BUTTE COLLEGE
COURSE OUTLINE

I. **CATALOG DESCRIPTION**

GEOG 20 - Introduction to Geographic Information Systems **3 Unit(s)**

Prerequisite(s): NONE
Recommended Prep: NONE

Transfer Status: CSU
34 hours Lecture
51 hours Lab

Study of Geographic Information Systems (GIS) science and its applications to spatial data management. Identification and acquisition of GIS data. Assessment of vector and raster systems, scale, resolution, map projection, coordinate systems, georeferencing and Global Positioning Systems (GPS). Spatial analysis and modeling with GIS. Explores how GIS solves spatial problems, such as those in natural resources, earth and life sciences, environmental planning, local government, business, transportation and other fields. (C-ID GEOG 155).

II. **OBJECTIVES**

Upon successful completion of this course, the student will be able to:

A. Define Geographic Information Systems (GIS).
B. Identify and evaluate GIS data sources and the importance of metadata.
C. Demonstrate the process of converting analogue data to digital data for use in a GIS
D. Identify, compare and contrast vector and raster GIS.
E. Evaluate the capabilities of various GIS software programs.
F. Apply cartographic principles of scale, resolution, projection and data management to a problem of a geographic nature.
G. Apply spatial analysis functions on a GIS to solve a Geospatial problem.
H. Plan, evaluate and execute a GIS project: Identify a problem of a geospatial nature; outline a strategy to solve the problem; locate relevant data sources; design and evaluate a plan to acquire the relevant data sources; incorporate data sources into a Geographic Information System and execute strategy to solve a geospatial problem; apply principles of spatial analysis; and present results (Lab activity).

III. **COURSE CONTENT**

A. **Unit Titles/Suggested Time Schedule**

Lecture

Topics	Hours
1. Fundamental Concepts in Geographic Information Systems a. Definition of GIS b. Vector and raster systems c. Scale and resolution d. Map projections and coordinate systems e. Applications of GIS f. Basics of cartographic design	4.00

2. GIS Data Sources a. Identify sources of GIS data b. Metadata c. Georeferencing and Global Positioning Systems (GPS) d. Converting digital data to a uniform projection and scale e. Vector-to-raster and raster-to-vector data conversions, error propagation	6.00
3. Designing and Implementing a GIS a. User needs assessment b. Database design and management c. Fundamentals of data storage d. Database management e. Input of data with GPS f. Digitizing, scanning, editing and output	12.00
4. Spatial Analysis a. Map algebra b. Buffering c. Interpolation and surface analysis d. Network analysis e. Applications in decision-making f. Modeling	12.00
Total Hours	34.00

Lab

Topics	Hours
1. Exploring ArcMap	1.50
2. Exploring ArcCatalog	1.50
3. Symbolizing features and rasters	3.00
4. Classifying features and rasters	3.00
5. Labeling features	2.00
6. Querying data	2.50
7. Joining and relating tables	1.00
8. Selecting features by location	3.00
9. Preparing data for analysis	3.00
10. Analyzing spatial data	3.00
11. Projecting data in ArcMap	1.00
12. Building geodatabases	1.50
13. Creating features	1.50
14. Editing features and attributes	3.00
15. Geocoding addresses	2.50
16. Making maps from templates	2.00
17. Making maps for presentation	2.00
18. Plan, evaluate and execute a GIS project	1.75
19. Identify a problem of a geospatial nature	1.75
20. Outline a strategy to solve the problem	1.75
21. Locate relevant data sources	1.75
22. Design and evaluate a plan to acquire the relevant data source	1.75

23. Incorporate data sources into a Geographic Information System and execute strategy to solve a geospatial problem	1.75
24. Apply principles of spatial analysis	1.75
25. Present results	1.75
Total Hours	51.00

IV. METHODS OF INSTRUCTION

A. Lecture
B. Instructor Demonstrations
C. Collaborative Group Work
D. Class Activities
E. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
F. Reading Assignments
G. Multimedia Presentations

V. METHODS OF EVALUATION

A. Quizzes
B. Demonstration
C. Homework
D. Lab Projects
E. Written Assignments
F. Written Examinations
G. Performance Examinations
H. Practical Evaluations

VI. EXAMPLES OF ASSIGNMENTS

A. Reading Assignments
   1. Read the chapter "Exploring ArcMap(Getting to Know ArcGIS)," and be prepared to discuss the importance of choosing the correct symbology and various sources of feature classes.
   2. Read the journal article found in Module 3: GIS-Based Generalization and Multiple Representation of Spatial Data, and be prepared to discuss the importance of generalization of symbology as a cartographic tool.

B. Writing Assignments
   1. Write a 500 word review of the journal article, "GIS-based simulation of land use change," provided by the instructor.
   2. Write a 750 word research paper concerning the applications of mobile GIS, including the implications of this technological advancement.

C. Out-of-Class Assignments
   1. Find ten examples of cartographic symbology from maps found on the internet, representing the evolution of cartographic symbology over time. Prepare a 500 word paper discussing those changes and include examples of your selection. You may find a large collection of historic and contemporary maps at: http://www.davidrumsey.com/
   2. Write a 1,000 word research report comparing the various GIS software programs available, including open-source freeware. Prepare a scientific poster using Powerpoint (or similar program) presenting your results orally in class.

VII. RECOMMENDED MATERIALS OF INSTRUCTION

Textbooks:

A. Ormsby, T., Napoleon, E., Burke, R., Groessl, C., Bowden, L. Getting to Know ArcGIS. 2nd Edition. ESRI, 2010.
B. Bolstad, P. GIS Fundamentals. 4th Edition. Eider Press, 2012.
C. Law, M. Collins, A. Getting to Know ArcGIS. 4th Edition. ESRI, 2015.

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