GIS 54 Course Outline as of Fall 2021

CATALOG INFORMATION

Dept and Nbr: GIS 54 Title: DATA ACQUISITION IN GIS
Full Title: Data Acquisition in Geographic Information Systems (GIS)
Last Reviewed: 11/14/2022

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	4.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	4.00	Lab Scheduled	3.00	8	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	6.00		Contact Total	105.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00 Total Student Learning Hours: 210.00

Title 5 Category:	AA Degree Applicable
Grading:	Grade Only
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
Develop skills in the acquisition, conversion, integration, analysis, management, storage and drafting of geospatial and attribute data for Geographical Information Systems (GIS).

Prerequisites/Corequisites:
Course Completion or Current Enrollment in GIS 51

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: Develop skills in the acquisition, conversion, integration, analysis, management, storage and drafting of geospatial and attribute data for Geographical Information Systems (GIS). (Grade Only)
Prerequisites/Corequisites: Course Completion or Current Enrollment in GIS 51
Recommended:
Limits on Enrollment:
Transfer Credit: CSU;

Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**			Effective:	Inactive:
CSU GE:	**Transfer Area**			Effective:	Inactive:
IGETC:	**Transfer Area**			Effective:	Inactive:
CSU Transfer:	Transferable	Effective:	Spring 2009	Inactive:	
UC Transfer:		Effective:		Inactive:	

CID:

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Identify and retrieve existing spatial, non-spatial and remote sensing data from online, proprietary and public sources.
2. Collect, process and reduce field data acquired using Global Positioning System (GPS) receivers.
3. Convert, analyze, manage, reformat, summarize and archive geospatial and attribute data sets.
4. Evaluate and summarize the field data collected by various types of GPS receivers and other acquired data sources for precision and accuracy.

Objectives:
Upon completion of this course, the student will be able to:
1. Identify appropriate sources of geospatial and attribute data for GIS.
2. Collect data in the field using GPS technology.
3. Capture attribute data from public and proprietary sources.
4. Hand digitize data from aerial and remote sensing imagery or maps.
5. Integrate Computer Aided Drafting (CAD), Raster, Triangular Irregular Network (TIN), Vector and point data in a GIS project.
6. Validate and prioritize GIS data and data layers based on accuracy, precision and other factors.
7. Prepare written, formatted and diagrammatic summaries of various data sources.
8. Describe data in narrative fashion for scientific reports and transmission to clients.

Topics and Scope:

I. Data science and the theory of data
II. Data as discrete numbers vs. data as information
  A. Classifications of data
  B. Spatial vs. non-spatial data
III. Global Positioning Systems (GPS)
  A. Basic concepts and mechanics

B. Signals and signal interpretation
C. Field collection
D. Office processing

IV. Coordinate systems and datums
A. Coordinate system selection - geographic or projected
B. Coordinate system transformations
C. Realizations vs. epochs

V. Data types, formats and field collection methods
A. Field diagrams and field notebooks
B. Electronic data loggers
C. Mobile mapping and data dictionaries

VI. Acquisition of existing geospatial and attribute data sets from related GIS sources
A. Data from collaborating professionals
B. Third party data vendors
C. Online data websites: public, private and governmental

VII. Acquisition of existing geospatial and attribute data from remote sensing
A. Signal characteristics
B. Signal interpretation
C. Image characteristics
D. Image interpretation

VIII. Raw Data vs. Processed Data
A. Validation: Quality Control (QC) / Quality Assurance (QA), analysis, summarization
B. Management: conversion, management & storage

IX. Metadata and data documentation
A. Importance
B. Style Sheets

X. Integration, summarization and delivery of GIS data and GIS deliverables

XI. Topics III thru X mentioned above will also be studied by means of field laboratory exercises and laboratory reports during the laboratory portion of the course

LABORATORY TOPICS & SCOPE

I. ESRI Virtual Campus -- Understanding Geographic Data - Modules 1-8

II. Field Mapping and Data Collection Methods
A. Field notes and field books
B. Use of compass and tape
C. Field use of GPS measuring devices
1. Mission Planning
2. Types of receivers and positional accuracy
3. GPS data collection methods
a. Navigation
b. Measurement
c. GPS receiver dashboard and controls
d. GPS data collector dashboard and controls
e. Device configuration, uploading and downloading data
D. Office processing of GPS data
1. Data download and storage
2. Data QC/QA, reduction, edits and preparation
3. Baseline/Vector processing
4. Vector QC/QA, Loop closure check
5. Adjustment of final solutions
6. Report preparation
E. Integration of field data into GIS project

III. Application of Imagery and Remote Sensing Data
  A. Data capture and reduction
  B. Signal interpretation and validation
  C. Reporting and mapping final results
IV. Capture and use of other data types
  A. Census Data
  B. Other government data
  C. Private sector datasets
    1. Professional project data
    2. Commercial vendor

Assignment:

1. Reading assignments averaging 30-50 pages per week.
2. Online tutorials with quizzes (8-16)
3. Lab reports/GPS skill demonstrations (8-16)
4. Midterm exam (1-2)
5. Final exam (may include an oral presenation)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.	Writing 0 - 0%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Lab reports, online tutorial exercises	Problem solving 40 - 50%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Operate GPS receivers, proper acquisition of data	Skill Demonstrations 30 - 40%

Exams: All forms of formal testing, other than skill performance exams.

Quizzes, mid-term exam and final exam, including: multiple choice, completion, true-false, short answer, short essay, and/or oral presentation	Exams 20 - 30%

Other: Includes any assessment tools that do not logically fit into the above categories.

Class Participation	Other Category 0 - 10%

Representative Textbooks and Materials:
GIS Fundamentals, A First Text on Geographic Information Systems (5th). Bolstad, Paul. Eider Press: 2016
Lining Up Data in ArcGIS: A Guide to Map Projections (2nd), Maher, Margaret. ESRI Press: 2013
Modeling Our World: the ESRI Guide to Geodatabase Concepts (2nd). Zeiler, Michael. ESRI Press: 2010
The Visual Display of Quantitative Information (2nd). Tufte, Edward R. Graphics Press: 2001 (classic)
Envisioning Information. Tufte, Edward R. Graphics Press: 1990 (classic)