GEOGRAPHY, SUSTAINABILITY, COMMUNITY AND URBAN STUDIES (GSCU)

GSCU 5000. Research Design. (3 Credits)
A survey of research methods in geography. Topics include spatial sampling, hypothesis construction and testing and geographic modelling. Formerly offered as GEOG 5000.

GSCU 5010. Geography Proseminar. (1 Credit)
Presentation by geography faculty of current research topics. Formerly offered as GEOG 5010.
Enrollment Requirements: Open to graduate students in Geography.

GSCU 5130. Transportation Geography. (3 Credits)
Discussion of the uses of Geographic Information Systems (GIS) for transportation rate establishment, for visualizing the results of transportation models for predicting flows, for exploring the impact of transportation on the location of economic activities, and for the planning of transportation facilities in cities. Formerly offered as GEOG 5130.
Enrollment Requirements: Open to graduate students in Geography.

GSCU 5230. Advanced GIS for Remote Sensing for Geoscience Applications. (3 Credits)
(Also offered as ERTH 5230.) Research methods for using Geographic Information Systems, remote sensing, and image interpretation to investigate problems in geoscience. Includes research techniques for data acquisition, processing and analysis of Digital Elevation Models and satellite imagery. Geologic materials, processes, landforms and landscapes. Formerly offered as GEOG 5230.
Enrollment Requirements: Not open for credit to students who have completed ERTH 4230.

GSCU 5320. Geography of Sustainable Development. (3 Credits)
Conceptualizing international development; understanding theories, strategies and ideologies of development; and use of case studies to understand development in practice. Emphasis placed on the concept of sustainable development and sustainability, grassroots-driven approaches to development, the role of women, and geographic explanations as to how and why uneven development has occurred. Formerly offered as GEOG 5220.

GSCU 5340. Biogeography. (3 Credits)
An examination of how physical environments, historical processes, and human activities shape current biogeographical patterns and influence future changes. Formerly offered as GEOG 5340.
Enrollment Requirements: GSCU 1000E or GSCU 2300E or EEB 2244E or EEB 2245 or NRE 1000E.

GSCU 5400. Spatial Data Analysis. (3 Credits)
Univariate statistics focused on the use of spatial statistics, including geostatistics in geographical research. Problems specific to spatial data analysis are addressed. Formerly offered as GEOG 5600.

GSCU 5410. Spatial Statistics and Modeling. (3 Credits)
Advanced study in the methods and practice of multidimensional statistics and spatial modeling. Formerly offered as GEOG 5610.
Enrollment Requirements: GSCU 5400.

GSCU 5500. Fundamentals of Geographic Information Science. (3 Credits)
An introduction to the theory and methods for representing, acquiring, storing, manipulating, displaying, and analyzing geographic features in relation to the surface of the earth. Formerly offered as GEOG 5500.

GSCU 5505. Remote Sensing of Marine Geography. (3 Credits)
Introduction to remote sensing applications in oceans and seas. Applications include image analysis of sea surface temperature, winds, altimetry, sea ice, chlorophyll, primary productivity, and bathymetry. Graduate section includes individualized projects. Formerly offered as GEOG 5505.

GSCU 5510. Applications of Geographic Information Systems. (3 Credits)
Operational and management issues of geographic information systems (GIS) with emphasis on understanding GIS through use of software. Topics include the principal functional components of GIS including general GIS design and management theory, spatial and attribute data creation, database design and management, spatial analysis, cartographic production, and application design and implementation. Practical work includes analytical exercises using GIS culminating in an application project. Formerly offered as GEOG 5510.
Enrollment Requirements: Recommended preparation: GSCU 5500.

GSCU 5512. Introduction to Spatial Data Science. (3 Credits)
Introduction to the fundamentals of spatial data science. Students will also learn how to apply a high-level programming language, R, for spatial data analysis, visualization, and modeling. Formerly offered as GEOG 5512.
Enrollment Requirements: GSCU 5500 or instructor consent.

GSCU 5515. Web GIS. (3 Credits)
Introduction to Internet GIS. The basics of system architecture, geospatial web services, mashups, key elements of mobile GIS solutions, the functionality of geoportals and web technologies, web mapping interoperability using universal data standards such as OGC (Open Geospatial Consortium) web services, and the current state of e-business and e-government web mapping interests. Formerly offered as GEOG 5515.

GSCU 5516. Fundamentals of Spatial Database Systems. (3 Credits)
The theories and principles behind Spatial Database Systems. Students will learn how to design and implement spatial databases. Formerly offered as GEOG 5516.
Enrollment Requirements: Not open for credit to students who have passed GSCU 4516.

GSCU 5518. Mobile GIS. (3 Credits)
This course covers how to develop, test, and publish mobile GIS web and native apps across multiple mobile platforms (Android, iOS, etc.). Formerly offered as GEOG 5518.
Enrollment Requirements: Not open for credit to students who have passed GSCU 4518.

GSCU 5519. Spatial Big Data Analytics. (3 Credits)
Covers the collection, analysis, and visualization of spatial big data to support better decision-making in geographic contexts. Formerly offered as GEOG 5519.
Enrollment Requirements: Instructor consent required. Not open for credit to students who have passed GSCU 4519.

GSCU 5520. GIS Modeling of the Urban Environment. (3 Credits)
Survey of GIS methods and spatial analysis for studying spatial patterns of land use and human activity in an urban environment. Formerly offered as GEOG 5520.

GSCU 5530. GIS for Health and Environment. (3 Credits)
An exploration of how spatial data and Geographic Information Systems (GIS) can be used to understand and improve human and environmental health. Formerly offered as GEOG 5530.
Enrollment Requirements: Recommended preparation: GSCU 5500.

GSCU 5540. Computer Applications in Spatial Analysis. (3 Credits)
Advanced seminar in the design of Geographic Information Systems software for solving problems in spatial analysis. Formerly offered as GEOG 5620.

GSCU 5550. Geospatial Artificial Intelligence Applications in Geography and GIS. (3 Credits)
Introduction to the ways in which geographers use AI-driven solutions for a spectrum of challenges impacting society and the natural world. Emphasizes hands-on exercises to craft and implement machine learning models tailored for geospatial analysis and visualization.
Enrollment Requirements: Not open for credit to students who have passed GEOG 5895 when offered as Introduction to Geospatial Artificial Intelligence.

GSCU 5800. Climate Science and Society. (3 Credits)
The science behind our changing climate, focusing on extreme weather events responsible for power outages, and society's perceptions of and responses to the climate crisis. Formerly offered as GEOG 5400.
Enrollment Requirements: Open only to students in the MEEM or other online fee-based degree programs.

GSCU 5840. Disaster Risk, Vulnerability, and Resilience. (3 Credits)
Overview of geographical perspectives on disaster risk, vulnerability, and resilience using an integrated environmental, social, and infrastructural approach. The theory, methods, metrics, and tools necessary to measure and understand risk, vulnerability, and the resilience of societies worldwide. Formerly offered as GEOG 5240.
Enrollment Requirements: Recommended preparation: Introductory course on natural hazards and disasters.

GSCU 5850. Social Dimensions of Renewable Energy. (3 Credits)
Geographic concepts and methodological tools guiding decision-making between potential energy futures. Spatial patterns of economic and social activity in the transition to low carbon energy. Formerly offered as GEOG 5540.
Enrollment Requirements: GSCU 5500 or consent of instructor.

GSCU 5990. Internship in Geography. (1-6 Credits)
A fieldwork internship program under the direction and supervision of the geography staff. Students will be placed in agencies or industries where their academic training will be applied. One 8-hour work day per week (or its equivalent) for the host agency during the course of the semester will be necessary for three academic credits. A written report will be required. Formerly offered as GEOG 5890.
May be repeated for a total of 12 credits

GSCU 5995. Special Topics in Geography. (1-6 Credits)
May be repeated with a change in content. Formerly offered as GEOG 5895.
May be repeated for a total of 18 credits

GSCU 6000. Themes in Geographic Thought. (3 Credits)
Examination of the historical development of geography since the early nineteenth century. Emphasis on the last century of intellectual developments that have led to the emergence of contemporary geography as a research discipline. Formerly offered as GEOG 6000.

GSCU 6910. Seminar on Spatial Analysis of Social Issues. (3 Credits)
An exploration of the complex social processes connecting people, places, and the environment across space using quantitative and qualitative methods of spatial analysis. Topics may include sustainability, environmental justice, racial and gender disparities, transportation, health issues, and the dynamics of internal and international migration with a unifying theme to understand the interaction between social processes and spatial inequalities. Formerly offered as GEOG 6810.
Enrollment Requirements: Instructor consent.
May be repeated for a total of 6 credits

GSCU 6915. Seminar on Geographic Information Science and Systems. (3 Credits)
An exploration of Geographic Information Science (GISc) and Systems (GIS) theories, methods, and critiques for physical and social sciences. Topics may range from fundamental to emergent themes including measurement biases, uncertainties, qualitative GIS, spatial big data, human dynamics, and GeoAI. Formerly offered as GEOG 6815.
Enrollment Requirements: Recommended preparation: GSCU 5500 or 5510.
May be repeated for a total of 6 credits

GSCU 6975. Seminar on Human-Environment Dynamics. (3 Credits)
An exploration of transdisciplinary and multidisciplinary approaches in human-environment systems (HES) science to help solve complex human-environmental problems. Topics may include an understanding of challenges, methodologies, and potential solutions to human-environmental problems such as global environmental change, related critical physical, chemical, and biological systems, natural hazards and disasters, risk, resilience, and climate extremes from geographic perspectives. Formerly offered as GEOG 6875.
May be repeated for a total of 6 credits

GSCU 6982. Practicum in College Teaching in Geography. (1 Credit)
Guided development of college-level instruction. Drafting of course objectives, selection of texts, development of course and lecture outlines, selection of grading mechanisms, and incorporating feedback for improvement of instruction. Formerly offered as GEOG 6800.
Enrollment Requirements: Open to graduate students in Geography.
May be repeated for a total of 3 credits