
Junior Senior hours (≥45)	Hrs Music Org. (≤ 6)	
KU Res hours (≥30)	Hrs Phys Ed (≤ 4)	

BACHELOR OF SCIENCE IN GEOGRAPHY: GEOGRAPHICAL INFORMATION AND ANALYSIS OPTION

General Requirements	credit hrs	
..... English - ENGL 101 (or exemption)	0-3	
..... ENGL 102 (or 105 or exemption)	0-3	
..... 200-level English course (ENGL 362 recommended)	3	
..... COMS 130 (COMS 230, PHIL 148, PHIL 310, exemption)	0-3	
..... History or philosophy of science Choose one of the following or approval of Undergraduate committee HIST 103, 136, 305, 306, 311, 347, 360, 407 PHIL 370, 375, 380, 620, 622 GEOG 357	3	
..... Two principal courses in the Humanities	3	
.....	3	
..... Two principal courses in the Social Sciences	3	
.....	3	
Preparation for the major		
..... MATH 121 and MATH 122 (or MATH 115, MATH 116 and MATH 122)	10-11	
..... EECS 138 or GEOG 514 or equivalent	3	
..... PHYS 114 and 115 <u>or</u> BIOL 150 and 152	8	
Geography Requirements		
Overview Geography courses		
..... GEOG 104 (GEOG 107) or GEOG 148 (149)	3	
..... GEOG 111 or GEOG 210	3	
..... GEOG 100 (101) or GEOG 102 (103)	3	
Additional Geography		
..... Two GEOG 300+ courses in Physical Studies, Human Studies and/or Regional Studies	3 3	
Core Geographic Information Science (Six courses, at least one from each category)	20-24	
..... Cartography and Visualization: GEOG 311, GEOG 513, GEOG 517		
..... Geographical Information Systems: GEOG 358, GEOG 558, GEOG 758		
..... Remote Sensing: GEOG 526, GEOG 726		
..... Statistics: GEOG 316, GEOG 516, GEOG 716		
.....		
.....		
Geographic Information Science Electives	6-8	
..... Two other courses from GIS Studies (GEOG 511 and 514 recommended)		
.....		
Allied Field: 3 courses and 9 credit hours minimum in one field (or a minor):	9	
..... Example areas: Area Studies, Atmospheric Science, Biology, Computer Science, Design, Environmental Studies, Engineering, Geology, Psychology, Urban Planning		
.....		
Electives (17-26 credits, any university courses)	17-26	
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Hour and GPA requirements		
Total Credit hours (≥124)	CC Transfer credits (≤64)	Overall GPA (≥ 2.0)
CLAS hours (≥ 99)	Other KU Schools (≤25)	Geography GPA (≥2.0)
Junior Senior hours (≥45)	Hrs Music Org. (≤ 6)	
KU Res hours (≥30)	Hrs Phys Ed (≤ 4)	

BACHELOR OF SCIENCE IN ATMOSPHERIC SCIENCE: GENERAL METEOROLOGY OPTION

General Requirements	credit hrs
..... English - ENGL 101 (or exemption)	0-3
..... ENGL 102 (or 105 or exemption)	0-3
..... Additional English (ENGL 203, 205, 209, 210, 211, or 362; ENGL 362 recommended)	3
..... COMS 130 or COMS 150 (or exemption)	0-3
..... COMS 330 (Recommended to take during the senior year)	3
..... One course in the Humanities	3
..... One course in the Social Sciences	3

Preparation for the major

..... MATH 121, MATH 122, MATH 223 and MATH 290	15
..... MATH 220 or MATH 320	3
..... PHSX 211 and PHSX 212 (PHSX 213 and 214 recommended: special permission provided)	8
..... EECS 138	3
..... MATH 581	3
..... CHEM 184	5
..... DSCI 301 or MATH 526	3 or 4
..... EVRN 148	3

Atmospheric Sciences Requirements

Core Atmospheric Sciences courses

..... ATMO 105	5
..... ATMO 321/GEOG 321	3
..... ATMO 505	3
..... ATMO 521/GEOG 521	3
..... ATMO 630	3
..... ATMO 640	3
..... ATMO 642	3
..... ATMO 660	3
..... ATMO 680	3
..... ATMO 697	1

NOTE: *Math 320 should be completed by the Junior year; ATMO 640 should be taken in/by the fall semester of the junior year, with ATMO 630 and ATMO 660 being taken in the Spring of the Junior year*

Additional Atmospheric Sciences

..... ATMO 506	3
..... ATMO 525	2
..... ATMO 650	3

Electives (21 credits, any university courses: Note general University restrictions below) 21

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Hour and GPA requirements

Total Credit hours (≥ 124)	CC Transfer credits (≤ 64)	Overall GPA (≥ 2.0)
CLAS hours (≥ 99)	Other KU Schools (≤ 25)	ATMO GPA (≥ 2.0) .....	.....
Junior Senior hours (≥ 45)	Hrs Music Org. (≤ 6)		
KU Res hours (≥ 30)	Hrs Phys Ed (≤ 4)		

BACHELOR OF SCIENCE IN ATMOSPHERIC SCIENCE: GENERAL METEOROLOGY OPTION WITH MINOR IN MATHEMATICS

General Requirements	credit hrs
..... English - ENGL 101 (or exemption)	0-3
..... ENGL 102 (or 105 or exemption)	0-3
..... Additional English (ENGL 203, 205, 209, 210, 211, or 362; ENGL 362 recommended)	3
..... COMS 130 or COMS 150 (or exemption)	0-3
..... COMS 330 (Recommended to take during the senior year)	3
..... One course in the Humanities	3
..... One course in the Social Sciences	3

Preparation for the major	
..... MATH 121, MATH 122, MATH 223 and MATH 290	15
..... MATH 320	3
..... PHSX 211 and PHSX 212 (PHSX 213 and 214 recommended: special permission provided)	8
..... EECS 138	3
..... MATH 581	3
..... CHEM 184	5
..... MATH 526	3 or 4
..... EVRN 148	3
..... MATH elective (MATH 647, MATH 646, MATH 611 or MATH 605 suggested)	3

Atmospheric Sciences Requirements

Core Atmospheric Sciences courses	
..... ATMO 105	5
..... ATMO 321/GEOG 321	3
..... ATMO 505	3
..... ATMO 521/GEOG 521	3
..... ATMO 630	3
..... ATMO 640	3
..... ATMO 642	3
..... ATMO 660	3
..... ATMO 680	3
..... ATMO 697	1

NOTE: *Math 320 should be completed by the Junior year; ATMO 640 should be taken in/by the fall semester of the junior year, with ATMO 630 and ATMO 660 being taken in the Spring of the Junior year*

Additional Atmospheric Sciences	
..... ATMO 506	3
..... ATMO 525	2
..... ATMO 650	3

Electives (19 credits, any university courses: Note general University restrictions below)	21
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Hour and GPA requirements

Total Credit hours (≥124)	CC Transfer credits (≤64)	Overall GPA (≥ 2.0)
CLAS hours (≥ 99)	Other KU Schools (≤25)	ATMO GPA (≥2.0)
Junior Senior hours (≥45)	Hrs Music Org. (≤ 6)	
KU Res hours (≥30)	Hrs Phys Ed (≤ 4)	

BACHELOR OF SCIENCE IN ATMOSPHERIC SCIENCE: AIR POLLUTION OPTION

General Requirements		credit hrs
..... English - ENGL 101 (or exemption)		0-3
..... ENGL 102 (or 105 or exemption)		0-3
..... Additional English (ENGL 203, 205, 209, 210, 211, or 362; ENGL 362 recommended)		3
..... COMS 130 or COMS 150 (or exemption)		0-3
..... COMS 330 (Recommended to take during the senior year)		3
..... One course in the Humanities		3
..... One course in the Social Sciences		3

Preparation for the major

..... MATH 121, MATH 122, MATH 223 and MATH 290	15
..... MATH 220 or MATH 320	3
..... PHSX 211 and PHSX 212 (PHSX 213 and 214 recommended: special permission provided)	3
..... EECS 138	3
..... MATH 581	3
..... CHEM 184	5
..... DSCI 301 or MATH 526	3 or 4
..... EVRN 148	3

Atmospheric Sciences Requirements

Core Atmospheric Sciences courses

..... ATMO 105	5
..... ATMO 321/GEOG 321	3
..... ATMO 505	3
..... ATMO 521/GEOG 521	3
..... ATMO 630	3
..... ATMO 640	3
..... ATMO 642	3
..... ATMO 660	3
..... ATMO 680	3
..... ATMO 697	1

NOTE: *Math 320 should be completed by the Junior year; ATMO 640 should be taken in/by the fall semester of the junior year, and ATMO 660 being taken in the Spring of the Junior year*

Additional Atmospheric Sciences

..... ATMO 525	3
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Additional Course work outside Atmospheric Sciences

..... CHEM 188	5
..... C E 477	3

Electives (18 credits, any university courses: Note general University restrictions below) 18

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Hour and GPA requirements

Total Credit hours (≥ 124)	CC Transfer credits (≤ 64)	Overall GPA (≥ 2.0)
CLAS hours (≥ 99)	.....	Other KU Schools (≤ 25)	.....	ATMO GPA (≥ 2.0)	.....
Junior Senior hours (≥ 45)	.....	Hrs Music Org. (≤ 6)	.....	
KU Res hours (≥ 30)	.....	Hrs Phys Ed (≤ 4)	.....	

BACHELOR OF SCIENCE IN ATMOSPHERIC SCIENCE: HYDROMETEOROLOGY OPTION

General Requirements	credit hrs
..... English - ENGL 101 (or exemption)	0-3
..... ENGL 102 (or 105 or exemption)	0-3
..... Additional English (ENGL 203, 205, 209, 210, 211, or 362; ENGL 362 recommended)	3
..... COMS 130 or COMS 150 (or exemption)	0-3
..... COMS 330 (Recommended to take during the senior year)	3
..... One course in the Humanities	3
..... One course in the Social Sciences	3

Preparation for the major

..... MATH 121, MATH 122, MATH 223 and MATH 290	15
..... MATH 220 or MATH 320	3
..... PHSX 211 and PHSX 212 (PHSX 213 and 214 recommended: special permission provided)	8
..... EECS 138	3
..... MATH 581	3
..... CHEM 184	5
..... DSCI 301 or MATH 526	3 or 4
..... EVRN 148	3

Atmospheric Sciences Requirements

Core Atmospheric Sciences courses

..... ATMO 105	5
..... ATMO 321/GEOG 321	3
..... ATMO 505	3
..... ATMO 521/GEOG 521	3
..... ATMO 630	3
..... ATMO 640	3
..... ATMO 642	3
..... ATMO 660	3
..... ATMO 680	3
..... ATMO 697	1

NOTE: *Math 320 should be completed by the Junior year; ATMO 640 should be taken in/by the fall semester of the junior year, and ATMO 660 being taken in the Spring of the Junior year*

Additional Atmospheric Sciences

..... ATMO 506	3
..... ATMO 525	2

Civil Engineering requirements

..... C E 301	5
..... C E 330	4
..... C E 455	3

NOTE: *You need to start this sequence by the beginning of your junior year, and you need to have finished the math and physics prerequisites to start this sequence.*

Electives (12 credits, any university courses: Note general University restrictions below) 12

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Hour and GPA requirements

Total Credit hours (≥ 124)	CC Transfer credits (≤ 64)	Overall GPA (≥ 2.0)
CLAS hours (≥ 99)	Other KU Schools (≤ 25)	ATMO GPA (≥ 2.0)
Junior Senior hours (≥ 45)	Hrs Music Org. (≤ 6)	
KU Res hours (≥ 30)	Hrs Phys Ed (≤ 4)	

BACHELOR OF SCIENCE IN ATMOSPHERIC SCIENCE: NEWS MEDIA FORECASTING OPTION

General Requirements		credit hrs
.....	English - ENGL 101 (or exemption)	0-3
.....	ENGL 102 (or 105 or exemption)	0-3
.....	Additional English (ENGL 203, 205, 209, 210, 211, or 362; ENGL 362 recommended)	3
.....	COMS 130 or COMS 150 (or exemption)	0-3
.....	COMS 330 (Recommended to take during the senior year)	3
.....	One course in the Humanities	3
.....	One course in the Social Sciences	3

Preparation for the major

.....	MATH 121, MATH 122, MATH 223 and MATH 290	15
.....	MATH 220 or MATH 320	3
.....	PHSX 211 and PHSX 212 (PHSX 213 and 214 recommended: special permission provided)	8
.....	EECS 138	3
.....	MATH 581	3
.....	CHEM 184	5
.....	DSCI 301 or MATH 526	3 or 4
.....	EVRN 148	3

Atmospheric Sciences Requirements

Core Atmospheric Sciences courses

.....	ATMO 105	5
.....	ATMO 321/GEOG 321	3
.....	ATMO 505	3
.....	ATMO 521/GEOG 521	3
.....	ATMO 630	3
.....	ATMO 640	3
.....	ATMO 642	3
.....	ATMO 660	3
.....	ATMO 680	3
.....	ATMO 697	1

NOTE: *Math 320 should be completed by the Junior year; ATMO 640 should be taken in/by the fall semester of the junior year, with ATMO 630 and ATMO 660 being taken in the Spring of the Junior year*

Additional Atmospheric Sciences

.....	ATMO 506	2
.....	ATMO 650	3

Journalism requirements

.....	JOUR 301	3
.....	JOUR 415	3
.....	JOUR 512	3

Electives (15 credits, any university courses: Note general University restrictions below) 15

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Hour and GPA requirements

Total Credit hours (≥ 124)	CC Transfer credits (≤ 64)	Overall GPA (≥ 2.0)
CLAS hours (≥ 99)	.....	Other KU Schools (≤ 25)	.....	ATMO GPA (≥ 2.0)	.....
Junior Senior hours (≥ 45)	.....	Hrs Music Org. (≤ 6)	.....	
KU Res hours (≥ 30)	.....	Hrs Phys Ed (≤ 4)	.....	

ATMOSPHERIC SCIENCE AND GEOGRAPHY COURSES

The Department of Geography offers a broad undergraduate curriculum as well as intensive graduate training. Students can obtain instruction in the areas of regional, physical, and cultural geography and atmospheric sciences (separate course list). Emphasis is also placed on techniques and methodology, including the areas of cartography, GIS, remote sensing, and quantitative methods. Inter-disciplinary research is encouraged.

Atmospheric Science Courses

ATMO 105 **Introductory Meteorology.** (5)

A lecture and laboratory course introducing students to the atmosphere, weather and climate phenomena, and their controlling physical processes. Topics covered include: the structure of the atmosphere, energy and energy budgets, climate and climate change, air pollution, clouds and precipitation, pressure and wind systems, severe weather, and weather forecasting.

ATMO 106 **Introductory Meteorology, Honors** (5)

Honors version of ATMO 105. A lecture and laboratory course introducing students to the atmosphere, weather and climate phenomena, and their controlling physical processes. Topics covered include: the structure of the atmosphere, energy and energy budgets, climate and climate change, air pollution, clouds and precipitation, pressure and wind systems, severe weather, and weather forecasting.

Prerequisite: membership in University Honors Program or by permission of instructor.

ATMO 220 **Unusual Weather.** (3)

An introductory lecture course which surveys the general principles and techniques of atmospheric science and illustrates their application through discussions of natural but unusual weather phenomena such as blizzards, hurricanes, tornados, and chinooks, of the effects of air pollution on weather, and of intentional human alteration of the atmosphere.

ATMO 310 **Aviation Meteorology.** (3)

This course will introduce students to meteorological events that affect aircraft operations. It will discuss aviation applications of meteorological observations including satellite and radar observations. Students will learn about graphical displays of meteorological information. Numerical forecasting models and how their output is applied for aviation will be considered. Forecasting of weather events of particular interest to aviation such as ceiling, visibility, icing and turbulence will be emphasized.

Prerequisite: ATMO 105 or AE 245 or equivalent.

ATMO 321 **Climate and Climate Change.** (3)

Same as GEOG 321

This course is designed to introduce students to the nature of the Earth's physical climate. It will introduce the basic scientific concepts underlying our understanding of our climate system. Particular emphasis is placed on energy and water balances and their roles in evaluating climate change. The course also evaluates the impact of climate on living organisms and the human environment. Finally, past climates are discussed and potential future climate change and its impact on humans is evaluated.

Prerequisite: GEOG 104 or ATMO 105.

ATMO 499 **Honors Course in Atmospheric Science.** (2-3)

Open to students with nine hours of upper level credit in Atmospheric Science, an average of at least 3.5 in all Atmospheric Science courses, and an overall average of at least 3.25. Includes the preparation of an honors paper and its defense before a committee of at least two regular faculty members.

ATMO 505 **Weather Forecasting.** (3)

A first course in synoptic meteorology designed to introduce students to weather analysis and forecasting through the

application of hydrodynamic and thermodynamic principles to operational analysis and forecasting. Topics include: analysis and interpretation of surface and upper-air observations and data from satellites, radars, and wind profilers; chart and sounding analysis; and three-dimensional, conceptual models of weather systems. The course includes student-led weather briefings and analysis exercises.

Prerequisite: ATMO 105; one other atmospheric science or computer science course; MATH 121.

ATMO 506 **Forecasting Models and Methods** (3)

Introduction to basic numerical weather prediction methods. Computer programs are used to apply numerical methods to weather data and to evaluate dynamical processes on numerical grids. Meteorological graphics packages are used to analyze current weather data and numerical model output. Current operational numerical models and output products are discussed.

Prerequisite: ATMO 505, Math 122, and EECS 138 or EECS 168.

ATMO 515 **Energy and Water Balance** (3)

A study of the distribution and circulation of water in the air-earth system as influenced by atmospheric processes and surface conditions. The solar and terrestrial radiation budget and the water balance at the earth's surface will be applied to agricultural and urban energy and water problems.

Prerequisite: ATMO 105 or EECS 138.

ATMO 521 **Microclimatology.** (3)

Same as GEOG 521

A study of climatic environments near the earth-atmosphere interface. The course considers rural climates in relationship to agriculture and urban climates as influenced by air pollution and other factors. Emphasis is on physical processes in the lower atmosphere, distribution of atmospheric variables, the surface energy budget and water balance.

Prerequisite: ATMO 105 and Math 106 or Math 121.

ATMO 525 **Air Pollution Meteorology** (3)

A study of background levels and concentrated sources of atmospheric pollution together with considerations of pollution buildup in urban areas as related to particular weather conditions. Inadvertent weather modifications and effects of atmospheric pollution on particular weather events and general climate will be discussed.

Prerequisite: ATMO 105, MATH 121, and EECS138.

ATMO 531 **Topics in Atmospheric Science:** _____ (1-3)

An investigation of special topics in atmospheric science. May include topics in dynamic, physical or synoptic meteorology or climatology as well as related topics in earth and physical sciences. May be repeated if topic differs.

ATMO 605 **Operational Forecasting** (2)

Students enhance their forecasting expertise by preparing forecasts for presentation to the public through a variety of media. Classroom activities include weekly map discussions and analysis of current weather situations. Forecasting topics such as forecast verification, aviation forecast products, severe weather, flash floods and watches and warnings are examined. Credit for ATMO 605, ATMO 606, and ATMO 607 is limited to a total of eight hours, six of which may be counted toward a degree in atmospheric science.

Prerequisites: ATMO 505.

ATMO 606 **Forecasting Practicum – Private Industry** (2)

Practical experience in private industry working with current and/or archived meteorological data. Possibilities include the preparation of forecasts for TV stations and meteorological consulting firms, and working with environmental consulting firms to assess air pollution hazards. May be repeated two times for credit. Credit for ATMO 605, 606, and 607 is limited to a total of eight hours, six of which may be counted toward a degree in Atmospheric Science.

Prerequisite: ATMO 605.

ATMO 607 Forecasting Intern – National Weather Service (2)

Practical experience working in a National Weather Service forecasting center in analyzing weather data and preparing weather forecasts. May be repeated two times for credit. Credit for ATMO 605, 606, and 607 is limited to a total of eight hours, six of which may be counted toward a degree in Atmospheric Science.

Prerequisite: ATMO 605.

ATMO 630 Synoptic Meteorology (3)

Interpretation, development, and analysis of synoptic charts.

Prerequisite: ATMO 505 and ATMO 640.

ATMO 634 Physical Climatology (3)

Atmospheric processes are described and discussed in relation to the climate of the earth's surface. Such topics as the greenhouse effect, ozone depletion, and the effect of solar irradiance on climatic change will be included. The physical processes and relationships between various climatic features will be studied.

Prerequisites: ATMO 505 and DSCI 301 or MATH 526.

ATMO 640 Dynamic Meteorology (3)

This course introduces the student to the fundamentals of fluid dynamics necessary for understanding large scale atmospheric motions. Fundamental physical laws of conservation of mass, momentum and energy are examined and applied to atmospheric flows. Rotation in the atmosphere is examined quantitatively in terms of both circulation and vorticity.

Prerequisite: MATH 223, PHSX 212, Prerequisite or corequisite of ATMO 505.

ATMO 642 Remote Sensing (3)

This course is designed to prepare students to effectively use remotely sensed data in operational or research settings for further work in this field. Topics include radiation and radiation transfer applied to active and remote sensing; radiative properties of space, sun, earth and atmosphere; instrument design considerations and operational characteristics; inversion methods for temperature or concentration profiling; surface temperature measurement; cloud top height determination; rain rate and wind velocity measurement; severe weather detection; satellite photograph interpretation.

Prerequisite: ATMO 680, MATH 581.

ATMO 650 Advanced Synoptic Meteorology (3)

Analysis and interpretation of synoptic weather charts including treatment of numerical weather forecasting.

Prerequisite: ATMO 630 and ATMO 660.

ATMO 660 Advanced Dynamic Meteorology (3)

Advanced study of the atmosphere including treatment of the vorticity equation.

Prerequisite: ATMO 630, ATMO 640, MATH 123, and PHSX 211.

ATMO 680 Physical Meteorology (3)

This course is designed to enhance the student's understanding of atmospheric processes through the study of these processes at molecular through micro scales. Topics include the properties and behavior of gases; transfer processes; phase change; solar and earth radiation; cloud drop, ice crystal and precipitation formation; atmospheric electricity; stratospheric chemistry.

Prerequisite: MATH 223, PHSX 212.

ATMO 690 Special Problems (1-3)

This course provides the student with an opportunity for independent work in meteorology beyond the content of the regularly-scheduled courses. Done under the guidance of a faculty member, the problem should be of mutual interest to the student and the faculty member; the nature of the work should be carefully discussed by both before enrollment.

Prerequisite: Nine credit hours in meteorology.

ATMO 697 Seminar for Seniors (1)

Current research in atmospheric science will be discussed. May be repeated for a total of two credit hours.

Prerequisite: Senior level in Atmospheric Science.

ATMO 699 Undergraduate Problems (2)

Prerequisite: Twelve credit hours in meteorology.

ATMO 710 Atmospheric Dynamics (3)

Presentation of contemporary approaches to the study of atmospheric dynamics. May include methodologies that provide insight into global, synoptic, mesoscale or microscale motions.

Prerequisite: ATMO 660 or equivalent.

ATMO 720 Atmospheric Modeling (3)

Illustration and application of contemporary approaches to mathematical and statistical description of atmospheric phenomena.

Prerequisite: MATH 122, ATMO 640, ATMO 680, and a course in statistics, or consent of instructor.

ATMO 727 Atmospheric Storms (3)

The physical processes and operating principles involved in the development and life cycles of extreme or unusual weather events including tornadoes, blizzards, lightning displays, and tropical storms.

Prerequisite: EECS 138, MATH 121, and ATMO 320.

ATMO 731 Advanced Topics in Atmospheric Science: _____ (1-3)

Advanced investigation of special topics in atmospheric science. May include topics in dynamic, physical or synoptic meteorology or climatology as well as related topics in earth and physical sciences. May be repeated if topic differs.

ATMO 750 Numerical Weather Prediction (3)

An exploration of the mathematical methods used to describe the current state of the atmosphere and to predict future states.

Current operational numerical weather prediction techniques will be included.

Prerequisite: ATMO 660.

Geography Courses

GEOG 100 World Regional Geography. (3)

An introductory survey of the environmental setting, historical formative periods, and present-day issues that distinguish the major culture areas of the world.

GEOG 101 World Regional Geography, Honors. (3)

An introductory survey of the environmental setting, historical formative periods, and present-day issues that distinguish the major culture areas of the world.

Prerequisite: Open only to students in the College Honors Program or by consent of instructor.

GEOG 102 Principles of Human Geography. (3)

An examination of the relationships between humans and their environments. The course introduces students to basic concepts in human geography relating to economic activities, landscapes, languages, migrations, nations, regions, and religions. Serves as the basis for further course work in cultural, economic, political, population, and urban geography.

GEOG 103 Principles of Human Geography, Honors. (3)

An introduction to how human societies organize space and modify the world about them. Resultant patterns on the landscape are interpreted through principles of space perception, cultural ecology, diffusion, land use, and location theory. Comparisons are made between urban and rural areas and between subsistence and commercial societies.

Prerequisite: Open only to students in the College Honors Program or by consent of instructor.

GEOG 104 Principles of Physical Geography. (3)

The components of the physical environment are discussed in order to familiarize the student with their distributions and

dynamic nature. Major topics include the atmosphere, landforms, soils and vegetation together with their interrelationships and their relevance to human activity. This course and Geography 105 together satisfy the laboratory science requirement.

GEOG 105 Introductory Laboratory in Physical Geography. (2)

A laboratory course designed to complement Geography 104 in satisfying the laboratory science requirement. It is required for geography majors. Laboratory exercises include a wide variety of analyses using data on the atmosphere, hydrosphere, biosphere and lithosphere. Prerequisite: GEOG 104 which may be taken concurrently.

GEOG 107 Principles of Physical Geography, Honors (3)

Interactive processes among the systems of the earth are studied and discussed. Major topics include vegetation, soils, landforms, water, the atmosphere, and cycles of matter between these portions of the earth. The course includes lectures and critical discussions to address study problems in physical geography.

Prerequisite: Open only to students in the College Honors Program or by consent of instructor.

GEOG 111 Maps and Mapping. (4)

How do people find their way to there or just around? Simple-- they use maps. Maybe not maps on pieces of paper but instead in their heads: mental maps. Different people have different maps, even of the same place. Mapping is an ancient form of communication that has created ideas and opinions, promoted understanding and confusion. A non-technical approach to the transformation of space onto maps, their content and structure, and to their role and impact in human activity, past and present. Neither background in geography nor artistic skills are required.

GEOG 148 Scientific Principles of Environmental Studies. (3)

Same as EVRN 148

This course presents an overview of our understanding of environmental processes and environmental issues. Topics include scientific principles, population and resource issues, pollution and global change, and land use and management. This course gives students a rigorous understanding of interactions between humans and their environment, and provides students with a scientific basis for making informed environmental decisions.

GEOG 149 Scientific Principles of Environmental Studies, Honors. (3)

Same as EVRN 149

This course presents an overview of our understanding of environmental processes and environmental issues. Topics include scientific principles, population and resource issues, pollution and global change, and land use and management. This course gives students a rigorous understanding of interactions between humans and their environment, and provides students with a scientific basis for making informed environmental decisions.

Prerequisite: Open only to students in the College Honors Program or by consent of instructor.

GEOG 150 Environment and Society. (3)

Same as EVRN 150

An introduction to geographic approaches to the study of the environment, emphasizing societal and cultural factors that influence human interaction with the biosphere, hydrosphere, lithosphere, and atmosphere. The course involves analysis of a broad range of contemporary environmental issues from the local to global scales.

GEOG 210 Computers, Maps and Geographic Analysis. (3)

This course will introduce students to a number of different methods for the visualization, representation and analysis of geographical phenomena. Both field and computer-based techniques will be employed to demonstrate the concept of experimental design and the collection, processing, and analysis of geographical data. Topics include: 1) the unique nature of

geographic data; 2) mapping techniques and technologies; 3) geographical information systems; 4) remote sensing (aerial photography and satellite imagery); and 5) methods of geographical analysis (e.g., statistic and spatial modeling).

GEOG 304 Environmental Conservation. (3)

Same as EVRN 304

A survey of current methods of describing and modeling the function, structure and productivity of natural and anthropogenically modified earth resource systems, along with a discussion of contemporary views of what constitutes a natural landscape. Fundamental natural science principles about the interplay among lithospheric, atmospheric, hydrospheric, and biospheric components of earth systems are emphasized. Uses of natural resources, including fossil fuels, minerals, and water are described with attention to the earth's total energy budget. Human activities that affect preservation, conservation, and multiple uses of earth regions receive attention. Systems under stress through population and other contemporary forces serve as examples.

GEOG 311 Map Conception and Development. (4)

An examination of the map production process with emphasis on two areas: the *mental map* formed during interaction with the environment, and the *map as a physical object*, which emerges from mapping activity. A local area will serve as the laboratory/environment for the mapping activity including production and use.

GEOG 316 Methods of Analyzing Geographical Data. (4)

Introduces the benefits and limitations of using quantitative methods to analyze geographical problems. Covers traditional descriptive (e.g., measures of central tendency) and inferential statistics (e.g., hypothesis testing), but also inherently geographical approaches such as shape and point pattern analysis, and spatial autocorrelation. Laboratory emphasizes using the computer to explore and analyze geographical problems.

GEOG 319 Topics in Techniques: _____ (1-3)

An investigation of special topics in Techniques. May include coursework in cartography, GIS, or remote sensing. May be repeated if topic differs.

GEOG 321 Climate and Climate Change. (3)

Same as ATMO 321

This course is designed to introduce students to the nature of the Earth's physical climate. It will introduce the basic scientific concepts underlying our understanding of our climate system. Particular emphasis will be placed on energy and water balances and their roles in evaluating climate change. The course will also evaluate the impact of climate on living organisms and the human environment. Finally, past climates will be discussed and potential future climate change and its impact on humans will be evaluated. *Prerequisite:* GEOG 104 or ATMO 105.

GEOG 331 Regional Geomorphology of the United States. (3)

This course examines forces and processes affecting the earth's surface, and furthermore identifies and describes the physiographic regions that are the result of these processes. Special efforts are made to explore various photographic resources, satellite imagery, and internet sources of geomorphic data from a regional perspective since there is no wholly satisfactory text available for the course. A research paper is required.

Prerequisite: An introductory earth science course or consent of the instructor.

GEOG 332 Glaciers and Landscape. (3)

Elements from glaciology, geology, and climatology are merged to examine the interactions between glaciers and their natural environments, including the processes involved in glacier formation, the relationship between glaciers and climate, the mechanisms of glacier flow, and interpretation of the Earth's glacial record. Emphasis is placed on an interdisciplinary approach to study environmental change and paleoclimate

reconstruction.

Prerequisite: GEOG 104, GEOL 101, or consent of instructor.

GEOG 335 Introduction to Soil Geography. (4)

This course focuses on the properties and processes of soils as they occur in their environment. The student is introduced to the nature of soil as it functions as a body; genesis of soils; properties of soil solids especially colloids; soil chemical composition, properties, and reactions; interaction between solid, liquid, and gaseous components in soils; plant-soil-water relationships; biological interactions with soil; classification of soils; and the distribution of soils on the landscape. Laboratory section is required.

Prerequisite: GEOG 104 or GEOL 101 or consent of instructor; BIOL 104 and CHEM 184 or CHEM 185 recommended.

GEOG 338 Introduction to River Systems. (3)

A course on fluvial geomorphology. Topics include the drainage basin, fluvial processes, river channel adjustment and forms, human disturbance and geomorphic response, and research methods in fluvial geomorphology. Field trip. *Prerequisite:* GEOG 104.

GEOG 339 Topics in Physical Geography: _____. (1-3)

An investigation of special topics in Physical Geography. May include coursework under headings of soils, vegetation, climate, or geomorphology. May be repeated if topic differs.

GEOG 350 Physical Geography of Africa. (3)

Same as AFS 350

This course is a survey of the basic physical features of the African continent including structure and relief, rivers and lakes, soils and mineral resources. It includes characteristics and processes of African climates, and the ecology of Africa's four major biomes: tropical rain forest, savanna, steppe, and desert. Climatic and environmental variations of the past, emergence of humankind, and development of pastoral and farming systems are discussed. Contemporary environmental concerns also include deforestation and desertification, the impacts of drought, methods for monitoring African environments, and Africa's prospects in a 21st century suffering from global warming.

GEOG 351 Africa's Human Geographies. (3)

Same as AAAS 351

An introduction to historical, cultural, social, political, and economic issues in Africa from a geographic perspective. The course begins with the historical geography of humanity in Africa, from ancient times through the present. Other topics include cultural dynamics, demography, health, rural development, urbanization, gender issues, and political geography. Case studies from Eastern and Southern Africa will be used to illustrate major themes.

GEOG 352 Economic Geography. (3)

This course offers an overview of contemporary economic geography with an underlying theme of uneven regional development. Topics examined include: the historical context in which capitalism emerged; the major theoretical approaches used to understand the temporal and spatial dynamics of capitalist society; a series of case studies of different economic sectors; and the global economy, including its development with respect to colonialism, neocolonialism, international trade, third world development, and population growth.

GEOG 357 History and Philosophy of Geographic Information Science (3)

An examination of the development of geographic information science (GISci) from its roots in traditional geography, cartography, and remote sensing to modern geographic information systems (GIS). GIS will be explored as a new scientific instrument, a "macroscope," for representing and analyzing complex earth processes, both physical and cultural. The societal benefits and risks of GIS will be demonstrated and discussed.

GEOG 358 Principles of Geographic Information Systems. (4)

An introduction to computer-based analysis of spatial data. Covers basic principles of collecting, storing, analyzing and displaying spatial data. Emphasis is on problem-solving activities using common spatial analytical techniques (e.g., map overlay). The student will gain extensive hands-on experience with state-of-the-art GIS software.

GEOG 370 Introduction to Cultural Geography. (3)

Charts some of the major lines of research in cultural geography, including critical theory, political economy, poststructuralist thought, feminism, and global consumption. Through fieldwork, diverse research methods are applied to issues such as community development, cultural patterns on the landscape and global impacts on local economies.

Prerequisite: GEOG 100, 101, 102 or 103; or consent of instructor.

GEOG 371 Environmental Geopolitics. (3)

This course is structured by a framework of geopolitics and critical geopolitics. We will engage with literature that demonstrates critical thinking about how human relationships with the biophysical world are portrayed and politicized. We will examine key contributions to the environmental security, resource conflicts, and related literatures. We will discuss how and why the environment is featured in debates about security and conflict as well as geopolitical assumptions on which these debates build. Learning objectives for this course include: 1) develop and apply, in writing and in discussion, critical thinking skills with particular attention to geopolitical interests, 2) develop and demonstrate an understanding of key debates about environment and security, resource conflicts, and the construction of environmental fears, 3) develop and demonstrate an ability to identify and discuss how themes in the course are evident in mainstream media and public debate.

GEOG 375 Intermediate human Geography. (3)

An examination of processes of cultural-economic interaction and patterns of human activity on a global scale. The topics cover the whole spectrum of human geography, with focus on urban-economic development, innovation and diffusion, and trade. Each week the third hour will be devoted to discussion of topics dealt with in lectures presented during the first two hours.

Prerequisite: Introductory course in Geography or consent of the instructor.

GEOG 377 Urban Geography. (3)

This course explores the city from the multiple perspectives of its inhabitants. The cultural viewpoints of place, gender, age, and ethnicity are stressed, but traditional economic topics such as urban hierarchy, functions of the city, suburbanization, and ongoing changes in core and peripheral areas also receive attention. The distinctive landscapes of individual North American cities are emphasized, but examples also are drawn from throughout the world.

GEOG 379 Topics in Cultural Geography: _____. (1-3)

An investigation of special topics in Cultural Geography. May include coursework under headings of culture theory, material culture, language, foodways, or religion. May be repeated if topic differs.

GEOG 390 Geography of the United States and Canada. (3)

Same as AM S 390

A study of the different physical, economic, and cultural settings in the United States and Canada which form the basis for the various forms of livelihood. Emphasis is on the United States. *Prerequisite:* An Introductory geography course or background in United States or Canadian history, social science, or culture or consent of the instructor.

GEOG 395 Environmental Issues of: _____. (3)

This regional geography course examines contemporary environmental issues of a particular region of the world based on the expertise of the professor. Course emphasis is on the

interaction of natural, socio-economic, and cultural factors of development that give rise to environmental problems. Students learn how local, national, and international government and non-governmental stakeholders address environmental problems. Course may be repeated with different professors.

GEOG 396 China's Geographies. (3)

An appreciation of how China and the Chinese way of life has evolved. Confucianism, Buddhism, Taoism, and communism are examined as the bases of Chinese culture values. These values are then set against a highly varied physical and economic landscape to show how an elaborate and complex society has come into being. Contemporary developments are discussed only as a part of the entire spectrum of Chinese history.

GEOG 397 Geography of Kansas and the Plains. (3)

A study of the different physical, economic, and cultural settings in Kansas and the Plains that form the basis for various kinds of livelihood.

GEOG 399 Topics in Regional Geography: _____. (1-3)

An investigation of special topics in Regional Studies. May include coursework related to a specific country or region. May be repeated if topic differs.

GEOG 410 Human Biogeography, Honors (3) N

Same as BIOL 410

Natural science principles of evolution and earth change are used to examine distributions of the populations, economies, and resource uses of humans. Lecture and discussion.

Prerequisites: BIOL 152 or 153 or GEOG 107 and membership in the University Honors Program, or consent of the instructor.

GEOG 418 Workshop in Production Cartography. (1-3)

Theory and practice of map production and other related graphics using the latest graphic and GIS software. Projects vary but include the processes of design and production, editing and quality control, and a final printed or operational product. Involves a weekly consultation session and laboratory time in KU Cartographic & GIS Services.

Prerequisite: Completion of GEOG 311 with a grade of B or better and consent of instructor.

GEOG 433 Biogeography Field and Laboratory Techniques (3)

Same as EVRN 433

This course provides undergraduate students with practical experience in field data collection techniques and laboratory data analysis methods. During the first half of the semester, students will work in the field using a variety of methods to measure such vegetation characteristics as: cover, density, biomass, leaf area, and canopy architecture. Students will gain experience in the use of field instruments including a spectroradiometer, and techniques for quantifying vegetation biophysical attributes. During the later part of the course, students will learn to summarize their field data and examine relationships between the vegetation attributes and measurements made using remote sensing instruments.

Recommended: Geog 316 or an introductory statistics equivalent.

GEOG 458 Geographical Information Systems: _____. (1-6)

An introduction to the organization and components of geographic information systems and their software. Fundamental concepts and their implementation with applications to physical and human systems.

GEOG 490 Geographic Internship. (1-6)

Supervised practical experience. The student submits a proposal describing the internship prior to enrollment. Upon acceptance, regularly scheduled meetings with the advisor provide assistance, guidance and evaluation of progress in the professional experience. A written summary of the experience or outcomes of the research project are prepared independently by the student, a representative of the host agency, and the advisor. Total credit not to exceed six hours (typically 80 work hours equate to one academic credit hour)

Prerequisite: 15 hours of geography and permission of

instructor.

GEOG 498 Special Topics in Geography. (1-5)

Prerequisite: 15 hours of geography.

GEOG 499 Honors Course in Geography. (2-3)

Open to students with nine hours of upperclass credit in geography, an average of at least 3.5 in all geography courses and a general average of at least 3.25. Includes the preparation of an honors paper and its defense before a committee of at least 2 regular members.

GEOG 510 Human Factors. (4)

Same as INDD 510

An introduction to the concepts and theories underlying the study of human-technological systems. Human-machine interfaces and system properties, and the environment are considered. Lecture-discussion sessions are supplemented by computer-supported laboratory and research activities.

GEOG 511 Intermediate Cartography: _____ (Selected topic to be specified). (1-6)

An investigation of special topics in cartography. Can be repeated for different topics.

Prerequisite: A course in cartography and consent of the instructor.

GEOG 513 Cartographic Design. (3)

A study of graphic elements and their role in the physical and perceptual structure of the map image. Concepts and principles of design are stressed with particular emphasis on the figure-ground relationships, color and lettering.

Prerequisite: GEOG 311.

GEOG 514 Visualizing Spatial Data. (4)

Students use Visual Basic or other currently prominent programming language to visualize spatial data. Early projects cover basic principles such as color manipulation and spatial transformations. Later projects involve developing more sophisticated software for data presentation, data exploration, and map animation.

Prerequisite: Some experience with Visual Basic or other programming language.

GEOG 515 Behavioral Systems. (3)

An introductory course in behavioral geography. Examines the development of spatial cognitions (acquisition, organization and use of environmental knowledge), and spatial patterns of behavior based on those cognitions at scales ranging from personal space to world views.

GEOG 516 Applied multivariate Analysis in Geography. (3)

An introduction to the application of multivariate statistical analysis in geography. Techniques covered include univariate and multivariate analysis of variance, multiple regression, logistic regression, principle components analysis, and spatial regression.

Practical applications of the techniques in a geographical research context are emphasized. Students will learn how to use statistical packages such as SPSS. *Prerequisite:* GEOG 316 or equivalent.

GEOG 517 Data Handling and Map Symbolization. (3)

An analysis of methods for manipulating and symbolizing spatial data. Techniques studied include dot, choropleth, proportional symbol, and isarithmic (contour) mapping. Topics covered include data classification, and the use of color, and automated methods of interpolation (triangulation, inverse distance, and kriging). Emphasis is on developing maps that can be presented to the general public, although some consideration is given to visualization software that can be utilized by individuals to explore spatial data.

Prerequisite: GEOG 111 or GEOG 210 or GEOG 311.

GEOG 519 History of Cartography. (3)

Same as HIST 546

A history of mapmaking worldwide from its origins to the present day; emphasis on maps as historical records of evolving civilizations and cultural landscapes; methods of studying early maps.

GEOG 521 Microclimatology. (3)

Same as ATMO 521

A study of climatic environments near the earth-atmosphere interface. Consideration of rural climates in relation to agriculture and urban climates as influenced by air pollution and other factors. Emphasis is on physical processes in the lower atmosphere, distribution of atmospheric variables, the surface energy budget and water balance.

Prerequisite: ATMO 105 and Math 106 or Math 121.

GEOG 526 Remote Sensing of Environment I. (4)

Same as EVRN 526

Introduction to study of the environment through air photos and satellite imagery, including principles of remote sensing, interactions of electromagnetic energy with the atmosphere and earth's surface, aerial photography, satellite systems, and sensors (electro-optical, thermal, and radar). Emphasis in the latter part of the course is on such applications as global monitoring, land cover mapping, forestry, agriculture, and oceanography. Laboratory emphasizes visual interpretation of aerial photography and satellite imagery and an introduction to digital image processing in the department's NASA Earth Science Remote Sensing Laboratory.

Prerequisite: basic algebra. GEOG 358 recommended.

GEOG 531 Topics in Physical Geography: _____. (1-3)

An investigation of special topics in physical geography. May include specific coursework under the headings of geomorphology, climatology, soils, vegetation, quaternary, paleoenvironments, hydrology, etc. May be repeated if topic differs.

GEOG 532 Geoarchaeology. (3)

Same as ANTH 517

Application of the concepts and methods of the geosciences to interpretation of the archaeological record. The course will focus primarily on the field aspects of geoarchaeology (e.g., stratigraphy, site formational processes, and landscape reconstruction), and to a lesser extent on the array of laboratory approaches available.

Prerequisite: GEOG 104, ANTH 110, or 310.

GEOG 535 Soil Geography. (4)

A broad study of the principles and properties of soils and their distribution on the landscape. Topics covered include: pedology, clay mineralogy, soil physics, soil chemistry, management of soils, soil biology, taxonomy, and soil geomorphology.

Laboratory section and a field project are required. Not open to students who have taken GEOG 335.

Prerequisite: GEOG 104 or GEOL 101 or consent of the instructor; BIOL 104 and CHEM 184 or 185 recommended.

GEOG 536 Landscape Ecology. (3) N

Landscape ecology is the study of spatial variation in landscapes at a variety of scales. It includes the biophysical and societal causes and consequences of landscape heterogeneity, linking natural sciences with related human disciplines. Its core themes address the spatial pattern of landscapes; relationships between pattern and process in landscapes; relationships between human activity and landscape pattern, process and change; and the effect of disturbances on the landscape. *Prerequisite:* GEOG 104 or GEOG 148 or EVRN 148, or consent of instructor.

GEOG 537 Elements of Plant Geography. (3)

An introduction to spatial and temporal variation in natural plant populations and communities. Included is an introduction to methods of analysis and an overview of structure and process in the earth's major biomes.

Prerequisite: GEOG 331, or an introductory biology/botany course and GEOG 104; or consent of instructor.

GEOG 538 Environmental Soil Physics and Chemistry. (4)

This course examines the physical and chemical properties of soils and methods of evaluation. Physical topics include the movement of water, heat, gases, and solutes through soil. Chemistry topics include solid and solution speciation, mineral solubility, ion exchange, and oxidation-reduction reactions in soils.

Prerequisites: GEOG 335 or 535, CHEM 188 or 189, MATH 121, PHSX 114, or consent of the instructor.

GEOG 541 Geomorphology. (4)

Same as GEOL 541

A critical study of landforms in relation to tectonics, climatic environment, and geologic processes. The use of geomorphic methods in the interpretation of Cenozoic history is emphasized. Laboratory exercises in analysis of field observations, maps, and photographs. Required field trip and fee.

Prerequisite: GEOL 101 or GEOG 104 or 304.

GEOG 550 Environmental Issues in Africa. (3)

Same as AFS 551

Acquaints students with the complexities of debates on environmental problems in Sub-Saharan Africa. Topics addressed may include deforestation, desert expansion, wildlife conservation, soil erosion, climate change, coral reef destruction, water resources development, mangrove preservation, and the environmental effects of war, industrialization, and urbanization. Class presentations and projects synthesize the perspectives of both human and physical geography.

Prerequisite: GEOG 104 or permission of the instructor.

GEOG 551 Intermediate Economic Geography. (3)

A lecture course dealing with the principles of location theory, resource utilization and regional specialization of economic activities. Economic concepts, such as rent payment for agricultural and mineral resources, scale and agglomeration economies, etc., are applied to various physical, demographic and cultural settings of major world regions. Special emphasis is placed on the basic principles of and recent changes in patterns of world trade, international investment, and economic development. *Prerequisite:* GEOG 375 or introductory economics or consent of instructor.

GEOG 552 Topics in Urban/Economic Geography: _____

(Selected topic to be specified). (1-3)

An investigation of special topics in urban/economic geography. May include specific coursework under the headings of energy, economic development, international trade, environmental perception, housing, transportation, and migration. May be repeated if topic differs.

GEOG 553 Geography of African Development. (3)

Same as AFS 553

Acquaints students with the values and social parameters of African agricultural and pastoral practice. Topics include customary land rights, African perspectives on the natural world, gender issues in African agriculture, and the urbanization of African cultures. The course also contrasts African views with those of Western development practitioners and donor agencies. Case studies from different countries are used to highlight the continent's regional differences.

GEOG 556 Geography of the Energy Crisis. (3)

A discussion and analysis of the basic facts and causes of energy problems on a national and world scale. Examines current production, consumption, efficiency, reserves, conservation and other energy policy options, including adjustments that will affect consumer use, national politics and strategic issues.

Prerequisites: GEOG 102 or 375.

GEOG 557 Cities and Development. (3)

Same as AAAS 557

An intermediate level course in urban geography, with an emphasis on cities in the developing world. Example cities in

Latin America and the Caribbean, Sub-Saharan Africa, the Middle East, South Asia, and/or Southeast Asia may be examined. The main focus is on the intersection between urbanization and economic development, but social, political, and cultural aspects of development in cities are considered. Other topics include the geographical impacts of European colonialism, urbanization and industrialization, rural-to-urban migration, urban structure and spatial dynamics, urban planning and environmental sustainability.

GEOG 558 Intermediate Geographical Information Systems (4)

An intermediate level course in geographic information science designed for advanced undergraduate and graduate level students who already have an introductory understanding of GIS. Emphasis will be placed on the application of spatial analytical techniques to geographical problem-solving. Topics include spatial data structures, interpolation techniques, terrain analysis, cost surfaces and database management techniques. Students will apply knowledge gained in lecture and reading to natural resource, urban, and scientific applications using state-of-the-art GIS software.

Prerequisite: GEOG 358 or consent of instructor.

GEOG 560 GIS Application Programming. (3)

This course teaches programming within Geographic Information Systems. Students will learn how to customize GIS applications to automate data processing and spatial analysis through programming languages. GIS programming concepts and methods will be introduced from the aspects of spatial data management and analysis covering both vector and raster data models.

Prerequisite: GEOG 558 and a course in programming languages.

GEOG 570 Geography of American Indians. (3)

A survey of the culture and history of selected indigenous peoples of the Americas. Emphasis is placed on the environmental setting, the settlement and subsistence patterns, and the impact of European colonization. Discussion includes present-day ethnic and resource issues.

GEOG 571 Topics in Cultural Geography: _____ (1-3)

An investigation of special topics in cultural geography. May include specific coursework under the headings of cultural theory and methodology, material culture, foodways, religion, and similar topics. May be repeated if topic differs.

GEOG 572 Political Geography. (3)

Acquaints students with the theories and methods of political geography. Topics include geographical studies of: states, nations, and nationalism; territories and territoriality; geopolitics; and elections. Case studies from various regions of the world to be included, with an emphasis on the developing world.

Prerequisite: GEOG 102 or consent of instructor.

GEOG 573 Advanced Geographic Analysis. (3)

A course designed to teach students how to define, gather, process, evaluate and present geographic research. Its emphasis is field work and original data gathering versus library research.

Prerequisite: previous coursework in geography and/or consent of the instructor.

GEOG 575 Geography of Population. (3)

Describes and analyzes the distribution of human populations and spatial relations among and within varying types of settlements.

Prerequisite: GEOG 102 or 375.

GEOG 576 Cultural Geography of the United States. (3)

Same as AMS 576

Distributions of major culture elements including folk architecture, religion, dialect, foodways, and political behavior are systematically studied from a predominately historical perspective. These discussions are followed by a survey of the major culture regions in America.

Prerequisites: Although not absolutely necessary, familiarity

with concepts treated in any of the following courses would be helpful: AMS 100, 110, ANTH 108, 308, GEOG 102, 390.

GEOG 579 Geography of American Foodways. (3)

Same as AMS 579

An interdisciplinary approach to food that explores the diversity of eating habits across the United States and the role of food as an indicator of cultural identity and change. Current regional and ethnic food consumption patterns are stressed. Topics include multi-culturalism and regional identity, the symbiotic relationship between restaurant food and home cooking, the recent interest in farmers' markets and organic foods, and the importance of the food industry and the popular press in setting trends.

GEOG 591 Geography of Latin America. (3)

A study of the different physical, economic, and cultural settings in Latin America which form the basis for the various forms of livelihood.

GEOG 592 Middle American Geography. (3)

This regional study of the natural environments and cultural-historical backgrounds of Mexico. Central America, and the Caribbean details the physical and historical processes that have shaped the cultural landscape.

GEOG 593 Central American Peoples and Lands. (3)

This is a study of the natural and cultural history of the region's lands and peoples that focuses on the cultural geography of the surviving indigenous populations, including their culture area, culture history, cultural landscape, and cultural ecology.

GEOG 594 Geography of the Former Soviet Union. (3)

An analysis of the spatial organization of the successor states to the USSR. A study of the diverse human and natural resources, demographic, cultural and economic conditions.

Prerequisite: An introductory geography course or background in Russian-East European history, social science, or culture or consent of instructor.

GEOG 595 Geography of Eastern Europe. (3)

A study of nations and regions of Eastern Europe, excluding Russia. *Prerequisite:* An introductory geography course or background in Slavic-East European history, social science, or culture or consent of the instructor.

GEOG 596 Geography of China. (3)

A detailed description and analysis of geographic patterns in both historic and modern China.

Prerequisite: An introductory geography course or background in Chinese history, social science, or culture or consent of the instructor.

GEOG 597 Geography of Brazil. (3)

Study of geographic factors, physical and cultural, that are basic to understanding the historical development of Portuguese South America and the contemporary and cultural geography of Brazil. Course also includes a survey of Brazil's South American neighbors.

GEOG 601 Indigenous Peoples of the World. (3)

Same as GINS 601

A survey of the native peoples of the world at the time of contact with Europeans. Includes an overview of various Indigenous cultures. A few detailed studies of selected groups are used to explore environmental settings, settlements and subsistence patterns, and the world view of the Western Hemisphere's Indigenous societies.

Prerequisite: Permission of Instructor.

GEOG 657 Geographic Models. (3)

Examination of several methodologies and specific techniques from geographical and operations research having proven applicability to public facility location decisions. The course emphasizes "hands-on" student experience with canned computer programs and real world problems.

Prerequisite: An introductory course in urban planning or transportation geography or urban geography or consent of the instructor.

GEOG 658 Topics in Geographic Information Science: _____ (1-6)

An investigation of special topics in geographic information science. May include specific coursework under the headings of methodology, basic research, thematic or regional applications, geographic information systems (GIS), Global Positioning System (GPS), and geostatistics. May be repeated if topic differs.

Prerequisite: Vary by topic.

GEOG 670 Cultural Ecology. (3)

Same as ANTH 695

Investigation of the interrelations between socio-cultural systems and the natural environment, including a survey of major theories and descriptive studies.

Prerequisite: An introductory course in Geography or Anthropology.

GEOG 710 Information Design. (3)

Concepts and principles for the organization of verbal, numerical and graphic/spatial data and their application to the production of information displays and instruments. Examination of the evolution of the information design process from the traditional (communication system) perspective to interactive user-centered design approaches. The nature of human information processing in handling information for both visualization and analysis, with particular emphasis on decision-making and usability.

Prerequisites: GEOG 510, INDD 510, PSYC 318, PSYC 685 or equivalent, or consent of the instructor.

GEOG 711 Advanced Cartography: _____ (3)

An investigation of special topics in cartography. Can be repeated for different topics.

Prerequisite: Consent of the instructor.

GEOG 713 Practicum in Cartography. (1-6)

Experience in the organization and presentation of cartographic material in lecture, discussion and laboratory formats. May be repeated to a total of six credits.

Prerequisite: Consent of the instructor.

GEOG 714 Field Experience. (3)

Working in a new environment presents problems unlike those encountered in a classroom situation. Data collection techniques and exercises discussed in this off-campus course are intended to provide experience in dealing with an unfamiliar situation. Course location is dictated by the interests and composition of the student group; offered in the first three weeks of August. Geography majors are encouraged to attend. This course is required for graduate students. Fee required.

Prerequisites: Junior-Senior standing and 15 hours of geography or instructor's consent.

GEOG 716 Advanced Geostatistics. (3)

An introduction to the practical application of advanced geospatial statistical techniques. Potential topics include: spatial regression, interpolation, clustering and advanced non-parametric statistics. Knowledge of a statistical package and GIS is assumed.

Prerequisite: GEOG 516 or equivalent and GEOG 358 or equivalent.

GEOG 719 Development of Geographic Thought. (2-3)

Critical analysis of the growth of geographic thought from antiquity to the present: Emphasis is on the structure of modern geography.

Prerequisite: 20 hours of geography, or consent of the instructor.

GEOG 726 Remote Sensing of Environment II. (4)

An overview of techniques for computer analysis of digital data

from earth orbiting satellites for environmental applications. Topics covered include: data formats, image enhancements and analysis, classification, thematic mapping, and environmental change detection. The laboratory exercises provide hands-on experience in computer digital image processing in the department's NASA Earth Science Remote Sensing Laboratory.

Prerequisite: Introductory statistics and GEOG 526 or equivalent.

GEOG 731 Topics in Physical Geography: _____ (1-3)

An investigation of special topics in physical geography. May include specific coursework under the headings of geomorphology, climatology, soils, vegetation, quaternary, paleoenvironments, hydrology, etc. May be repeated if topic differs.

GEOG 733 Advanced Biogeography Field and Laboratory Techniques. (3)

This course provides graduate students with practical experience in field data collection techniques and laboratory data analysis methods. During the first half of the semester, students will work in the field using a variety of methods to measure such vegetation characteristics as: cover, density, biomass, leaf area, and canopy architecture. Students will gain experience in the use of field instruments including a spectroradiometer, and techniques for quantifying vegetation biophysical attributes. The laboratory analyses component will include: data summary, data entry, correlation, regression, MANOVA, cluster analysis, and data display and reporting.

Prerequisites: GEOG 516 or multivariate statistics equivalent recommended.

GEOG 735 Soil Geomorphology. (3)

Examines the interaction of pedogenic and geomorphic processes during the Quaternary with an emphasis on strategies and methodologies employed in soil-geomorphic studies. Group research projects incorporating field data collection and analyses are required.

Prerequisite: GEOG 335 or 535 or consent of the instructor.

GEOG 741 Advanced Geomorphology. (1-3)

Same as GEOL 741

Detailed discussions of processes and landforms characteristic of specific environments. Considered during separate semesters will be general methodology, and fluvial, arid regions, glacial, and shoreline geomorphology. Course may be taken more than once.

Prerequisite: GEOG 541.

GEOG 749 Topics in Stable Isotopes in the Natural Sciences (2-3)

Same as BIOL 749

Isotopic compositions of substances provide powerful insights into many topics in the natural sciences. Applications of isotopic analyses of carbon, hydrogen, oxygen, and nitrogen to selected research topics such as plant resource use, food web analysis, paleoecology, paleodiet reconstruction, hydrology, and soils genesis will be examined.

Prerequisite: Knowledge of isotope chemistry is not required. (Concepts necessary to understand pertinent articles will be taught during the first class meetings.) May be repeated.

GEOG 751 Analysis of Regional Development. (3)

An analytical approach to spatial organization of economic activities and aspects of growth and development. An emphasis is given to location theory and the geography of trade and migration. A research paper is required.

Prerequisite: GEOG 551, or a course in economics, or consent of the instructor.

GEOG 752 Topics in Urban/Economic Geography: _____

(Selected topic to be specified). (1-3)

An investigation of special topics in urban/economic geography. May include specific coursework under the headings of energy, economic development, international trade, environmental perception, housing, transportation, and migration. May be repeated if topic differs.

GEOG 756 Energy Problems and the Economic-Physical Environment. (2-3)

This course investigates the economic, social, political, and environmental conditions of energy production, transport and use: total energy consumption and mix, relations to the level and structure of the economy, substitutability of fuel and energy sources, resource endowment in an international setting.

Prerequisite: GEOG 551, or a course in economics, or consent of the instructor.

GEOG 758 Geographic Information Science. (4)

This course integrates topics in geographical information science (GISci) with spatial analytical techniques to solve spatial problems. Focuses on the most current research in GISci and its relevance to the environmental sciences, natural resource management, and spatial decision-making. Students are expected to apply the concepts and techniques learned in this class to their own research projects.

Prerequisites: GEOG 558 and GEOG 316, or consent of instructor.

GEOG 771 Topics in Cultural Geography : _____. (1-3)

An investigation of special topics in cultural geography. May include specific course methodology, material culture, foodways, religion, and similar topics. May be repeated if topic differs.

GEOG 772 Problems in Political Geography. (3)

Case studies of regional and national power settings with particular emphasis upon the geographical analysis of political developments in unstable areas of the world.

Prerequisites: GEOG 102 or GEOG 375.

GEOG 773 Humanistic Geography. (3)

A discussion and project-oriented course focused on ways of studying the character and meaning of places. Concepts examined include place image and image makers, landscapes as text, sense of place, vernacular regions, and alternate representations of space. *Prerequisite:* Graduate standing or fifteen hours of geography or consent of instructor.

GEOG 775 Proseminar in Population Geography. (3)

Evaluation of problem formulation, data gathering, research methods and substantive knowledge in the geography of human populations. Concurrent auditing of GEOG 575 plus an additional meeting each week is required.

Prerequisites: GEOG 575 and 516, and SOC 514.

GEOG 790 North American Regions: _____ (Selected areas to be specified). (3)

A detailed description and analysis of selected regions of North America.

Prerequisite: An introductory geography course or background in United States or Canadian history, social science, or culture or consent of the instructor.

GEOG 791 Latin American Regions: _____. (3)

A description and analysis of the principal sources of geographic information pertaining to portions or all of Latin America.

Prerequisite: GEOG 591, or concurrent auditing of 591, or consent of the instructor.

GEOG 794 Regions of the former USSR. (3)

A description and analysis of geographic data pertaining to the successor states of the USSR.

Prerequisite: Fifteen hours of Geography courses or background in Russian, East European or Middle East studies, or consent of the instructor.

GEOG 795 European Regions: _____. (3)

Prerequisite: Fifteen hours in Geography, background in specified region, or consent of instructor.

GEOG 796 Asian Regions: _____. (2-3)

Prerequisite: Fifteen hours in Geography, background in Asia, or consent of instructor.

