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Geography and Environmental Resources

The School of Earth Systems and Sustainability offers a program that leads to the Master of Science degree in Geography and Environmental Resources. It also houses an interdisciplinary Doctor of Philosophy in Environmental Resources and Policy.

Geography and Environmental Resources is the study of how humans modify, impact, adapt to, monitor, and manage the natural environment. Students in the M.S. program study the dynamic relationship between nature and society in the field and the computer laboratory as well as in the traditional classroom. Students choose from two concentrations: environmental geography and sustainability and geographic information science.

Graduate students in Geography and Environmental Resources take core courses that provide them a strong disciplinary foundation, then work with a faculty advisor to develop a research focus area with appropriate analytical and research skills.

The graduate program stresses a problem-solving perspective, for which skills of critical analysis and dialogue are essential. Geography maintains strong collaborations with many other SIU Carbondale (SIUC) programs and students are encouraged to take advantage of courses and faculty expertise in other units. Each student's progress is assessed at regular intervals by the faculty and provided with feedback. Students are expected to show continued progress in carrying out the program of study, and in developing habits of scholarship and professionalism.

This program requires a \$65 nonrefundable application fee that must be submitted with the application for Admissions to Graduate Study in Geography and Environmental Resources. Applicants must pay this fee by credit card when completing the online application. Questions regarding the program can be directed to geog@siu.edu.

Master of Science (M.S.) in Geography and Environmental Resources

Advisement

Students newly admitted to the M.S. in Geography and Environmental Resources degree program are advised by the graduate program director, with the assistance of program faculty. Students choose a permanent adviser at the end of the first semester in residence. The choice of permanent adviser and advisory committee is made in consultation with the graduate faculty, taking into consideration such matters as faculty expertise and faculty advisee loads.

Degree Requirements

To obtain the M.S. in Geography and Environmental Resources degree, the student shall:

1. Complete all degree requirements specified by the Graduate School, and explained under degree requirements, M.S. in Geography and Environmental Resources degree program in the *Graduate Catalog*. A total of 30 Graduate Credit Hours must be completed, with 50% of these hours at the 500 level or above.
2. Include as required courses the following: GEOG 500, Principles of Research, during the first fall semester in residence; GEOG 501, the following semester; GEOG 504, Spatial Analysis, or GEOG

512, Applied Geographic Statistics or equivalent. GEOG 502, Geographic Information Systems is recommended depending on the student's background.

3. In consultation with an adviser, develop a program of study, identifying courses to be taken, research skills to be developed, deficiencies to be rectified. This shall be approved by the faculty. The program of study shall include a core of substantive courses in geography and environmental resources, as explained in the policy statement on core curriculum for master's degree students, available from the graduate program director. The program of study may include courses offered by other programs. The graduate faculty will meet to review and approve/disapprove the program of study of each M.S. in Geography and Environmental Resources degree student enrolled in GEOG 500. An approved program of study will be filed with the graduate program director as part of GEOG 500.
4. Develop a thesis or research paper proposal. The thesis or research paper proposal must be approved by the student's master's advisory committee before the student registers for GEOG 599, Thesis, or GEOG 593A-C, Research in Geography and Environmental Resources. A total of six credit hours of GEOG 599 may be awarded for a thesis at the discretion of the advisory committee upon final examination on the thesis (see #5 below). A total of three credit hours may be awarded for a research paper.
5. Submit a thesis or research paper to the advisory committee at least two weeks before the defense. A student who writes a thesis will be examined by the committee at a meeting that may be attended by other faculty and students. A research paper may be evaluated and approved by the advisory committee with or without public presentation.

Environmental Geography and Sustainability Concentration

Environmental Geography and Sustainability is for students who want training in physical and social aspects of environmental and sustainability science. We focus on the interactions between people, natural resources, policies, and the environment. Relevant skills and techniques include the ability to collect, evaluate, and analyze social and environmental data, engage with stakeholders, assess policy, and solve environmental problems. Students in Environmental Geography and Sustainability pursue careers as sustainability consultants, environmental managers, environmental educators, community organizers, environmental regulators, and more.

Geographic Information Science Concentration

Geographic Information Science is for students who are interested in environmental applications of geospatial technologies, such as GIS and remote sensing. GIS links locational and database information to enable people to visualize patterns, relationships and trends. Students in Geographic Information Science develop skills related to cartography, geographic data management, and quantitative methods and pursue careers spanning the public and private sectors. Career options for those pursuing the Geographic Information Science specialization include GIS analyst, GIS manager, data scientist, environmental consultant, and others.

Doctor of Philosophy (Ph.D.) in Environmental Resources and Policy

The central focus of the Ph.D. in Environmental Resources and Policy is advanced interdisciplinary training and research on geological, physical, biological, and social processes responsible for natural resource and environmental problems facing contemporary society. Additionally, the Ph.D. in Environmental Resources and Policy focuses on assessing public policy alternatives to address those problems and create new opportunities.

Within the broad and flexible Environmental Resources and Policy framework, a customized program is developed for each student, permitting them to conduct research in traditional and non-traditional earth science sub disciplines, under the direction of one or more Geology faculty members. Please see

the Environmental Resources and Policy section of this catalog for detailed information and admission procedures.

Certificate in GIS

The GIS post-baccalaureate certificate enables students to focus on advanced geospatial techniques and analytical skills. This certificate meets the needs of the expanding job opportunities for Masters' and Ph.D. students. Students must be admitted to an SIUC graduate program or the SIUC non-declared graduate program and maintain a 3.0 GPA in the certification courses. This certificate ensures that the students understand advanced mapping technologies; know how to combine individual models and functions in ArcGIS to carry out a complicated spatial analysis task; master advanced digital image processing and analysis technologies; and obtain competence in designing, developing, and managing spatial databases. Further, they will demonstrate an understanding of GIS's relationships with remote sensing, global positioning system (GPS), mathematics, statistics, and other sciences and obtain capacity in integrating multi-disciplinary methods for problem-solving. Finally, they will be competent in planning, developing, and implementing a complex GIS project. The program requires students to complete 18 credit hours of graduate level coursework from the following:

- GEOG 502: Geographic Information Systems (3 CH)
- GEOG 504: Spatial Analysis (3 CH)
- GEOG 506: Intro to Remote Sensing (3 CH)
- GEOG 508: Advanced Remote Sensing (3 CH)
- GEOG 520: Advanced GIS Studies (3 CH) -OR- GEOG 517: GIS Programming and Customization (3 CH)
- GEOG 528: GIS Portfolio/GIS Capstone Project (3 CH)

Certificate in Sustainability

The Sustainability post-baccalaureate certificate enables students to expand their knowledge and understanding of the long-term sustainable use of the earth's resources, including water, land use and food systems, climate change, urban sustainability, and "green" energy. This certificate meets the needs of the expanding job opportunities in environmental sustainability. Students must be admitted to an SIUC graduate program or the SIUC non-declared graduate program and maintain a 3.0 GPA in the certification courses. The program requires students to complete 18 credit hours of graduate level coursework, as follows:

- GEOG 521: Urban Sustainability (3 CH)
- GEOG 524: Sustainable Development (3 CH)
- GEOG 536: Natural Hazards (3 CH)
- GEOG 539: Global Climate Change (3 CH)
- GEOG 570: Contemporary Issues in Environmental Studies (3 CH)

Plus, one of the following:

- GEOG 502: Geographic Information Systems (3 CH)
- GEOG 512: Applied Geographic Statistics (3 CH)

Geography and Environmental Resources Courses

GEOG419 - Enterprise GIS Planning and Implementation Students will gain both theoretical and practical understanding of the design process of enterprise GIS; be able to assess the scope of a system and address data and technology requirements of that system; become exposed to a host of the state-of-the-art tools and concepts in enterprise GIS; and learn skills for hardware, software and computer

networking issues. Students are expected to have a basic working knowledge of ArcGIS and ArcIMS. Prerequisite: GEOG 401 or consent. Lab fee: \$20. Credit Hours: 3

GEOG430 - Environmental Systems Analysis Exploration of the major environmental systems relevant to planning. Topics include concepts of systems and system behavior; basics of systems analysis and modeling environmental systems; environmental fluxes of energy and materials (e.g., hydrologic cycle, carbon cycle, energy budgets, erosion and sediment transport, role of biosphere in organizing fluxes); environmental variability. Credit Hours: 3

GEOG452 - Environment and Population Introduction to population geography. Emphasis is on the relationships between population trends, resource use patterns and environmental impacts. Topics include methods and data used to describe and predict populations, theories of population and policy issues that relate to the interaction between population, quality of life and environmental quality. Prerequisite: GEOG 320 or consent of instructor. Credit Hours: 3

GEOG457 - American Environmental History (Same as HIST 457) An exploration of the attitudes toward and the interaction with the natural resource environment of North America by human settlers. Coverage from the Neolithic Revolution to the present. Credit Hours: 3

GEOG458 - Applied GIS This course provides practical GIS applications and draws from special topics in data visualization and environmental applications. The topic on data visualization includes an overview of techniques for visualizing large-scale datasets and is inspired by concepts from information visualization. Topics in environmental applications consist of risk assessment, digital elevation model processing, and watershed delineation and hydrological modeling. Students taking this course will distinctively learn: (1) how to visualize geographic data; (2) how to use different environmental risk assessment methods; (3) how to assess, detect, and characterize environmental risks and potential threats; and (4) how to create meaningful visualization scenes to support environmental decision-making. Active learning experiences will be achieved through the use of classroom lectures, lab exercises, group tasks, and presentations. Prerequisite: GEOG 401 or GEOG 310I or consent of instructor. Lab fee: \$20. Credit Hours: 3

GEOG471 - Environmental Impact Analysis Techniques of assessing the impact of human activities on the environment, including weighting schemes, cost-benefit analysis, linear programming, ecological impact assessment. Emphasis is on placing NEPA and EIS writing in legal, economic, and environmental perspective. Credit Hours: 3

GEOG481 - Cooperative Work Experience in Geography Placement of advanced undergraduate or graduate student in private or public organization for one or more semesters in paid career-related position identified by student. Student gains professional experience, under faculty and on-site supervision. A report or professional poster on the work is required at the end of the semester. Three credit hours of either 480 or 481 may apply toward requirements for a Geography undergraduate major or graduate degree. Restricted to students majoring in Geography and Environmental Resources or minoring in Environmental Studies. Special approval needed from the program. Credit Hours: 3-12

GEOG500 - Principles of Research This course teaches students the key components of graduate research: identify a research problem, determine research questions, structure a literature review, and develop research methods. Examples of geographic research are discussed and students work to identify independent research projects. The course culminates with students developing their own research proposals. Credit Hours: 3

GEOG501 - Research Methods Students enrolled in research methods will work directly with their faculty mentor to complete background research on methods of analysis required to complete proposed graduate work. Specific topics will depend on the mutual interests of the student and faculty member and may include qualitative and quantitative approaches to graduate-level research. Credit Hours: 3

GEOG502 - Geographic Information Systems This course will prepare students with comprehensive working knowledge and technical skills related to geographic information systems (GIS). It covers important topics in the context of GIScience, including coordinate systems and georeferencing, data structures (vectors and rasters), map principles and design, spatial analysis and modeling, GPS, GIS data sources, and data uncertainty, which are critical to support the implementation of a GIS project. A series of GIS labs and a leadership role on a final class project will help equip students with necessary skills (e.g., mapping, spatial analysis, and geocoding) to fulfill the tasks of an entry-level GIS position. Graduate

students are expected to demonstrate in-depth problem-solving skills and complete a term paper with additional requirements. Students who have passed GEOG 401 are not eligible to enroll in GEOG 502. Lab fee: \$40. Credit Hours: 3

GEOG504 - Spatial Analysis This spatial analysis course is an introduction to spatial statistical methods for geographers. The course provides an overview of the application of spatial statistical theories, concepts and approaches in the general context of the emerging fields of geographic information systems (GIS) and science (GISci). The main focus of this course is on how techniques for the analysis of spatial data can be effectively applied in a GIS environment, with a particular emphasis on the study of spatial patterns, distributions, and associations. Moreover, students will learn how to integrate the advanced spatial analysis technologies with GIS, computer science and mathematics to solve practical problems. Students are also required to read research articles and write three literature review essays to learn the state of the arts in spatial analysis. Students who have passed GEOG 404 are not eligible to enroll in GEOG 504. Prerequisite: GEOG 401 or GEOG 502 with a grade of C or higher, or consent of instructor. Lab fee: \$40. Credit Hours: 3

GEOG506 - Introduction to Remote Sensing This course is an introduction to the fundamentals of remote sensing and application to environmental management. In addition to the theoretical and applied approaches associated with the use and analysis of aerial photography and satellite imagery, this course provides an introduction to advanced satellite systems and their development. These include how remote sensing data are acquired, displayed, analyzed and applied, and how environmental information can be extracted from such data and integrated with other spatial data. Students will be introduced to manual interpretation and digital image processing and analysis techniques of remotely sensed imagery and will have the opportunity to gain hands-on experience using image processing software. Through reading research articles and writing three literature review essays, in addition, students will learn the state of the art, potential developments, and the important remote sensing programs such as Landsat in detail. More importantly, students will learn how to integrate remote sensing with geographic information science, global positioning systems, computer science, mathematics, statistics, and other fields, to solve practical problems in the fields of geography and environment. Students who have successfully passed GEOG 406 are not eligible to enroll in GEOG 506. Lab fee: \$60. Credit Hours: 3

GEOG508 - Advanced Remote Sensing Advanced techniques in the analysis of remotely sensed data. Focus is placed on advanced digital image processing algorithms and contemporary analysis and modeling approaches using state-of-the-art technologies. This course will also emphasize integration of multidisciplinary approaches from mathematics, statistics, computer science, geographic information system (GIS), geography and environmental science to advance image analysis and application. Students will be expected to develop individual problem-driven projects that use the knowledge, tools, advanced techniques and skills developed in this course for solutions to real world problems. This course will enhance the ability of students to independently conduct remote sensing relevant research work through reading research articles and writing literature review essays and completing course projects. Students who have passed GEOG 408 are not eligible to enroll in GEOG 508. Prerequisite: GEOG 406 or GEOG 506, with grade of C or higher, or consent of instructor. Lab fee: \$60. Credit Hours: 3

GEOG512 - Applied Geographic Statistics Introduction to statistical methods and skills related to the application of statistics to problems in geography. Lectures are supplemented with practical exercises to stress the applied nature of statistics in environmental problem solving. Topics covered include descriptive statistics, time series, probability, point and interval estimation, hypothesis testing, correlation and regression, analysis of variance, and spatial statistics, and other special topics relevant to enrolled students. Students who have passed GEOG 412 are not eligible to enroll in GEOG 512. Credit Hours: 3

GEOG513 - Research Methods for Environmental Social Science This course provides a foundation in social inquiry for environmental scientists. Topics include quantitative and qualitative social science research methods that can be applied to understand and identify solutions to complex socio-environmental issues. Research paradigms, research design, sampling frameworks, measurement, and the ethics of social research will be discussed. The course structure includes a combination of lectures, seminar-style discussions, and in-class activities. Credit Hours: 3

GEOG516 - Cartographic Design Introduction to the concepts and principles of map design and automated cartographic techniques used to promote the understanding of a map as a powerful communication model. Students will examine techniques for the representation, manipulation, display, and presentation of spatial data using computer mapping techniques and graphics software. This course

will also provide an introduction of contemporary map-making and communication technologies and their applications for solutions of real world problems. Team-based projects will address a geographic or environmental problem and produce professional maps. In addition, through reading research articles and writing three literature review essays, students will learn the history of cartographic design, the state of the arts and potential developments in detail. Students will learn how to integrate cartographic design with spatial analysis, geographic information science, Global Positioning System, remote sensing, computer sciences, and statistics, to solve practical problems in geography and other environmental fields. Students who have passed GEOG 416 are not eligible to enroll in GEOG 516. Prerequisites: GEOG 401 or GEOG 502, with grade of C or higher, or consent of instructor. Lab fee: \$40. Credit Hours: 3

GEOG517 - GIS Programming and Customization GIS programming trains students in customizing GIS applications and streamlining spatial analysis by assembling functions provided by the underlying GIS platforms. This course is an introduction to programming and scripting for intermediate GIS users who need to automate the geoprocessing of GIS datasets. This course focuses the most popular commercial platform, ArcGIS ModelBuilder and Python Scripting for ArcGIS. Through this course, students will understand the object-oriented programming principles, master the advanced skills of building a complex workflow for GIS analysis, and develop customized geoprocessing programs to edit, manipulate and analyze spatial data using ArcPy and Python. Graduate students are expected to develop in-depth analytical procedures for addressing complex GIS problems, and to present the results in the form of oral presentations and written reports. Students who have passed GEOG 417 are not eligible to enroll in GEOG 517. Prerequisite: GEOG 401 or GEOG 502, with grade of C or higher, or consent of instructor. Lab fee: \$40. Credit Hours: 3

GEOG520 - Advanced GIS Studies This course focuses on advanced conceptual and technical issues underlying GIS, including GIS data modeling, geodatabase model and structure, analytical methods and procedures associated with geospatial modeling, and the latest developments in geospatial sciences. Laboratory assignments include the analysis of digital geographic information of physical and social phenomena, emphasizing the use of standard GIS software to illustrate techniques of geodatabase, map digitization, spatial data exploration, spatial analysis/modeling, and GIS-based decision support. Graduate students will independently design, implement and present a GIS project that takes full advantage of advanced GIS theories and techniques to solve spatial problems. Students who have passed GEOG 420 are not eligible to enroll in GEOG 520. Prerequisite: GEOG 401 or GEOG 502, with grade of C or higher, or consent of instructor. Lab fee: \$40. Credit Hours: 3

GEOG521 - Urban Sustainability Students develop professional expertise to identify, analyze and explain urban problems and their sustainable solutions. Students use a geographic perspective to develop novel inquiries through independent research about the meaning and application of sustainability in an urban setting. Students who have passed GEOG 421 are not eligible to enroll in GEOG 521. Credit Hours: 3

GEOG522 - Environmental and Energy Economics Economics of renewable and nonrenewable natural resources management and environmental policy. Topics covered include: static and dynamic efficiency, market efficiency and market failures (market power, externalities, and public goods), the economics of nonrenewable resource extraction, renewable resources management (with a focus on forests and water), mechanism design choices and their implementation in the real world, and the role of the private and public sectors in research and development. Students that have successfully passed GEOG 422 are not eligible to enroll in GEOG 522. Credit Hours: 3

GEOG524 - Sustainable Development Students will develop professional expertise to analyze multiple dimensions of sustainable development focusing on institutions with impacts that vary from local to global scales. In addition to learning about extant examples of sustainable development initiatives, students conduct independent research to expand academic understanding of the concept of sustainable development. Students who have successfully passed GEOG 424 are not eligible to enroll in GEOG 524. Credit Hours: 3

GEOG526 - US Environmental Policy This course investigates the US system of environmental regulation: the background of social and environmental movements that influence US policy and the agencies involved in US environmental regulation. Emphasis is on US regulations and US participation in

global environmental policies. Overall, the focus is on spatial variations in environmental regulations; or the geography of environmental quality. Credit Hours: 3

GEOG528 - GIS Portfolio/Capstone Project Students propose a topic and independently develop, design and implement a GIS research project for solution of a real world problem with guidelines and guidance from the instructor. The focus is placed on integration of multidisciplinary methods and multi-source spatially referenced and aspatial data to search for an effective solution for a real world problem. Submission of a project portfolio or a research paper with a poster is required for successful completion. Prerequisite: GEOG 401 or GEOG 502 and GEOG 406 or GEOG 506, with a grade of C or higher, or consent of instructor. Lab fee: \$20. Credit Hours: 3

GEOG529 - Geography of Local and Organic Food A graduate level course related to food systems. Focus on local issues such as farmer decision-making, landscapes, sense-of-place, marketing, etc. to national/global concerns including organic certification, corporate influences, agricultural productivity, food safety, etc. Students who have passed GEOG 429 are not eligible to enroll in GEOG 529. Credit Hours: 3

GEOG531 - Climate Data Analysis This course focuses on identifying, locating, and applying appropriate climate data sets (e.g., station observations, atmospheric reanalyses, and climate model output), techniques for obtaining and processing these data sets, and methods commonly used for applied climate analysis. Student-lead, applied research projects provide students with the opportunity to utilize a variety of data sets and analytical tools introduced during the semester. The curriculum is organized around graduate-level research projects that utilize climate data sets. Students will become familiar with a range of computational packages, including Matlab. Students should have a basic understanding of climatology and statistics prior to taking this class. Students who have passed GEOG 431 are not eligible to enroll in GEOG 531. Credit Hours: 3

GEOG533 - Advanced Field Methods in Geography Quality graduate level geographic research depends on obtaining reliable data through an informed research design. Exploring both social and environmental processes, students will actively participate in developing and conducting research. Using the SIU Carbondale campus and surrounding region as a laboratory, lab exercises will include human geography, geomorphology, hydrology, climatology, spatial analysis, and biogeography. As a graduate level class, advanced analytical techniques will be presented and utilized by the students. These techniques will include graduate level statistics and spatial analysis. Students who have successfully passed GEOG 433 are not eligible to enroll in GEOG 533. Lab fee: \$40. Credit Hours: 3

GEOG534 - Water Resources Hydrology This course covers the major components of the hydrologic cycle with emphasis on surface water and fluvial (stream) processes. Students will gain a detailed understanding of the major hydrologic processes and develop substantial experience in collecting, compiling, and analyzing hydrologic data for use in water resource analysis and management. In addition, they will learn and demonstrate their proficiency in using advanced statistics and spatial analyses used in hydrologic research. Students that have successfully passed GEOG 434 are not eligible to enroll in GEOG 534. Lab fee: \$20. Credit Hours: 3

GEOG536 - Natural Hazards This course introduces students to the geophysical and human dimension of natural hazards and focuses on five main areas: 1) characterization of natural hazards; 2) human dimensions of natural hazards; 3) natural hazard risk assessment; 4) natural hazard mitigation planning; and 5) the use of geospatial tools and models used in risk assessments and mitigation planning activities. It is expected that graduate students will develop an advanced understanding of both geophysical and human dimensions of natural hazards. They will also learn and then demonstrate their proficiency in using advanced statistics and spatial analyses used in hazards research. Students who have successfully passed GEOG 436 are not eligible to enroll in GEOG 536. Lab fee: \$20. Credit Hours: 3

GEOG539 - Global Climate Change This course examines the major environmental, social and policy impacts and solutions related to global climate change, including anthropogenic greenhouse gas emissions, land use/land cover change, extinction and biodiversity, environmental communication, climate hazards, and potential climate change related impacts on human health. Students that have successfully passed GEOG 439 are not eligible to enroll in GEOG 539. Credit Hours: 3

GEOG540 - Rivers and Their Management In this class, students will develop an advanced understanding of the linkages between physical river processes and the services rivers provide to society. The topics covered in this course include river hydrology, fluvial geomorphology, river management,

and human impacts on rivers and their ecosystems. Students will gain an advanced knowledge and experience in collecting, compiling, and analyzing hydrologic, sedimentological, and hydraulic data for use in quantitative analyses and management. Students will also be expected to be able to synthesize and then present key concepts and ideas from the academic literature to their peers. This additional level of scholarship will be demonstrated through graduate student led seminars. Students who have passed GEOG 440 are not eligible to enroll in GEOG 540. Lab fee: \$20. Credit Hours: 3

GEOG544 - Soils and Human Health Exploration of the ways that soils, and to a lesser extent air and water, influence human health both positively and negatively. Soil properties and processes that control this interaction. Techniques used to explore the soil-human health relationship and needs for future advancement. Prerequisite: CSEM 240 or GEOG 303I or FOR 352 with a grade of C or better. Credit Hours: 3

GEOG554 - Conservation and Environmental Movements This course covers topics that include: environmental non-governmental organizations (ENGOS), human perceptions of the environment, theories of human interactions with nature, conservation literature, key environmentalists, historical environmental movements, societal perception of nature, and impacts of environmentalism on policy. Students who have successfully passed GEOG 454 are not eligible to enroll in GEOG 554. Credit Hours: 3

GEOG555 - Environmental Behavior Change This course will cover foundational psychological principles and theories related to how people think about, feel about, relate to and experience the natural environment. Students will learn how these theories and principles can be applied to change behavior and encourage environmental sustainability. Throughout the semester, students will practice drawing upon their theoretical knowledge to design behavioral interventions and communication strategies of their own. Students will also learn to design studies to evaluate whether those interventions are effective in achieving their goals. Finally, students will learn to read, understand, evaluate and critique peer-reviewed psychological research papers. Readings will be drawn from several areas of psychology, including behavioral, social, cognitive and experimental psychology. The course structure includes a combination of lectures, seminar-style discussions and in-class activities. Credit Hours: 3

GEOG556 - Geographic Visualization In addition to an overview of the theories, concepts and approaches of geographic visualization, this course will provide an introduction of advanced methods for information visualization, data quality assessment, and communication enhancement in the fields of exploratory data analysis (EDA), cartographic design, thematic mapping, web cartography, map animation, virtual environment, and multimedia applications. Students will learn the use of commercial software packages commonly used for graphic-based applications and complete the required hands-on exercises. However, the focus is put on integration of multidisciplinary methods for geographic visualization. Students will also learn about contemporary technologies through writing literature review essays and completing a course project. Students who have successfully passed GEOG 456 are not eligible to enroll in GEOG 556. Lab fee: \$30. Credit Hours: 3

GEOG565 - Introduction to Energy Geography This course explores energy as a critical geographic and social phenomenon, emphasizing the spatial and temporal dimensions of energy distribution, availability, accessibility, and acceptability. Students will (1) understand energies beyond disciplinary technical and engineering domains but from interdisciplinary geographic perspectives, and (2) examine the interplay between energy and place, as well as the relationships between energy and people. The course covers both physical and social perspectives, offering a comprehensive understanding of the complexities of energy systems, their role in economic development, environmental sustainability, and community resilience. Prerequisite: GEOG 502 with a grade of C or better. Credit Hours: 3

GEOG570 - Contemporary Issues in Environmental Studies Topics may include history of environmentalism, conservation/preservation, US environmental policy, green jobs, innovative technology, sustainability, environmental non-governmental organizations, climate change, and environmental education. Students who have passed GEOG 470 are not eligible to enroll in GEOG 570. Credit Hours: 3

GEOG580 - Internship in Geography Practical experience on-site with an environmental organization or GIS office. A report or professional poster on the work is required at the end of the semester. Special approval needed from the program. Credit Hours: 2-3

GEOG591 - Independent Studies in Geography Restricted to graduate standing. Credit Hours: 2-4

GEOG593A - Research in Environmental Sustainability Restricted to graduate standing. Credit Hours: 2-6

GEOG593B - Research in Geographic Information Science Prerequisite: GEOG 500 and GEOG 501. Restricted to graduate standing. Credit Hours: 2-6

GEOG593C - Research in Climate & Water Resources Restricted to graduate standing. Credit Hours: 2-6

GEOG596 - Field Course Restricted to graduate standing. Credit Hours: 2-4

GEOG599 - Thesis Restricted to graduate standing. Credit Hours: 2-6

GEOG601 - Continuing Enrollment For those graduate students who have not finished their degree programs and who are in the process of working on their thesis or research paper. The student must have completed the minimum thesis or research hours before being eligible to register for this course. Concurrent enrollment in any other course is not permitted. Graded S/U or DEF. Credit Hours: 1

GEOG699 - Postdoctoral Research Must be a Postdoctoral Fellow. Concurrent enrollment in any other course is not permitted. Credit Hours: 1

Geography and Environmental Resources Faculty

Duram, Leslie A., Professor, Geography and Environmental Resources, Ph.D., University of Colorado, 1994; 1994. Environmental geography, local food systems, climate change and society, campus sustainability.

Hurst, Kristin, Assistant Professor, Geography and Environmental Resources, Ph.D., Virginia Polytechnic Institute and State University, 2019; 2021. Sustainability psychology, pro-environmental behavior, climate change engagement, and human-environment interaction.

Li, Ruopu, Associate Professor, Geography and Environmental Resources, Ph.D., University of Nebraska, 2012; 2015. GIS analysis and modeling, water resources modeling and management, energy geography, agricultural land use.

Remo, Jonathan, Associate Professor, Geography and Environmental Resources, Ph.D., Southern Illinois University, 2008; 2012. Fluvial geomorphology, flood hydrology, hydraulic modeling, disaster mitigation planning, disaster loss modeling.

Schoof, Justin, Professor and Director School of Earth Systems and Sustainability, Geography and Environmental Resources, Ph.D., Indiana University, 2004; 2006. Climate variability and change, synoptic climatology, statistical climatology, climate extremes.

Wang, Guangxing, Professor, Geography and Environmental Resources, Ph.D., University of Helsinki, 1996; 2007. Remote sensing, GIS, forest and city carbon modeling and mapping, spatial uncertainty analysis of remote sensing products.

Weinert, Julie, Professor of Practice, Ph.D., The Ohio State University, 2008; 2005. Tourism geography, ecotourism, feminist geography, globalization, geography of development.

Emeriti Faculty

Baumann, Duane D., Professor, Emeritus, Ph.D., Clark University, 1968.

Dziegielewski, Benedykt, Professor, Emeritus, Ph.D., Southern Illinois University, 1983.

Horsley, Doc, Assistant Professor, Emeritus, Ph.D., Southern Illinois University, 1974.

Lieber, Stanley R., Professor, Emeritus, Ph.D., University of Iowa, 1974.

Sharpe, David M., Professor, Emeritus, Ph.D., Southern Illinois University, 1968.

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