

GEOLOGY

- Certificate, Geographic Information Systems (p. 1)

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Certificate in Geographic Information Systems (GIS)

The GIS certificate program contains four courses at its core:

GEO 550	Applied Geographic Information Systems	4
or GEO 551	Geographic Information Systems (GIS) for Human Rights	
GEO 555	Environmental Remote Sensing	4
GEO 560	Advanced Applications of Geographical Information Systems	3
GEO 598	GIS Capstone	3
Total Hours		14

Students may take 1 or 2 other courses relating to distinctive areas of concentration that they may choose. These courses can be existing UD courses that provide additional background knowledge to GIS usage, or GIS-specific courses that can be developed later with collaboration from other departments.

Courses

GEO 502. Glacial Geology. 3 Hours

The origin of mountain and continental glaciers; their depositional features, erosive activity and dynamics; history of glaciation in geologic past with special emphasis on North American Quaternary ice advances. Prerequisites: GEO 115 or GEO 109 or SCI 210 or GEO 208 or GEO 218.

GEO 502L. Glacial Geology Laboratory. 1 Hour

Course to accompany GEO 502. Three hours each week.

GEO 507. Sculpted Planet: Geomorphology, Surface Processes and the Origins of Earth's Topography. 3 Hours

Detailed study of the processes shaping the Earth's surface and the landforms and deposits they produce. This course is co-listed with GEO 407, and students taking this course will be given supplemental work and responsibilities, including additional or alternative exams, research and leadership roles during group projects. Prerequisites: GEO 115 or GEO 109 or SCI 210 or GEO 208 or GEO 218.

GEO 507L. Sculpted Planet Laboratory. 1 Hour

Course to accompany GEO 407. Three hours each week. This course is co-listed with GEO 407L, and students taking this course will be given supplemental work and responsibilities, including additional or alternative exams, research and leadership roles during group projects.

GEO 509. Advanced Surface & Groundwater Hydrology. 3 Hours

This course is designed to provide a graduate-level science or engineering student with the fundamental concepts and principles central to the study of water as a resource. This will include an examination of all components of the hydrologic cycle including surface-water hydrology and management, groundwater hydrogeology and water resource management. This course is co-listed with GEO 409, and students taking this course will be given extra assignments such as developing a report of groundwater flow analysis for an aquifer. Prerequisites: GEO 115 or SCI 210 or GEO 208 or GEO 109 or GEO 218 or permission of instructor.

GEO 509L. Advanced Surface and Groundwater Hydrology Laboratory. 1 Hour

Laboratory exercises to accompany GEO 409. Three hours per week. This course is co-listed with GEO 409L, and students taking this course will be given extra assignments.

GEO 510. Stratigraphy and Sedimentology. 3 Hours

Investigation and interpretation of sedimentary rocks, sedimentary environments and the stratigraphic record. This course is co-listed with GEO 410, and students taking this course will be given extra assignments during the semester and will be assignment a class project accompanied with an oral or poster presentation at the end of the semester. Prerequisites: GEO 109 or GEO 115 or GEO 208 or GEO 218 or equivalent.

GEO 510L. Stratigraphy and Sedimentology Laboratory. 1 Hour

Investigation and interpretation of sedimentary rocks, sedimentary environments and the stratigraphic record. This course is co-listed with GEO 410, and students taking this course will be given extra assignments during the semester and will be assignment a class project accompanied with oral or poster presentation at the end of the semester.

GEO 512. Introductory Geochemistry. 3 Hours

Study of elementary thermodynamics, aqueous geochemistry, and principles governing the distribution of trace elements, radioisotopes and stable isotopes in igneous, metamorphic and sedimentary rocks. Emphasis on applications and solution of geological problems. This course is co-listed with GEO 412, and students taking this course will be given extra assignments and article reading during the semester and will be assignment a class project accompanied with oral or poster presentation at the end of the semester. Prerequisites: GEO 201 or permission of instructor.

GEO 512L. Introductory Geochemistry Laboratory. 1 Hour

Course to accompany GEO 512 and co-listed with GEO 412 L. The class meet three hours a week. The lab extends the basic geochemical principles and concepts discussed in GEO 512 and provide hands on experience in the lab. The labs covers scientific methodology, analytical techniques, data analysis and interpretation, and applying geochemical principles to geological problems. In addition, the lab introduces geochemical softwares. Other skills you will learn are independent thinking and self-motivation.

GEO 550. Applied Geographic Information Systems. 4 Hours

This course covers the fundamentals of Geographic Information Systems (GIS) technology and how it is being applied in such diverse fields as physical sciences, social/political sciences, planning, marketing, health, criminal justice, natural resources, and engineering. Students will learn the processes to collect, organize, analyze and display geographic data obtained from sources such as address geocoding, GPS, CD-ROM and World Wide Web sites. However, the emphasis of the course will be on data preparation and visualization based on sound knowledge of basic principles of cartographic design. Some preliminary data analysis techniques will be introduced but it is not an emphasis of the course. Each student will complete a series of mini projects that illustrate the typical steps in a GIS project. Major topics include: representation of geography, coordinate systems and map projections, principles of basic cartography, thematic mapping, data acquisition using GPS, geocoding, basic editing, and basic data management and exploration.

GEO 551. Geographic Information Systems (GIS) for Human Rights. 4 Hours

This course introduces the concepts and implementation of analysis in geographic information systems (GIS), and applies the GIS tool to different human rights situations or investigations. This course is cross-listed with GEO 451 and HRS 451, and it is a CAP-approved course for undergraduate level, we would like to make this course available for graduate students.

GEO 555. Environmental Remote Sensing. 4 Hours

Introduction to principles and concepts of Remote Sensing, a sophisticated technology of earth observation that provides fundamental data for global environmental investigation.

GEO 560. Advanced Applications of Geographical Information Systems. 3 Hours

Building upon GEO 450 / GEO 550, this course aims to broaden students' understanding of GIS theories and emphasize advanced spatial analysis, modeling and visualization methodologies. Based on an applied approach, this course will use a variety of projects to illustrate these techniques. Prerequisite(s): GEO 450 / GEO 550 Applied GIS.

GEO 585. Geographic Information Systems Applications in Water Resource Planning & Management. 4 Hours

This course introduces GIS applications in water resource management. Following an introduction to raster-based modeling in GIS, it will focus on GIS techniques in surface water modeling and floodplain delineation and management.

GEO 598. Capstone Project. 3 Hours

This capstone course aims to integrate concepts and capabilities developed in previous courses (GEO 450 / GEO 550 and GEO 560) and to apply them in a realistic setting relevant to individual student interests. The course seeks to refine skills in project implementation using GIS, emphasizing project development, organization and management, presentation technique, and the use of modern information-acquisition and processing technology in GIS and/or Remote Sensing. Prerequisite(s): GEO 450 / GEO 550 Applied GIS; GEO 560 Advanced GIS.