CIS C191: INTERMEDIATE GEOGRAPHIC INFORMATION SYSTEMS (GIS)

Item	Value
Curriculum Committee Approval Date	11/17/2023
Top Code	070200 - Computer Information Systems
Units	3 Total Units
Hours	72 Total Hours (Lecture Hours 54; Lab Hours 18)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)

Course Description

This intermediate-level Geographic Information Systems (GIS) course builds upon the foundational knowledge acquired in introductory GIS courses. It takes a deeper dive into the theory and application of GIS technologies, focusing on advanced spatial analysis, data management, and geospatial modeling. Students will gain a comprehensive understanding of GIS principles and develop proficiency in using GIS software to solve complex spatial problems. Through hands-on projects and case studies, students will apply GIS techniques to real-world scenarios. ADVISORY: CIS C190 or GEOG C155. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Describe the concepts and principles of web mapping and interactive mapping applications.
2. Plot address data on a digital map through geocoding.
3. Develop, edit, and digitize new spatial features on a digital map.
4. Effectively communicate geospatial findings through maps and reports.

Course Objectives

- 1. Share knowledge of advanced knowledge of GIS concepts, data structures, and coordinate systems.
- 2. Provide demonstrations of advanced spatial analysis techniques, including overlay, proximity analysis, and spatial statistics.
- 3. Show methods to manage and manipulate geospatial data from various sources.
- 4. Explain how to create and maintain geodatabases and perform attribute and topological editing.
- 5. Provide examples of how to design and execute geospatial models and workflows to solve real-world problems.
- 6. Outline the concepts of remote sensing and imagery data in GIS analysis.
- 7. Discuss the principles of web mapping and interactive mapping applications.
- 8. Discuss ethical and legal issues in GIS, including privacy and data sharing.
- 9. Provide real-world examples of ways to communicate geospatial findings through maps, reports, and presentations.

Lecture Content

Advanced Spatial Analysis: Overlay operations, proximity analysis, and spatial statistics. Network analysis and routing. Data Management and Geodatabases: Geodatabase design and management. Attribute and topological editing. Geospatial Modeling: Model builder tools and geoprocessing. Creating and executing geospatial models. Remote Sensing and Imagery: Principles of remote sensing. Integration of imagery data in GIS. Web Mapping and Interactive Applications: Web GIS concepts. Creating interactive maps and web applications. Geospatial Data Acquisition: Field data collection methods. GPS and mobile data collection. Ethical and Legal Issues in GIS: Privacy, data sharing, and data ownership. Ethical considerations in geospatial analysis. Geospatial Communication: Creating effective maps and cartographic design. Presenting geospatial findings. GIS Projects and Case Studies: Applied projects that require the use of advanced GIS techniques to solve real-world spatial problems.

Lab Content

Advanced Spatial Analysis: Analyze a given dataset using advanced spatial analysis techniques such as overlay, buffer analysis, and spatial statistics. Network Analysis: Plan and analyze a network of transportation routes or utility lines using network analysis tools. Geodatabase Management: Create and manage a geodatabase, import various spatial datasets, and perform attribute and topological editing. Geospatial Modeling Develop a geospatial model using ModelBuilder or scripting tools to solve a specific problem (e.g., site selection). Remote Sensing Integration: Process and integrate remote sensing or satellite imagery data with existing GIS data to analyze land use, vegetation, or environmental changes. Web Mapping and Interactive Applications: Create an interactive web map or GIS application using web GIS tools (e.g., ArcGIS Online, Leaflet, or Mapbox). Data Collection and Fieldwork: Collect geospatial data in the field using GPS devices or mobile data collection apps, and then import and analyze the data in GIS software. Ethical and Legal Issues in GIS: Analyze a case study involving ethical and legal issues in GIS, and propose solutions or best practices. Geospatial Communication: Create a thematic map or cartographic product that effectively communicates geospatial information. Include proper labeling, symbology, and layout design. Real-World Case Studies: Analyze real-world spatial problems or scenarios using advanced GIS techniques.

Method(s) of Instruction

- Lecture (02)
- DE Online Lecture (02X)
- Lab (04)
- DE Online Lab (04X)

Instructional Techniques

This course will be delivered as a classroom-based course. Learning strategies will include hands-on lecture, textbook readings and projects, ESRI virtual Campus course readings and projects, and Internet research. Students will complete hands-on computer assignments in class and out of class.

Reading Assignments

Students will be asked to read from the required textbook and additional open-educational resources, to learn about: the concepts, theory, and application of GIS technologies. advanced spatial analysis, data management, and geospatial modeling.

Writing Assignments

Written reports will include an evaluation of ethical and legal issues in GIS, including privacy and data sharing. Written reports will describe how to effectively communicate geospatial findings through maps, reports, and presentations.

Out-of-class Assignments

Design and execute geospatial models and workflows to solve real-world problems. Manage and manipulate geospatial data from various sources.

Demonstration of Critical Thinking

Written discussions and assignments will be used to demonstrate critical thinking.

Required Writing, Problem Solving, Skills Demonstration

All lessons and class projects require the use of a logical approach in identifying the problem, obtaining data and solving the problem through proper analysis. Hands-on projects and the Midterm and Final Exam projects.

Eligible Disciplines

Computer information systems (computer network installation, microcomputer ...: Any bachelors degree and two years of professional experience, or any associate degree and six years of professional experience. Computer science: Masters degree in computer science or computer engineering OR bachelors degree in either of the above AND masters degree in mathematics, cybernetics, business administration, accounting or engineering OR bachelors degree in engineering AND masters degree in cybernetics, engineering mathematics, or business administration OR bachelors degree in mathematics AND masters degree in cybernetics, engineering mathematics, or business administration OR bachelors degree in any of the above AND a masters degree in information science, computer information systems, or information systems OR the equivalent. Note: Courses in the use of computer programs for application to a particular discipline may be classified, for the minimum qualification purposes, under the discipline of the application. Masters degree required.

Textbooks Resources

1. Required Gorr, W.L.; Kurland, K.S. GIS Tutorial for ArcGIS Pro 3.1, 5th ed. ESRI Press, 2023 Rationale: -

Other Resources

1. ESRI Virtual Campus Courses – Understanding Map Projections and Coordinate Systems (no cost to student) 2. ESRI Virtual Campus Courses – Creating, Editing, and Managing Geodatabases for ArcGIS Desktop (no cost to student) 3. ESRI Virtual Campus Course – Geoprocessing Using ModelBuilder (no cost to student) 4. GPS learning resource to be determined (text or on-line tutorial) 5. Access to Internet either in a Coastline Community College Lab or outside the college. For Classroom based class and Hybrid class, a minimum of 2 Gigabyte USB memory stick. 6. Coastline Library