**Geography (GEO) - Graduate Courses**

### Courses

**ESC/GEO 422/522 Cr.3**

**Meteorology**
Atmospheric concepts and processes of the earth's weather are covered. Principles and laws which govern the behavior of the atmosphere are investigated, including energy exchange between the earth and the atmosphere, forces governing atmospheric motion, atmospheric moisture and stability, condensation and precipitation processes, air masses and cyclogenesis, thunderstorm and tornado development, and hurricanes. Surface and upper-air charts, synoptic patterns, thermodynamic charts, radar and satellite images, and weather patterns are analyzed. Prerequisite: ESC 221. (Cross-listed with ESC/GEO; may only earn credit in one department.) Offered Spring - Odd Numbered Years.

**ESC/GEO 425/525 Cr.3**

**Biogeography**
A systematic analysis of the geographic distribution of organisms from historical, ecological and regional perspectives. Emphasis is placed on the principles and the methods of biogeography. Special reference is made to biogeographic regions, the distribution of organisms in space and time, and ecological biogeography. Prerequisite: ESC 101 or ESC 211. (Cross-listed with ESC/GEO; may only earn credit in one department.) Offered Fall - Odd Numbered Years.

**ESC/GEO 426/526 Cr.4**

**Soil Systems**
A comprehensive study of soils around the world and the factors and processes that drive their formation and dynamic evolution. Emphasis is placed on soil morphology, formation, and biogeochemical influences within the soil environment. A one-credit lab section is devoted to the hands-on exploration and study of soils through laboratory and field exercises. Lect. 3, Lab 2. Prerequisite: ESC 222. (Cross-listed with ESC/GEO; may only earn credit in one department.) Offered Alternate Years.

**ESC/GEO 430/530 Cr.3**

**River Systems**
A systematic study of the interactions between flowing water and surface landforms. Emphasis is placed on watershed and stream development, sediment transport and storage, flow frequency analysis, and applications of fluvial principles to river management and stream restoration. Class activities will include field exercises in the La Crosse region, mathematical analysis of hydrologic variables, and spatial analysis with Geographic Information Systems. Prerequisite: ESC 222. (Cross-listed with ESC/GEO, may only earn credit in one department.) Offered Spring - Odd Numbered Years.

**ESC/GEO 440/540 Cr.3**

**Geographic Interpretation of Aerial Photographs**
Systematic applications of aerial photographs in the interpretation and analysis of geographic problems. Emphasis is placed on digital photograph interpretation within a geographic information system. Topics include urban and rural land use, natural resource, and environmental assessment. Lect. 2, Lab 2. Prerequisite: ESC/GEO 385. (Cross-listed with ESC/GEO; may only earn credit in one department.) Offered Occasionally.

**ESC/GEO 445/545 Cr.3**

**Advanced Remote Sensing**
Advanced techniques of digital satellite and airborne image analysis and processing, emphasizing theory and applications in natural resource, land use and environmental assessment. Includes practical approaches to integrating imagery with geographic information systems area for spatial analyses and decision making. Data acquisition, integrity, manipulation, formatting, storage, and retrieval are also examined. Prerequisite: ESC/GEO 345. (Cross-listed with ESC/GEO; may only earn credit in one department.) Offered Spring.

**ESC/GEO 450/550 Cr.3**

**Web Mapping**
In this course, students will learn how to produce and design interactive Web maps for communication. Web maps take many forms and they are continually changing. Thus, the objective of this course is to do two things: (1) develops proficiency in the scripting languages and tools most frequently used to design and create these maps; and (2) teaches the theory and concepts underlying good Web map design so that as the technologies change in the future students will still be able to design effective Web maps. At the end of this course, students will be able to design a Web map from scratch. Lect. 2, Lab 2. Prerequisite: ESC/GEO 250; ESC/GEO 355; junior standing. (Cross-listed with ESC/GEO, may only earn credit in one department.) Offered Spring.

**ESC/GEO 460/560 Cr.3**

**Environmental Hazards**
Environmental processes are investigated in light of the hazards they might pose for development and how they may be avoided, mitigated and managed. Prerequisite: ESC 221 or ESC 222. (Cross-listed with ESC/GEO; may only earn credit in one department.) Offered Fall - Even Numbered Years.
GEO 465/565 Cr.3
**Scripting in GIS**
This course will teach students how to customize within GIS software using scripting and programming tools commonly used in GIS discipline. Student will learn about the conceptual and practical aspects of programming for geographic applications using Python, a free open-source scripting language. Python is well integrated with all the major GIS softwares, and a very popular language among GIS professionals. The course focuses on solving geographic problems by modifying and automating generic GIS software through programming. In this course, students will learn general and transferable scripting skills, and GIS-specific applications, including the basics of writing and modifying scripts, batch processing and automation of repetitive geoprocessing tasks, and designing complex geoprocessing tasks. The skills learned in this course are equally applicable in scientific research, the public sector, and in industry. Students taking this course must be familiar with geographic data structures, basic GIS concepts, and demonstrate basic understanding of geospatial analysis. No prior programming experience is required or expected. This course is taught largely at an undergraduate level. Graduate students will have additional course requirements/expectations. Lect. 2, Lab 2. Prerequisite: ESC/GEO 385. Offered Occasionally.

ESC/GEO 470/570 Cr.1-3
**Special Topics in Geography/Earth Science**
Specifically selected topics or skills which may be designed for the interest of special groups will be offered with formalized instruction and methodology appropriate to geography and/or earth science. May be counted as an elective in the geography major or earth science minor at the discretion of the geography/earth science department. Prerequisite may be required at the discretion of the department. Repeatable for credit - maximum six. (Cross-listed with ESC/GEO; may only earn credit in one department.) Offered Occasionally.

ESC/GEO 476/576 Cr.1-3
**Geography/Earth Science Topics for Teachers**
Selected topics in geography and/or earth science pertinent to applications in the teachers’ classrooms. Courses are designed to meet the needs of teachers so that they may implement the course material into their classroom teaching. (Cross-listed with ESC/GEO; may only earn credit in one department.) Offered Occasionally.

GEO 485/585 Cr.3
**Advanced Geographic Information Science**
Advanced theories in geographic information systems database structures, advanced applications, database transfers, database management, use of census data, spatial analysis, and decision-making. Emphasis on ARCGIS and its applications. Integration of GIS with remote sensing and GPS. Lect. 2, Lab. 2. Prerequisite: STAT 145; ESC/GEO 385. Offered Spring.

GEO 588 Cr.3
**Spatial Data Analysis**
Theory, methods, and techniques for quantitative analysis of spatial data. Students will learn and employ basic quantitative techniques for describing, modeling, and analyzing spatial data. This course explores point pattern analysis, methods for continuous data, and spatial regression. Focus will be on the interpretation and the application of spatial data analysis techniques to address geographic problems. Prerequisite: STAT 145; GEO/ESC 385. Offered Alternate Years.

ESC/GEO 490/590 Cr.2-3
**Independent Study**
Individual readings and investigation of selected problems in geography. Open to senior majors and minors with a “B” (3.00) average in geography. Registration with consent of regular advisor, instructor, department chairperson, and the dean of the college in which the student is enrolled. Repeatable for credit - maximum six. Maximum three credits applicable to major. Maximum three credits from any instructor. (Cross-listed with ESC/GEO; may only earn credit in one department.) Consent of instructor. Offered Fall, Winter, Spring, Summer.

ESC/GEO 495/595 Cr.1-3
**Seminar in Geography/Earth Science**
Investigation into various topics in geography or the earth sciences. Varying topics will be offered at intervals with a specific title assigned to each. This course is taught largely at an undergraduate level. Graduate students will have additional course requirements/expectations. Repeatable for credit - maximum six. Variable topics - check semester timetables. Prerequisite: two semesters of geography and/or earth science. Additional prerequisites may be required by the instructor. (Cross-listed with ESC/GEO; may only earn credit in one department.) Offered Occasionally.

GEO 734 Cr.1-3
**Field Studies of World Regions**
Geographic study of a selected region of the world with emphasis on guided field study and individual research problems. Library and field-work and geographic techniques of research leading to a better understanding of problems concerning another region of the world. Repeatable for credit - maximum three. Offered Occasionally.

ESC/GEO 790 Cr.1-3
**Directed Study**
Individual readings and investigations of selected topics in geography and earth science. Repeatable for credit – maximum three. Prerequisite: permission of the instructor and the department chair. (Cross-listed with ESC/GEO; may only earn credit in one department.) Offered Occasionally.