

GEOGRAPHIC INFORMATION SYSTEMS (GIS)

GIS 201 Introduction to Geographic Information Systems and Spatial Analysis (3 Credits)

This course will provide an introduction to the fundamentals of geospatial technologies, including using Geographic Information Systems (GIS), Global Positioning Systems (GPS), basics of cartography, remote sensing and spatial analysis. Emphasis will be on hands-on application of these technologies to create maps, to organize and visualize spatial data, and to utilize spatial data to analyze and address social, economic, political and environmental issues.

GIS 350 Spatial Analysis and Social Justice (3 Credits)

Geographic Information Systems (GIS) can be a powerful tool to understand and mitigate the impacts of social inequity. We will analyze how the workings of power and privilege in the United States (US) have led to Black, Latinx, and Native American communities being disproportionately affected by societal problems such as environmental justice, discrimination, economic injustice, or political unfairness. We will also explore how geospatial scientists and community leaders can work together to solve these challenges. For GIS to truly be a tool for social justice, we also need a diverse and inclusive GIS community. We will discuss the importance of diversity, equity, and inclusion in geographic information science and strategies for overcoming the barriers that currently exist. This course will be tailored to the area of expertise of the instructor and the exact topics covered will vary. While the content may change, each course will adhere to the course description, objectives and goals, grading policy, and module outline. The COLL 350 requirement enhances students' knowledge and facilitates their critical analysis of the workings of power, privilege, and inequity in US society and globally, past and present. The goals of the COLL 350 are: 1) to provide students with a rigorous academic space in which to explore differences in perspective while foregrounding reasoned and respectful discussion as the means for achieving common ground; 2) to deepen students' understanding of justice, equity, and the value-laden processes of social inclusion and exclusion through institutional, cultural, and normative practices that are both historical and ongoing. To meet these pedagogical goals, COLL 350 courses will: 1) examine social norms, institutional practices, and patterns of belonging and marginalization by exploring race and at least one other key social category including, but not limited to: class, disability, ethnicity, gender expression, gender identity, immigration status, language, religion, sex, and sexual orientation; 2) emphasize respectful dialogue among students as an integral component of the course; and 3) enable critical reflection by requiring students to make substantial and sustained connections between the course material and contemporary life in the United States. The subject matter will be at times difficult. However, the ability to engage complex and sensitive subjects is an essential life skill. Therefore, as a class, we will establish guidelines and ground rules to encourage respectful dialogue.

Prerequisite(s): GIS 201 or CONS 201

College Curriculum: C350

GIS 405 Geovisualization & Cartographic Design (3 Credits)

Communicating geographic concepts, problems and solutions are key to the geovisualization and spatial design, the modern art and science of cartography. The foundational principles of the course will be grounded in the fundamentals of traditional cartography using GIS in combination with design and analytical software. This course will immerse students in color theory, symbology, typography, along with 2-D and 3-D design layout within web and print media. Hands-on learning experiences will emphasize and apply scientific visualization techniques alongside the art of data visualization, both in terms of how to use visualization to understand spatial data and to create strong visual communication. Prerequisite(s): GIS 201 or INTR 204 or BIOL 445 or CONS 210

GIS 410 Introduction to Remotely Sensed Imagery and Analysis (3 Credits)

Remote sensing is the art and science of obtaining information about an object without being in direct physical contact. Students will develop a robust understanding of the tools and techniques used to display, process, and analyze remotely sensed data, while studying the theory, principles, and methodology of remote sensing of the environment for geospatial applications. Emphasis will be placed on designing, implementing, and critically evaluating the processes of image acquisition and data collection in the electromagnetic spectrum from a variety of sensors (i.e. aerial, satellite, multispectral, hyperspectral, and LiDAR) and analysis through data set manipulations. Upon completion of this course students will be able to develop analytical workflows to derive products and extract information from remotely sensed data for a broad range of applications.

Prerequisite(s): CONS 210 or GIS 201 or BIOL 445

GIS 420 Advanced GIS Analysis & Programming (3 Credits)

This course extends the existing base of GIS knowledge and skills by amplifying programmatic approaches to spatial data and analysis. Lectures, labs, and projects emphasize GIS model development, develop spatial database architecture and design best practices, and extend knowledge of web GIS by authoring and consuming geographic web services. Students will become familiar with methods of leveraging programming languages (such as Python) to make GIS processing easier, faster, and more accurate by scripting and automating data management, production, manipulation, and analysis procedures. Activities develop GIS analysis skills with examples from government, social science, physical science, and the humanities.

Prerequisite(s): GIS 405 or GIS 410

GIS 425 Mentored Geospatial Teaching (1 Credit)

Pre-req: Student must have achieved an A- or above in the class in which they will assist, or be otherwise approved to enroll. Approval is given by both the instructor and Chair/Director of Department. A mentored experience in geospatial technology teaching through selected readings and short discussion sessions. Teaching skills will be developed by assisting in approved GIS classes offered by the CGA. May be repeated for credit with approval from both instructor and Chair of Department/ Program Director.

GIS 475 Legislative Redistricting with Geographic Information Systems (1 Credit)

Legislative Redistricting w/Geographic Information Systems With the 2020 census data release, significant attention will be placed on redistricting in the coming years. Inherent in any redistricting plan is a recognition of the spatial configuration of voting districts and the processes driving proposed voting district maps. Federal and state constitutions and statutes impose legal requirements for voting districts that in practice are often manipulated to favor drawing lines that protect partisan/incumbent interests. This one credit course will combine an introduction to Geographic Information Systems (GIS) with a focus on the legal analysis of redistricting plans.

Prerequisite(s): CONS 210 or GIS 201

GIS 480 Independent Research In Geospatial Technologies (1-3 Credits)

This course provides students the opportunity to create a project demonstrating an application of knowledge using geospatial technologies such as GIS, Remote Sensing, GPS, and spatial analysis. Each student will design and apply practical research methodology for an original project. Projects should involve solving geospatial technology challenges, such as complex data collection, data management strategies, implementing new or experimental analysis techniques, or working with multiple stakeholders in an applied and/or academic setting. Identification of a faculty mentor and agreement on the format of deliverables is required prior to registration for this course. The course can be repeated for credit up to a maximum of 3 credits of GIS 480.

Prerequisite(s): BIOL 445 or GIS 201 or GIS 410

GIS 490 Topics: Geospatial Technologies (1-4 Credits)

Selected topics related to geospatial technologies (GIS, GPS, Remote Sensing, etc). These courses will be offered as advanced study of topics not routinely covered by existing courses or emerging topics in the field of geospatial technologies. Subjects, prerequisites and instructor will vary from semester to semester. If there is no duplication of topic, may be repeated for credit.