Welcome to the Geography Department

Undergraduate Guide

Information on the Department, and majors in Geography and Atmospheric Science

---

**Geography Information**

- Undergraduate degrees ........................................ Page 3
- Honors ................................................................. Page 5
- Minor degrees offered ........................................ Page 5
- Geography course classification .......................... Page 12
- Degree requirements and worksheets
  - Bachelor of Arts ................................................. Page 13
  - Bachelor of General Studies ............................... Page 14
  - Bachelor of Science: Physical Geography option .... Page 15
  - Bachelor of Science: Geographic Information Analysis option Page 16

**Atmospheric Science Information**

- Undergraduate degree ........................................... Page 4
- Honors ................................................................. Page 5
- Minor degree offered ........................................ Page 5
- Degree requirements and worksheets
  - Bachelor of Science: General Meteorology option .. Page 17
  - Bachelor of Science General Meteorology option with Minor in Mathematics Page 18
  - Bachelor of Science: Air Pollution option .......... Page 19
  - Bachelor of Science: Hydrometeorology option .... Page 20
  - Bachelor of Science: News Media Forecasting option Page 21

---

**Contact Information**

Department of Geography
1475 Jayhawk Blvd.
213 Lindley Hall
University of Kansas
Lawrence, KS 66045

Telephone: (785) 864 5143
Fax: (785) 864 5378
Email: geog@ku.edu
Web: www.geog.ku.edu
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. In addition to the KU Core Requirements, students need to meet a number of requirements set by the College of Liberal Arts and Sciences. Students are required to complete 6 credits of Writing, 3 credits of Quantitative Reasoning, Lab or Field Experience (variable credit) as well as obtaining 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. In addition to the KU Core, the B.G.S. degree requires a secondary field of academic study (a second major or minor). Another difference from the B.A. is that this degree has no foreign language requirement. 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. HYDROMETEOREOLOGY 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 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. Students have 24-hour access to departmental computing facilities. Lindley 310 contains twenty-three Dell Optiplex dual core systems installed with the Windows 7 enterprise operating system. Lindley 405, the Atmospheric Science program Meteorology and Climate Hub (MACH) contains two Dell Optiplex dual core systems installed with the Windows 7 enterprise operating system and ten quad core systems installed with RedHat Linux. Within Lindley 310, one system is a dedicated instructional workstation connected to the room’s LCD projector while twenty-two systems are for general GIS and image-processing instruction with accessibility to large format scanners, color and black and white printers. The ten RedHat LINUX Dell quad core computers in the MACH lab are running meteorological software packages such as Integrated Data Viewer, GEMPAK and Meldas. The two Windows systems available in the MACH lab are to assist student weather forecasting and prepare for university radio and television student weather reports. Black and white and color printers are also available in the MACH lab.

Other instructional classrooms for practicums in Atmospheric Science and Geography have dedicated Dell Optiplex or Dell Latitude systems installed with Windows 7 enterprise to compliment the document viewers and LCD projectors installed in the classrooms.

All Windows computers in the department labs are equipped with Office 2010, SPSS 18, ArcGIS 10, Imagine 2010, and ENVI 4.7x. Other supporting software within the labs may include Photoshop, Illustrator, and Freehand. Departmental computing facilities are complimented by various university-sponsored labs around campus and cooperative arrangements with other academic departments: Environmental Studies, the Kansas Applied Remote Sensing program of the Kansas Geological Survey, and the Kansas Geological Survey.

In addition to computing facilities, the department has well-equipped laboratories for students working in traditional cartographic production, soils/geomorphology, palynology, and climatology/atmospheric science. The department has easy access to extensive map collections at the Spencer Research Library and the university map library.

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, 417 Lindley; David Braaten, 413C Lindley; Nathaniel Brunsell, 214A Lindley; David Mechem, 230 Lindley; David Rahn, 201 Lindley, or Justin Stachnik, 214 Lindley.

GIS AND CARTOGRAPHY: Xingong Li, 404 Lindley; Stephen Egbert, 217C Lindley; or Ting Lei, 207 Lindley.

HUMAN AND CULTURAL GEOGRAPHY: Pete Shortridge, 209 Lindley; Chris Brown, 223 Lindley; Peter Herlihy, 202 Lindley; Shannon O’Lear, 219B Lindley; So-Min Cheong, 221 Lindley; Barney Warf, 219C Lindley; Jay Johnson, 402 Lindley; Alexander Diener, 413A Lindley; or Abel Chikanda, 204 Lindley.

PHYSICAL AND ENVIRONMENTAL GEOGRAPHY: William Johnson, 419 Lindley; Dan Hirmas, 415A Lindley; Pamela Sullivan, 420 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; Pete Shortridge, 209 Lindley; Shannon O’Lear, 219B Lindley; Jay Johnson, 402 Lindley; Alexander Diener, 413A Lindley; or Abel Chikanda 204 Lindley.

REMOTE SENSING: Stephen Egbert, 217C 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 *.

<table>
<thead>
<tr>
<th>Research and Technical</th>
<th>Education and Government</th>
<th>Communications</th>
<th>Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Archaeologist</td>
<td>*Public administrator</td>
<td>Editor</td>
<td>*Attorney</td>
</tr>
<tr>
<td>*Cartographer</td>
<td>Bicultural program</td>
<td>Technical writer</td>
<td>Environmental impact</td>
</tr>
<tr>
<td>*Computer simulation model designer</td>
<td>specialist</td>
<td>International agency representative</td>
<td>assessment researcher</td>
</tr>
<tr>
<td>Demographer</td>
<td>Museum education director</td>
<td>interpreter</td>
<td>Travel agent/guide</td>
</tr>
<tr>
<td>Marketing researcher</td>
<td>Congressional committee</td>
<td>National/state park</td>
<td>Human resources manager</td>
</tr>
<tr>
<td>*Climatologist</td>
<td>staff director</td>
<td>interpreter</td>
<td>Marketing manager</td>
</tr>
<tr>
<td>*Paleontologist</td>
<td>Teacher</td>
<td>Journalist/travel writer</td>
<td>Advertising account executive</td>
</tr>
<tr>
<td>*Soil scientist</td>
<td>State/federal government</td>
<td>Market analyst</td>
<td>Executive search consultant</td>
</tr>
<tr>
<td>*Geologist</td>
<td>policy analyst</td>
<td>Pastor</td>
<td>Salesperson</td>
</tr>
<tr>
<td>*Seismologist</td>
<td>Urban/regional planner</td>
<td>Statistician</td>
<td>*Environmental</td>
</tr>
<tr>
<td>Land-use planner</td>
<td>*College administrator</td>
<td>*Therapist: group or recreation</td>
<td>scientist/engineer</td>
</tr>
<tr>
<td>*Civic engineer</td>
<td>*Social worker</td>
<td>Vocational guidance assistant</td>
<td>Navigation equipment</td>
</tr>
<tr>
<td>*Aquarist</td>
<td>Foreign service officer</td>
<td></td>
<td>specialist</td>
</tr>
<tr>
<td>*Petroleum engineer</td>
<td>Military officer</td>
<td></td>
<td>Airline pilot</td>
</tr>
<tr>
<td>*Meteorologist</td>
<td>Restoration carpenter</td>
<td></td>
<td>Farmer</td>
</tr>
<tr>
<td>*Botanist</td>
<td>Wildlife biologist</td>
<td></td>
<td>Real estate developer</td>
</tr>
<tr>
<td>*Systems engineer</td>
<td>Transportation planner</td>
<td></td>
<td>Banker/trust officer</td>
</tr>
<tr>
<td>*Manufacturing engineer</td>
<td>Community development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geographer</td>
<td>analyst</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funeral director</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Medical assistant</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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
2016-17

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

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

So-Min Cheong (Associate Professor): Economic, sustainable resources, East Asia. Research on integration of science and policy.

Abel Chikanda (Assistant Professor): Migration and development, food security and informal economy, Africa. Research on migration and food security in Africa.

Alexander C. Diener (Associate Professor): Political and cultural geography, social and geographic theory, nationalism/transnationalism, border studies, mobilities and immobilities, critical geopolitics, urban landscape change, Central Eurasia, Mongolia.


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

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


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

Ting Lei (Assistant Professor): GIS, remote sensing, transportation. Research on spatial analysis and sustainable development.

Xingong Li (Associate Professor): Geographic information science, spatial analysis. Research on computational methods of analysis of spatial data.

David B. Mecham (Associate Professor): Physical meteorology, cloud and mesoscale dynamics. Research on cloud microphysics and dynamics, mesoscale processes, numerical modeling, and boundary layer clouds.

Shannon R. O’Lear (Professor): Cultural and political geography, environmental policy, Russia, the Caucasus and Central Asia. Research on resource conflict in Azerbaijan.
David A. Rahn (Assistant Professor): Atmospheric science, mesoscale and synoptic meteorology. Research on coastal low-level jets, coastally trapped wind reversals, and the marine atmospheric boundary layer.

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

Justin P. Stachnik (Assistant Professor): Tropical meteorology, mesoscale precipitating systems, radar and satellite meteorology, cloud physics and dynamics.

Pamela Sullivan (Assistant Professor): Ecohydrology, hydrogeology, aqueous geochemistry. Research on the ecohydrologic controls on landscape evolution.

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.

AFFILIATED FACULTY:

Joseph Brewer (Courtesy Assistant Professor): natural resources management for American Indians & Alaskan Natives, Indian land tenure

Kelly Kindscher (Courtesy Professor): Plant community ecology research.

Rolfe Mandel (Courtesy Professor): Soils, geoarcheology, Quaternary sediments.

Valery Terwilliger (Adjunct Associate Professor): Biogeography, geomorphology, geotechnical engineering.
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 336 Introduction to Environmental Hydrology and Water Resources
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 Micrometeorology
GEOG 531 Topics in Physical Geography:
GEOG 532 Geochronology
GEOG 535 Soil Geography
GEOG 537 Elements of Plant Geography
GEOG 538 Soil Chemistry
GEOG 540 Econochemistry
GEOG 541 Geomorphology
GEOG 635 Soil Physics
GEOG 731 Topics in Physical Geography:
GEOG 735 Soil Geomorphology
GEOG 741 Advanced Geomorphology
GEOG 749 Topics in Stable Isotopes:

Geographic Information Science
GEOG 111 Mapping our Changing World
GEOG 210 Computers, Maps and Geographical Analysis
GEOG 311 Introductory Cartography & Geovisualization
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 360 Computer Programming for Mapping and Spatial Analysis
GEOG 418 Internship in Production Cartography
GEOG 433 Biogeography Field & Laboratory Techniques
GEOG 458 Geographic Information Systems:
GEOG 511 Intermediate Cartography:
GEOG 512 Advanced Cartography & Geovisualization
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 528 Spatial Databases
GEOG 558 Intermediate Geographic Information Systems
GEOG 560 GIS Application Programming
GEOG 648 Location Modeling
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 758 Geographic Information Science

GEOG 354 Globalization
GEOG 370 Introduction to Cultural Geography
GEOG 371 Environmental Geopolitics
GEOG 372 Environmental Policy
GEOG 373 Political Geography
GEOG 374 Vulnerability & Adaptation
GEOG 375 Intermediate Human Geography
GEOG 377 Urban Geography
GEOG 379 Topics in Cultural Geography:
GEOG 510 Human Factors
GEOG 519 History of Cartography
GEOG 552 Topics in Urban/Economic Geog:
GEOG 355 Seminar in Urban Geography
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 576 Cultural Geography of the United States
GEOG 577 Human Dimensions of Global Change
GEOG 579 Geography of American Foodways
GEOG 582 Geopolitics and Genocide
GEOG 601 Indigenous Peoples of the World
GEOG 670 Cultural Ecology
GEOG 710 Information Design
GEOG 719 Development of Geographic Thought
GEOG 752 Topics in Urban/Economic Geog:
GEOG 771 Topics in Cultural Geography:
GEOG 772 Problems in Political Geography
GEOG 781 Environmental Geopolitics

Regional Studies
GEOG 351 Africa’s Human Geographies
GEOG 390 Geography of the United States and Canada
GEOG 395 Environmental Issues of:
GEOG 396 East Asia
GEOG 397 Geography of Kansas and the Plains
GEOG 399 Topics in Regional Studies:
GEOG 350 Environmental Issues in Africa
GEOG 553 Geography of African Development
GEOG 574 Exploring Oceania
GEOG 590 Understanding Central Asia
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 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

KU Core requirements
Goal 1 Critical Thinking and Quantitative Literacy 2 units
Goal 2 Communication 3 units
Goal 3 Breadth of Knowledge 3 units
Goal 4 Culture and Diversity 2 units
Goal 5 Social Responsibility and Ethics 1 unit
Goal 6 Integration and Creativity 1 unit

College requirements
First Year Writing 6
Quantitative Reasoning 3
Lab or Field Experience variable
Non-English Language Study variable

Geography Course requirements
............. GEOG 102 People, Place and Society (or GEOG 103) 3
............. GEOG 104 Principles of Physical Geography (or GEOG 107) 3
............. GEOG 105 Introductory Laboratory in Physical Geography 2
............. GEOG 210 Computers, Maps and Geographic Analysis 3
............. GEOG 316 Methods of Analyzing Geographical Data or GEOG 358 Principles of Geographic Information Systems 4
............. GEOG 500 Senior Capstone in Geography or GEOG 714 Field Experience 3

15 credit hours of electives at the 200-500 level from 3 of the 4 major categories (Physical, GIS, Human, and Regional), one of which must be a regional course:
............. 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**

**KU Core requirements**

<table>
<thead>
<tr>
<th>Goal</th>
<th>Course Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal 1</td>
<td>Critical Thinking and Quantitative Literacy</td>
<td>2</td>
</tr>
<tr>
<td>Goal 2</td>
<td>Communication</td>
<td>3</td>
</tr>
<tr>
<td>Goal 3</td>
<td>Breadth of Knowledge</td>
<td>3</td>
</tr>
<tr>
<td>Goal 4</td>
<td>Culture and Diversity</td>
<td>2</td>
</tr>
<tr>
<td>Goal 5</td>
<td>Social Responsibility and Ethics</td>
<td>1</td>
</tr>
<tr>
<td>Goal 6</td>
<td>Integration and Creativity</td>
<td>1</td>
</tr>
</tbody>
</table>

The BGS degree requires the completion of the requirements of a single BGS major AND a secondary field of academic study (a second major or minor).

Second major or minor ________________

**Geography Course requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 102</td>
<td>People, Place and Society (or GEOG 103)</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 104</td>
<td>Principles of Physical Geography (or GEOG 107)</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 105</td>
<td>Introductory Laboratory in Physical Geography</td>
<td>2</td>
</tr>
<tr>
<td>GEOG 210</td>
<td>Computers, Maps and Geographic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 316</td>
<td>Methods of Analyzing Geographical Data or GEOG 358 Principles of Geographic Information Systems</td>
<td>4</td>
</tr>
<tr>
<td>GEOG 500</td>
<td>Senior Capstone in Geography or GEOG 714 Field Experience</td>
<td>3</td>
</tr>
</tbody>
</table>

15 credit hours of electives at the 200-500 level from 3 of the 4 major categories (Physical, GIS, Human, and Regional), one of which must be a regional course:

1. ________________ Category __________
2. ________________ Category __________
3. ________________ Category __________
4. ________________ Category __________
5. ________________ Category __________

15+

**Hour and GPA requirements**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units/Hours</th>
<th>Requirement</th>
<th>Units/Hours</th>
<th>Requirement</th>
<th>Units/Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Credit hours</td>
<td>(≥124)</td>
<td>CC Transfer credits</td>
<td>(≤64)</td>
<td>Overall GPA</td>
<td>(≥ 2.0)</td>
</tr>
<tr>
<td>CLAS hours</td>
<td>(≥ 99)</td>
<td>Other KU Schools</td>
<td>(≤25)</td>
<td>Geography GPA</td>
<td>(≥2.0)</td>
</tr>
<tr>
<td>Junior Senior hours</td>
<td>(≥45)</td>
<td>Hrs Music Org.</td>
<td>(≤ 6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KU Res. hours</td>
<td>(≥30)</td>
<td>Hrs Phys Ed</td>
<td>(≤ 4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Bachelor of Science in Geography: Physical Geography Option**

**General Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>English - ENGL 101 (or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>ENGL 102 (or 105 or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>ENGL 203, 205, 209, 210, 211 or 362 (ENGL 362 recommended) or exemption</td>
<td>3</td>
</tr>
<tr>
<td>COMS 130 (COMS 230, PHIL 148, PHIL 310, exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>History or philosophy of science</td>
<td>3</td>
</tr>
<tr>
<td>Choose one of the following or approval of Undergraduate committee</td>
<td></td>
</tr>
<tr>
<td>PHIL 370, 375, 380, 620, 622</td>
<td></td>
</tr>
<tr>
<td>GEOG 357</td>
<td></td>
</tr>
<tr>
<td>Two principal courses in the Humanities</td>
<td>3</td>
</tr>
<tr>
<td>Two principal courses in the Social Sciences</td>
<td>3</td>
</tr>
<tr>
<td>Two principal courses in the Humanities</td>
<td>3</td>
</tr>
</tbody>
</table>

**Preparation for the Major**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 125 and MATH 126 (MATH 220 and 320 are also recommended)</td>
<td>10</td>
</tr>
<tr>
<td>PHSX 211 and PHSX 216 or PHSX 114 and 201 and 216</td>
<td>5-6</td>
</tr>
<tr>
<td>PHSX 212 and 236 or PHSX 115 and 202 and 236</td>
<td>4-6</td>
</tr>
<tr>
<td>BIOL 150 and BIOL 152</td>
<td>8</td>
</tr>
<tr>
<td>CHEM 130 (or 190) and CHEM 135 (or 195)</td>
<td>10</td>
</tr>
<tr>
<td>EECS 138</td>
<td>3</td>
</tr>
</tbody>
</table>

**Geography Requirements**

**Overview Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 104 Principles of Physical Geography or GEOG 107 (Honors)</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 105 Introductory Laboratory in Physical Geography</td>
<td>2</td>
</tr>
<tr>
<td>One course in Human or Regional Geography</td>
<td>3</td>
</tr>
</tbody>
</table>

**Core System Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biogeography: BIOL 414 Principles of Ecology</td>
<td>3</td>
</tr>
<tr>
<td>Climate: GEOG 321 Climate and Climate Change</td>
<td>3</td>
</tr>
<tr>
<td>Geomorphology: GEOG 331 Regional Geomorphology of the United States</td>
<td>3</td>
</tr>
<tr>
<td>Soil Geography: GEOG 335Introduction to Soil Geography or GEOG 535 Soil Geography</td>
<td>4</td>
</tr>
<tr>
<td>Hydrology and Glaciology: GEOG 332 Glaciers and Landscape or CE 455 Hydrology</td>
<td>3</td>
</tr>
</tbody>
</table>

**Techniques Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 316 Methods of Analyzing Geographical Data</td>
<td>4</td>
</tr>
<tr>
<td>GEOG 358 Principles of Geographic Information Systems</td>
<td>4</td>
</tr>
<tr>
<td>One 500-level or above course from GIS Studies (GEOG 558 Intermediate Geographical Information Systems or GEOG 526 Remote Sensing of Environment I recommended)</td>
<td>4-5</td>
</tr>
</tbody>
</table>

**Elective Courses: (2 or more of the following courses)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biogeography: GEOG 537</td>
<td></td>
</tr>
<tr>
<td>Climate: GEOG 521</td>
<td></td>
</tr>
<tr>
<td>Geomorphology: GEOG 532, GEOG 541</td>
<td></td>
</tr>
<tr>
<td>Soil Geography: GEOG 538, GEOG 735</td>
<td></td>
</tr>
<tr>
<td>Other advanced courses in Physical Geography</td>
<td></td>
</tr>
</tbody>
</table>

**Capstone Course**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 500 Senior Capstone in Geography or GEOG 714 Field Experience</td>
<td>3</td>
</tr>
</tbody>
</table>

**Hour and GPA Requirement**

<table>
<thead>
<tr>
<th>Category</th>
<th>Minimum Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Credit hours</td>
<td>≥124</td>
</tr>
<tr>
<td>CLAS hours</td>
<td>≥99</td>
</tr>
<tr>
<td>Junior Senior hours</td>
<td>≥45</td>
</tr>
<tr>
<td>KU Res hours</td>
<td>≥30</td>
</tr>
<tr>
<td>CC Transfer credits</td>
<td>≤64</td>
</tr>
<tr>
<td>Other KU Schools</td>
<td>≤25</td>
</tr>
<tr>
<td>Hrs Music Org.</td>
<td>≤6</td>
</tr>
<tr>
<td>Hrs Phys Ed</td>
<td>≤4</td>
</tr>
</tbody>
</table>

| Overall GPA               | ≥2.0          |
| Geography GPA             | ≥2.0          |
# Bachelor of Science in Geography: Geographical Information and Analysis Option

**General Requirements**

- English - ENGL 101 (or exemption)  
  Credit hrs: 0-3
- ENGL 102 (or 105 or exemption)  
  Credit hrs: 0-3
- ENGL 203, 205, 209, 210, 211 or 362 or exemption  
  Credit hrs: 3
- COMS 130 (COMS 230, PHIL 148, PHIL 310, exemption)  
  Credit hrs: 0-3
- History or philosophy of science  
  Choose one of the following or approval of Undergraduate committee  
  PHIL 370, 375, 380, 620, 622  
  GEOG 357  
  Credit hrs: 3
- Two principal courses in the Humanities  
  Credit hrs: 3
- Two principal courses in the Social Sciences  
  Credit hrs: 3

**Preparation for the major**

- MATH 125 and MATH 126  
  Credit hrs: 8
- EECS 138 or GEOG 514  
  Credit hrs: 3-4
- PHSX 211 and 212  
  Credit hrs: 7

**Geography Requirements**

**Overview Geography courses**

- GEOG 104 (GEOG 107) and GEOG 105 or GEOG 140  
  Credit hrs: 3-5
- GEOG 102 (or GEOG 103)  
  Credit hrs: 3
- GEOG 111 or GEOG 210  
  Credit hrs: 3
- Two GEOG 300+ courses, one in Physical and one in Human and/or Regional Geography  
  Credit hrs: 6

**Core Geographic Information Science** (Six courses, at least one from each category)  
  Credit hrs: 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**

- Two other courses from Geographic Information Science  
  Credit hrs: 6-8

**Allied Field:** (3 courses and 9 credit hours minimum in one field (or a minor):

- Example areas: Area Studies, Atmospheric Science, Biology, Computer Science, Design,  
  Environmental Studies, Engineering, Geology, Psychology, Urban Planning

**Capstone Course**

- GEOG 500 Senior Capstone in Geography or GEOG 714 Field Experience  
  Credit hrs: 3

**Electives (14-23 credits, any university courses)**

**Hour and GPA requirements**

- Total Credit hours (≥124)  
  Credit hrs: 124
- CLAS hours (≥99)  
  Credit hrs: 99
- Junior Senior hours (≥245)  
  Credit hrs: 245
- KU Res hours (≥30)  
  Credit hrs: 30
- CC Transfer credits (≤64)  
  Credit hrs: 64
- Other KU Schools (≤25)  
  Credit hrs: 25
- Hrs Music Org. (≤6)  
  Credit hrs: 6
- Hrs Phys Ed (≤4)  
  Credit hrs: 4

**Overall GPA (≥ 2.0)**  
Credit hrs:  

**Geography GPA (≥2.0)**  
Credit hrs:  

---

16
# Bachelor of Science in Atmospheric Science: General Meteorology Option

## General Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>English - ENGL 101 (or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>ENGL 102 (or 105 or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>Additional English (ENGL 203, 205, 209, 210, 211, or 362; ENGL 362 recommended)</td>
<td>3</td>
</tr>
<tr>
<td>COMS 130, COMS 131 or COMS 150 (or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>One course in the Humanities</td>
<td>3</td>
</tr>
<tr>
<td>One course in the Social Sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

## Preparation for the Major

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 125 or MATH 145 and MATH 126 or MATH 146</td>
<td>8</td>
</tr>
<tr>
<td>MATH 127 or MATH 147 and MATH 290 or 291 and MATH 320 or 220</td>
<td>8</td>
</tr>
<tr>
<td>PHSX 211 and 216 or PHSX 114 and 201 and 216 or PHSX 213</td>
<td>5-6</td>
</tr>
<tr>
<td>PHSX 212 and 236 or PHSX 115 and 202 and 236 or PHSX 214</td>
<td>4-6</td>
</tr>
<tr>
<td>EECS 138</td>
<td>3</td>
</tr>
<tr>
<td>MATH 581</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 130 or CHEM 190</td>
<td>5</td>
</tr>
<tr>
<td>DSCI 202 or MATH 526</td>
<td>3 or 4</td>
</tr>
<tr>
<td>EVRN 148</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 358</td>
<td>4</td>
</tr>
</tbody>
</table>

## Atmospheric Sciences Requirements

### Core Atmospheric Sciences Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 105</td>
<td>5</td>
</tr>
<tr>
<td>ATMO 321/GEOG 321</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 505</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 521/GEOG 521</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 630</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 640</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 642</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 660</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 680</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 697</td>
<td>1</td>
</tr>
</tbody>
</table>

*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

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 525</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 605</td>
<td>2</td>
</tr>
<tr>
<td>ATMO 650</td>
<td>3</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Hour and GPA requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credit Hours</th>
<th>Transfer Credits</th>
<th>Overall GPA</th>
<th>ATMO GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Credit hours</td>
<td>≥124</td>
<td>≤64</td>
<td>≥2.0</td>
<td></td>
</tr>
<tr>
<td>CLAS hours</td>
<td>≥99</td>
<td>Other KU Schools</td>
<td>≥2.5</td>
<td></td>
</tr>
<tr>
<td>Junior Senior hours</td>
<td>≥45</td>
<td>Hrs Music Org.</td>
<td>≤6</td>
<td></td>
</tr>
<tr>
<td>KU Res hours</td>
<td>≥30</td>
<td>Hrs Phys Ed</td>
<td>≤4</td>
<td></td>
</tr>
</tbody>
</table>
**Bachelor of Science in Atmospheric Science: General Meteorology Option with Minor in Mathematics**

**General Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>English - ENGL 101 (or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>ENGL 102 (or 105 or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>Additional English (ENGL 203, 205, 209, 210, 211, or 362; ENGL 362 recommended)</td>
<td>3</td>
</tr>
<tr>
<td>COMS 130 or COMS 150 (or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>One course in the Humanities</td>
<td>3</td>
</tr>
<tr>
<td>One course in the Social Sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

**Preparation for the major**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 125 or MATH 145 and MATH 126 or MATH 146</td>
<td>8</td>
</tr>
<tr>
<td>MATH 127 or MATH 147 and MATH 290 or 291 and MATH 320</td>
<td>8</td>
</tr>
<tr>
<td>PHSX 211 and 216 or PHSX 114 and 201 and 215 or PHSX 213</td>
<td>5-6</td>
</tr>
<tr>
<td>PHSX 211 and 236 or PHSX 115 and 202 and 236 or PHSX 214</td>
<td>4-6</td>
</tr>
<tr>
<td>EECS 138</td>
<td>3</td>
</tr>
<tr>
<td>MATH 581</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 130 or CHEM 190</td>
<td>5</td>
</tr>
<tr>
<td>MATH 526</td>
<td>3</td>
</tr>
<tr>
<td>EVRN 148</td>
<td>3</td>
</tr>
<tr>
<td>MATH elective (MATH 647, MATH 646, MATH 611 or MATH 605 suggested)</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 358</td>
<td>4</td>
</tr>
</tbody>
</table>

**Atmospheric Sciences Requirements**

**Core Atmospheric Sciences courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 105</td>
<td>5</td>
</tr>
<tr>
<td>ATMO 321/GEOG 321</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 505</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 521/GEOG 521</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 630</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 640</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 642</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 650</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 680</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 697</td>
<td>1</td>
</tr>
</tbody>
</table>

*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**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 525</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 605</td>
<td>2</td>
</tr>
<tr>
<td>ATMO 650</td>
<td>3</td>
</tr>
</tbody>
</table>

**Electives (19 credits, any university courses: Note general University restrictions below)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hour and GPA requirements**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Credit hours (≥124)</td>
<td></td>
</tr>
<tr>
<td>CLAS hours (≥99)</td>
<td></td>
</tr>
<tr>
<td>Junior Senior hours (≥45)</td>
<td></td>
</tr>
<tr>
<td>KU Res hours (≥30)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC Transfer credits (≤64)</td>
<td></td>
</tr>
<tr>
<td>Other KU Schools (≤25)</td>
<td></td>
</tr>
<tr>
<td>Hrs Music Org. (≤6)</td>
<td></td>
</tr>
<tr>
<td>Hrs Phys Ed (≤4)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GPA Requirement</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall GPA (≥ 2.0)</td>
<td></td>
</tr>
<tr>
<td>ATMO GPA (≥2.0)</td>
<td></td>
</tr>
</tbody>
</table>
# Bachelor of Science in Atmospheric Science: Air Pollution Option

## General Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>credit hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>English - ENGL 101 (or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>ENGL 102 (or 105 or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>Additional English (ENGL 203, 205, 209, 210, 211, or 362; ENGL 362 recommended)</td>
<td>3</td>
</tr>
<tr>
<td>COMS 130, COMS 131 or COMS 150 (or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>One course in the Humanities</td>
<td>3</td>
</tr>
<tr>
<td>One course in the Social Sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

## Preparation for the Major

<table>
<thead>
<tr>
<th>Course</th>
<th>credit hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 125 or MATH 145 and MATH 126 or MATH 146</td>
<td>8</td>
</tr>
<tr>
<td>MATH 127 or MATH 147 and MATH 290 and 291 and MATH 320 or 220</td>
<td>8</td>
</tr>
<tr>
<td>PHSX 211 and 216 or PHSX 114 and 201 and 216 or PHSX 213</td>
<td>5-6</td>
</tr>
<tr>
<td>PHSX 212 and 236 or PHSX 115 and 202 and 236 or PHSX 214</td>
<td>4-6</td>
</tr>
<tr>
<td>EECS 138</td>
<td>3</td>
</tr>
<tr>
<td>MATH 581</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 130 or CHEM 190</td>
<td>5</td>
</tr>
<tr>
<td>DSCI 202 or MATH 526</td>
<td>3 or 4</td>
</tr>
<tr>
<td>EVRN 148</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 358</td>
<td>4</td>
</tr>
</tbody>
</table>

## Atmospheric Sciences Requirements

### Core Atmospheric Sciences Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>credit hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 105</td>
<td>5</td>
</tr>
<tr>
<td>ATMO 321/GEOG 321</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 505</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 521/GEOG 521</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 630</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 640</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 642</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 660</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 680</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 697</td>
<td>1</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Course</th>
<th>credit hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 525</td>
<td>3</td>
</tr>
</tbody>
</table>

## Additional Course work outside Atmospheric Sciences

<table>
<thead>
<tr>
<th>Course</th>
<th>credit hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 135 or 195</td>
<td>5</td>
</tr>
<tr>
<td>CE 477</td>
<td>3</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course</th>
<th>credit hrs</th>
</tr>
</thead>
</table>

## Hour and GPA requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Credit hours (≥124)</td>
<td></td>
</tr>
<tr>
<td>CLAS hours (≥99)</td>
<td></td>
</tr>
<tr>
<td>Junior Senior hours (≥24)</td>
<td></td>
</tr>
<tr>
<td>KU Res hours (≥30)</td>
<td></td>
</tr>
<tr>
<td>CC Transfer credits (≤64)</td>
<td></td>
</tr>
<tr>
<td>Other KU Schools (≤25)</td>
<td></td>
</tr>
<tr>
<td>Hrs Music Org. (≤6)</td>
<td></td>
</tr>
<tr>
<td>Hrs Phys Ed (≤4)</td>
<td></td>
</tr>
</tbody>
</table>

**Overall GPA (≥ 2.0)**

**ATMO GPA (≥2.0)**
### Bachelor of Science in Atmospheric Science: Hydrometeorology Option

#### General Requirements

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>English - ENGL 101 (or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>ENGL 102 (or 105 or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>Additional English (ENGL 203, 205, 209, 210, 211, or 362; ENGL 362 recommended)</td>
<td>3</td>
</tr>
<tr>
<td>COMS 130, COMS 131 or COMS 150 (or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>One course in the Humanities</td>
<td>3</td>
</tr>
<tr>
<td>One course in the Social Sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Preparation for the Major

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 125 or MATH 145 and MATH 126 or MATH 146</td>
<td>8</td>
</tr>
<tr>
<td>MATH 127 or MATH 147 and MATH 290 or 291 and Math 320 or 220</td>
<td>8</td>
</tr>
<tr>
<td>PHSX 211 and 216 or PHSX 114 and 201 and 216 or PHSX 213</td>
<td>5-6</td>
</tr>
<tr>
<td>PHSX 212 and 236 or PHSX 115 and 202 and 236 or PHSX 214</td>
<td>4-6</td>
</tr>
<tr>
<td>EECS 138</td>
<td>3</td>
</tr>
<tr>
<td>MATH 581</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 130 or CHEM 190</td>
<td>5</td>
</tr>
<tr>
<td>DSCI 202 or MATH 526</td>
<td>3 or 4</td>
</tr>
<tr>
<td>EVRN 148</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 358</td>
<td>4</td>
</tr>
</tbody>
</table>

#### Atmospheric Sciences Requirements

**Core Atmospheric Sciences Courses**

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 105</td>
<td>5</td>
</tr>
<tr>
<td>ATMO 321/GEOG 321</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 505</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 521/GEOG 521</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 630</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 640</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 642</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 660</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 680</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 697</td>
<td>1</td>
</tr>
</tbody>
</table>

*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**

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 525</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 605</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Civil Engineering Requirements

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>C E 301</td>
<td>5</td>
</tr>
<tr>
<td>C E 330</td>
<td>4</td>
</tr>
<tr>
<td>C E 455</td>
<td>3</td>
</tr>
</tbody>
</table>

*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)

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Hour and GPA Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credit Hours</th>
<th>CC Transfer Credits</th>
<th>Overall GPA (≥ 2.0)</th>
<th>KU Res Hours (≥ 30)</th>
<th>Hrs Phys Ed (≤ 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Credit Hours (≥124)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLAS Hours (≥ 99)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior Senior Hours (≥45)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KU Res Hours (≥ 30)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other KU Schools (≤ 25)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hrs Music Org. (≤ 6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hrs Phys Ed (≤ 4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Bachelor of Science in Atmospheric Science: News Media Forecasting Option**

**General Requirements**

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>English - ENGL 101 (or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>ENGL 102 (or 105 or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>Additional English (ENGL 203, 205, 209, 210, 211, or 362; ENGL 362 recommended)</td>
<td>3</td>
</tr>
<tr>
<td>COMS 130, COMS 131 or COMS 150 (or exemption)</td>
<td>0-3</td>
</tr>
<tr>
<td>One course in the Humanities</td>
<td>3</td>
</tr>
<tr>
<td>One course in the Social Sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

**Preparation for the major**

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 125 or MATH 145 and MATH 126 or MATH 146</td>
<td>8</td>
</tr>
<tr>
<td>MATH 127 or 147 and MATH 290 or 291 and MATH 320 or 220</td>
<td>8</td>
</tr>
<tr>
<td>PHSX 211 and 216 or PHSX 1114 and 201 and 216 or PHSX 213</td>
<td>5-6</td>
</tr>
<tr>
<td>PHSX 212 and 236 or PHSX 115 and 202 and 236 or PHSX 214</td>
<td>4-6</td>
</tr>
<tr>
<td>EECS 138</td>
<td>3</td>
</tr>
<tr>
<td>MATH 581</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 130 or CHEM 190</td>
<td>5</td>
</tr>
<tr>
<td>DSCI 202 or MATH 526</td>
<td>3 or 4</td>
</tr>
<tr>
<td>EVRN 148</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 358</td>
<td>4</td>
</tr>
</tbody>
</table>

**Atmospheric Sciences Requirements**

**Core Atmospheric Sciences courses**

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 105</td>
<td>5</td>
</tr>
<tr>
<td>ATMO 321/GEOG 321</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 505</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 521/GEOG 521</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 630</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 640</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 642</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 660</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 680</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 697</td>
<td>1</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 605</td>
<td>2</td>
</tr>
<tr>
<td>ATMO 650</td>
<td>3</td>
</tr>
</tbody>
</table>

**Journalism requirements**

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOUR 302</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 304</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 415</td>
<td>3</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

**Hour and GPA requirements**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Credit hours (≥124)</td>
<td></td>
</tr>
<tr>
<td>CLAS hours (≥99)</td>
<td></td>
</tr>
<tr>
<td>Junior Senior hours (≥245)</td>
<td></td>
</tr>
<tr>
<td>KU Res hours (≥30)</td>
<td></td>
</tr>
<tr>
<td>CC Transfer credits (≤64)</td>
<td></td>
</tr>
<tr>
<td>Other KU Schools (≤25)</td>
<td></td>
</tr>
<tr>
<td>Hrs Music Org. (≤6)</td>
<td></td>
</tr>
<tr>
<td>Hrs Phys Ed (≤4)</td>
<td></td>
</tr>
<tr>
<td>Overall GPA (≥2.0)</td>
<td></td>
</tr>
<tr>
<td>ATMO GPA (≥2.0)</td>
<td></td>
</tr>
</tbody>
</table>

21
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 177 First Year Seminar: [Title]. (3)
A limited-enrollment, seminar course for first-time freshmen, addressing current issues in Atmospheric Science. Course is designed to meet the critical thinking learning outcome of the KU Core. First-Year Seminar topics are coordinated and approved by the Office of First-Year Experience.

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, tornadoes, 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 introduces students to meteorological events that affect aircraft operations. Aviation applications of meteorological observations including satellite and radar observations are discussed. 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 is 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 introduces 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 and MATH 125 or MATH 115.

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 126, 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. Consideration of 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 125.

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 125, EECS 138 and CHEM 130 or equivalent.

ATMO 531 Topics in Atmospheric Science: [Title]. (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 ATMOS 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: ATMOS 605.

ATMOS 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 twice for credit. Credit for ATMOS 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: ATMOS 605.

ATMOS 630 Synoptic Meteorology. (3) Interpretation, development, and analysis of synoptic charts.
Prerequisite: ATMOS 505 and ATMOS 640.

ATMOS 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: ATMOS 505 and DSCI 301 or MATH 526.

ATMOS 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 and PHSX 214 or PHSX 212 and 236.

ATMOS 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: ATMOS 680, MATH 581.

ATMOS 650 Advanced Synoptic Meteorology. (3) Analysis and interpretation of synoptic weather charts including treatment of numerical weather forecasting.
Prerequisite: ATMOS 630 and ATMOS 660.

ATMOS 660 Advanced Dynamic Meteorology. (3) Advanced study of the atmosphere including treatment of the vorticity equation.
Prerequisite: ATMOS 640 and MATH 220 or MATH 320.

ATMOS 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 214 or PHSX 212 and 236.

ATMOS 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.

ATMOS 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.

ATMOS 699 Undergraduate Research. (2) Work on a research project under the supervision of a faculty member. May be taken up to three times for credit.
Prerequisite: Nine credit hours in meteorology.

ATMOS 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: ATMOS 660 or equivalent.

ATMOS 720 Atmospheric Modeling. (3) Illustration and application of contemporary approaches to mathematical and statistical description of atmospheric phenomena.
Prerequisite: Consent of instructor.

ATMOS 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: consent of instructor.

ATMOS 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.

ATMOS 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: ATMOS 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 University Honors Program or by consent of instructor.

GEOG 102 People, Place, and Society. (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 University 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 University Honors Program or by consent of instructor.

GEOG 110 Geopolitics in the News. (3)  
This course examines leading contemporary geopolitical events and processes through the lens of geography. It focuses on major political conflicts and struggles as they play out unevenly over space, contextualizing them within broader themes of neocolonialism, globalization, and the international system of nation-states. Emphasis is put on making issues commonly found in the media understandable to students by providing a relevant historical background and drawing comparisons among events.

GEOG 111 Mapping our Changing World. (4)  
This course is an introduction to geospatial technologies. It focuses on the conceptual and technical aspects of mapping technologies that transform information about locations, people, objects, environments, events, and phenomena to digital representations of the world and as end-products of geospatial analysis. Topics covered include surveying, aerial photography and photogrammetry, satellite remote sensing, global positioning systems (GPS), geographic information systems (GIS), and thematic mapping. Students will learn how to acquire and develop geospatial data as the sources for mapping, the skills of analyzing and interpreting spatial information, and how geovisualization can be used in addressing real-world problems.

GEOG 140 Global Environment I: The Discovery of Environmental Change. (5)  
Same as EVRN 140 and HIST 140  
This interdisciplinary course and laboratory sections survey the foundations of environmental understanding and the process of scientific discovery from perspectives that combine the principles and methodologies of the humanities, physical, life and social sciences. Key topics will include the history of environmental systems and life on earth, the discovery of biotic evolution, ecological change, and climate change. Laboratory sections apply the principles and methodologies of the humanities, physical, life and social sciences to earth systems and the development of environmental understanding using historical and present-day examples.

GEOG 142 Global Environment II: The Ecology of Human Civilization. (5)  
Same as EVRN 142 and HIST 142  
This interdisciplinary course and its laboratory sections survey the history of humanity’s relationship with the natural world over the long term from perspectives that combine the principles and methodologies of the humanities, physical, life and social sciences. Key topics include the evolution of Homo sapiens and cultural systems; the development of hunter, gatherer, fisher, agricultural, and pastoral lifeways; the ecology of colonialism and industrial civilization, and the emergence of ideological and ethical perspectives on the relationship between nature and culture. Laboratory sections apply the principles and methodologies of the humanities, physical, life and social sciences to humanity’s engagement with the global environment using historical and present-day examples.

GEOG 144 Global Environment I: The Discovery of Environmental Change, Honors. (5)  
Same as EVRN 144 and HIST 144  
This interdisciplinary course and laboratory sections survey the foundations of environmental understanding and the process of scientific discovery from perspectives that combine the principles and methodologies of the humanities, physical, life and social sciences. Key topics will include the history of environmental systems and life on earth, the discovery of biotic evolution, ecological change, and climate change. Laboratory sections apply the principles and methodologies of the humanities, physical, life and social sciences to earth systems and the development of environmental understanding using historical and present-day examples. Open only to students admitted to the University Honors Program or by permission of instructor.

GEOG 145 Global Environment II: The Ecology of Human Civilization, Honors. (5)  
Same as EVRN 145 and HIST 145  
This interdisciplinary course and its laboratory sections survey the history of humanity’s relationship with the natural world over the long term from perspectives that combine the principles and methodologies of the humanities, physical, life and social sciences. Key topics include the evolution of Homo sapiens and cultural systems; the development of hunter, gatherer, fisher, agricultural, and pastoral lifeways; the ecology of colonialism and industrial civilization, and the emergence of ideological and ethical perspectives on the relationship between nature and culture. Laboratory sections apply the principles and methodologies of the humanities, physical, life and social sciences to humanity’s engagement with the global environment using historical and present-day examples. Open only to students admitted to the University Honors Program or by permission of instructor.

GEOG 148 Scientific Principles of Environmental Studies. (3)  
Same as EVRN 148  
This course presents an overview of our understanding of environmental processes and issues. Topics include scientific principles, resource issues, pollution and global change, among others. 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 issues. Topics include scientific principles, resource issues, pollution and global change, among others. 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 University Honors Program or by consent of instructor.

GEOG 150 Environment, Culture 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 177 First Year Seminar: ____________ (3)  
A limited-enrollment, seminar course for first-time freshmen, addressing current issues in Geography. Course is designed to meet the critical thinking learning outcome of the KU Core. First-Year Seminar topics are coordinated and approved by the Office of First-Year Experience.

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 relation to the earth's 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 Introductory Cartography and Geovisualization.  
This course is an introduction to cartography and focuses on computer-based map making skills. It begins with the history of cartography, cognitive maps, and the use of maps in the past and modern times. Topics covered in this course emphasize spatial data handling, principles of cartography and symbolization, map elements and design, and mapping techniques such as choropleth, proportional symbol and dot maps. Students will learn to adopt appropriate spatial data and mapping techniques to create accurate and creative digital maps reflecting given phenomena.

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 introduces 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 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.

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 or 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, or GEOL 101, or consent of instructor.

GEOG 335 Introduction to Soil Geography. (4)  
Same as EVRN 335  
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. Not open to students who have taken GEOG 535/EVRN 535.  
Prerequisite: GEOG 104 or GEOL 101 or consent of instructor; BIOL 100 and CHEM 130 or CHEM 190 recommended.

GEOG 336 Introduction to Environmental Hydrology and Water Resources. (3)  
Same as EVRN 363  
Water is vital to life on earth. In this course we will cover components of the water of "hydrologic" cycle, how management has altered them, and how they are predicted to change with the changing climate. We will discuss the evolution of water policy, its implications for management and the economic impact of human perturbation on water. We will study the physical processes that govern the water cycle, learn how they are measured, and estimate hydrologic fluxes.  
Prerequisite: GEOG 104 or GEOL 101/102.

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 AAAS 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 354 Globalization. (3)
Same as GIS 354
This course is designed to provide a broad overview of some major facets of the historical, economic, political, cultural, and geographical dimensions of contemporary globalization, the process by which individual regions and nations have become progressively linked to, and structured by, the world-system of states and markets, and the cultural contradictions associated with this process.

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 "macroscopic," 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 360 Computer Programming for Mapping and Spatial Analysis. (3)
This course teaches basic computer programming concepts and skills for mapping and spatial analysis using various scripting languages. The goal is to enable students to write computer programs, develop mapping applications, and perform spatial data analysis. This course will lay the foundation for computerized problem solving skills that can be applied in later courses. This course assumes no previous programming experience.

GEOG 370 Introduction to Cultural Geography. (3)
Charts some of the major lines of research in cultural geography, including critical theory, political economy, poststructualist 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)
Same as EVRN 371/GIST 371
This course examines how human relationships with the biophysical world are politicized. Examines key contributions to debates surrounding environmental security, resource conflicts, and related issues, as well as geopolitical assumptions on which these debates build.

GEOG 372 Environmental Policy. (3)
An historical and analytical study of the formulation, implementation, and consequences of environmental policy in the United States. Attention is directed at relevant interest groups, issues specific to both rural and urban populations, relationships between national policies and international organizations concerned with environmental problems. Prerequisite: GEOG/EVRN 148 and EVRN/HIST 103, EVRN/HIST 347 or GEOG/EVRN 150.

GEOG 373 Political Geography. (3)
Political Geography is concerned with spatial dynamics of power. It concerns issues such as territory, boundaries, and identity as well as feminist, post-colonial, geopolitical, and environmental perspectives. This class will consider the development of this subfield, the role it has played in imperial expansion, and ways in which more recent critiques have shaped political geography to be a means of understanding different forms of power and its relationship to people and places. Prerequisite: GEOG 100 or GEOG 102 or equivalent or consent of instructor.

GEOG 374 Vulnerability and Adaptation. (3)
Same as EVRN 374
The course objective is to understand and analyze human adaptation to environmental change by focusing on disasters and climate change. Each semester, the course rotates topics ranging from oil spills, hurricanes, sea-level rise to infectious disease. It provides undergraduate students with research experience and service learning, and offers opportunities for certificates through the Center for Undergraduate Research and the Center for Civic and Service Responsibility at KU. Students learn theories relevant to the case study, work in groups to generate research themes, conduct literature search and review, learn research methods, and write and present their work.

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. 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 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 East Asia. (3)
This course is an introduction to the contemporary politics,
economy, and culture of Korea, China, and Japan in the context of
globalization. In addition to the discussion of individual countries,
the course examines the cross-cutting themes such as international
relations, cultural exchange, and economic development in the
region of East Asia.

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
Principles of evolution and earth change are used to examine
distributions of human populations, economies, wealth, and
resources. 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 biophysical attributes of vegetation. During the latter
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
descriving 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 upper level 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 faculty members.

GEOG 500 Senior Capstone in Geography. (3)
The capstone project provides students with a broad-based,
interdisciplinary educational experience and allows them to
integrate and synthesize the knowledge they have gained in their
studies. The major goals of this course are to help students
synthesize an integrated view of geography, advance steps toward
career preparation, and develop networking and professional skills.
The course will provide an overview of geography as a unified,
coherent discipline with multiple perspectives, emphasize writing
and analytical skills, introduce students to a major research project
that integrates elements of physical and human geography,
cultivate knowledge for future professional development, and
introduce students to professional organizations. Students will
gain experience applying and/or interviewing for professional
positions and be introduced to multiple professional development
and career services on campus. Graduate students may take this
course by permission only.
Prerequisite: Nine hours in Geography and status as a senior
major in the department, or permission of the instructor.

GEOG 510 Human Factors. (4)
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 512 Advanced Cartography and Geovisualization. (4)
This is an advanced computer-based scientific cartography course.
It covers mapping techniques such as: dasymetric mapping,

multivariate mapping, cartogram and flow map, map animation,
geovisual analytics, web and interactive mapping, and mapping
from remotely sensed imagery. This course focuses on practical
and hands-on experience. Students will learn theoretical concepts,
principles, and design examples, and produce a cartographic
portfolio of well-designed and professional maps.
Prerequisite: GEOG 311 or equivalent, or consent of 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 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, principal 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 and methods of studying early maps.

GEOG 521 Micrometeorology. (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 125.

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: MATH 101 or equivalent. GEOG 358 recommended.

GEOG 528 Spatial Databases. (3)
This course covers concepts in spatial databases and their relevance in geographic information systems (GIS) and spatial analysis. It introduces the fundamental theories of data management behind Geographic Information Systems and imparts hands-on experience with mainstream spatial database management systems (DBMS), standard query languages and necessary tools to query/transform geospatial data, and perform spatial and network analysis. The course provides more in-depth coverage on database-oriented approaches for GIS geospatial analysis.
Prerequisite: GEOG 358 or equivalent; may be waived upon instructor's approval.

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 formation processes, and landscape reconstruction), and to a lesser extent on the array of laboratory approaches available.
Prerequisite: GEOG 104, ANTH 110, or ANTH 310.

GEOG 535 Soil Geography. (4)
Same as EVRN 535
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/EVRN 335.
Prerequisite: GEOG 104 or GEOL 101 or consent of the instructor; BIOL 104 and CHEM 130 or 190 recommended.

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 Soil Chemistry. (3)
Same as EVRN 538
This course examines the chemical properties and processes of soils and methods of evaluation. Topics include solid and solution speciation, mineral solubility, soil colloidal behavior, ion exchange, surface complexation, soil saturation and sodicity, soil acidity, oxidation-reduction reactions, and kinetics of soil chemical processes.
Prerequisites: GEOG/EVRN 335 or 355, CHEM 135 or 195, MATH 125 or consent of the instructor.

GEOG 540 Ecophyiology. (3)
Same as EVRN 540
Ecophyiology is the discipline that answers real world hydrologic and biologic questions through integrating knowledge from hydrology, ecology, atmospheric science and biogeochemistry. We will focus on the key concepts, methodological approaches and analytical techniques utilized in ecophyiology to understand and quality: plant water use, evolution of hydrologic properties, groundwater-surface water interactions, controls on landscape patterns, spatial and temporal patterns of soil moisture and nutrient concentrations, and vegetation competition. Students should leave the class having developed critical skills in: 1) reviewing scientific literature, 2) collecting environmental samples, 3) analyzing ecophyologic data, 4) writing a scientific research paper, 5) working collaboratively and independently.
Prerequisites: GEOG 104 or GEOL 101/102, GEOG 336 or permission of the instructor.

GEOG 541 Geomorphology. (4)
Same as GEOL 541
A critical study of landforms in relation to tectonics, climatic processes, 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 and GEOL 103, GEOG 104 and GEOG
GEOG 550 Environmental Issues in Africa. (3)
Same as AAAS 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 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 AAAS 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 555 Seminar in Urban Geography. (3)
Same as GIST 555
This course is a survey of recent literature and conceptual advances within the broad domain of urban geography. It begins by examining a few classic works, and then explores several topics within urban political economy, including the urban division of labor and restructuring, changing modes of urban governance, suburbanization, gentrification, global cities, and gender and the city. It also delves briefly into the issue of urbanization in the developing world.
Prerequisite: Any upper division course in human geography or urban planning.

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, Southeast 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 are introduced from the aspects of spatial data management and analysis covering both vector and raster data models.
Prerequisites: 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 574 Exploring Oceania. (3)
Acquaints students with the culture and history of Oceania including its settlement and the impacts of European and American colonialism on Australasia, Melanesia, Micronesia and Polynesia. Emphasis is placed on applying broad geographical concepts to this vast Oceanic region through the lenses of development, media, and migration studies.
Prerequisite: GEOG 102 or 103, or consent of instructor.

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 577 Human Dimensions of Global Change. (3)
Same as GIST 577
This class introduces concepts such as coupled human and natural systems, social-ecological resilience, and sustainability science, examines people's responses to major climate, land, water, and coastal change, and discusses case studies. One hour of each seminar will be devoted to individual needs that address topical or methodological issues. Class requirements include presentations, biweekly papers, and a term paper.
Prerequisites: One of the following: GEOG 100, GEOG 104, GEOG 374, or an Environmental Studies introductory course.

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 582 Geopolitics and Genocide. (2-3)
Same as GIST 582
Explores the inherently geographical and geopolitical nature of genocide and related mass violence and introduces an overarching concept, territorial cleansing, that foregrounds the spatial and territorial nature of these events. Detailed studies of cases at a range of scales and locales provide the major context for critical examination and comparison of territorial cleansing concepts. Students enrolling for 3 credits will prepare and present a substantial independent research paper.

**Prerequisites:** GEOG 102 or 103 or ANTH 108 or 109 recommended.

**GEOG 590 Understanding Central Asia.** (3)
Same as REES 510
An intensive, multidisciplinary survey of Central Asia, focusing on the former Soviet republics-Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan-with additional coverage of neighboring regions (the Caucasus and the Caspian basin, Afghanistan, and western China). The course addresses the history of the region (from the Silk Road to Soviet rule), geography, religion, and the building of post-Soviet states and societies.

**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 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 ISP 601
A survey of the varied responses of global Indigenous peoples as a result of the imposition of external economic and political systems. An overview of diverse, thematic issues such as land rights, economic development, resources and cultural patrimony, languages, knowledge systems, and women’s rights from the perspectives of Indigenous societies around the world. Detailed studies of Indigenous peoples seeking recognition and protection under international law are used.

**GEOG 635 Soil Physics.** (3)
Same as EVRN 635
Provides theoretical and practical foundations for understanding physical properties and processes of variably-saturated porous media. Focus is on the transport, retention, and transformation of water, heat, gases, and solutes through the soil. We will examine modern vadose zone measurement methods, analytical tools, and numerical models for data collection and interpretation.

**Prerequisite:** GEOG/EVRN 335 or 535, MATH 125, PHSX 114 or consent of instructor.

**GEOG 648 Location Modeling.** (3)
This course provides an overview of advanced location analysis and modeling in the context of GIS. Introduces students to principles of location analysis, methods for making strategic location decisions as well as existing classic location problems. Demonstrates analytical approaches by which location problems can be solved using mathematical programming, GIS and other optimization software. This course is a specialized course with an emphasis on the spatial analysis function of Geographic Information Systems, which covers many concrete applications of GIS geospatial analysis in urban planning, transportation, and service systems planning, ranging from firefighting stations to forestry management to transportation facilities.

**Prerequisite:** GEOG 358 or equivalent; may be waived upon instructor’s approval.

**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.

**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 geo-spatial 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 properties. 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 GEOG 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.

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, palaeoecology, paleodiet reconstruction, hydrology, and soils genesis will be examined. Knowledge of isotope chemistry is not required. (Consents necessary to understand pertinent articles will be taught during the first class meetings.) May be repeated.

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 758 Geographic Information Science. (4) This course integrates topics in geographical information science (GISc) with spatial analytical techniques to solve spatial problems. Focuses on the most current research in GISc 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 781 Environmental Geopolitics. (3) Same as GIST 781. This course examines how human relationships with the biophysical world are politicized. Examines key contributions to debates surrounding environmental security, resource conflicts, and related issues, as well as geopolitical assumptions on these debates build. This course is a more advanced and rigorous version of the undergraduate version of this course (GEOG 371/ENVR 371). It is not open to students who have taken or are enrolled in GEOG 371/ENVR 371, Environmental Geopolitics. Enrollment by instructor permission only.

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: ___________ (1-3) 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.

Courses updated February 2017