BUTTE COLLEGE
COURSE OUTLINE

I. **CATALOG DESCRIPTION**

GEOG 22 - Remote Sensing and Spatial Analysis **3 Unit(s)**

Prerequisite(s): NONE
Recommended Prep: NONE

Transfer Status: CSU
34 hours Lecture
51 hours Lab

This course covers Geographic Information Systems (GIS) for investigating geographic patterns, relationships and connections. Spatial analysis methods are employed for both raster and vector data. Emphasis is on problem-solving and decision making using GIS. Models and scripts for automating GIS processes are also undertaken. In addition, remote sensing fundamentals as they apply to mapping the Earth's surface will be covered. Image enhancement, classification and quantitative techniques are explored with attention to integration with GIS datasets. Application of remote sensing for land cover change, vegetation classification, and environmental quality are explored.

II. **OBJECTIVES**

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

A. Distinguish between conventional statistical analyses to spatial analysis.
B. Identify and use basic sampling methods used in GIS.
C. Compare and interpret geographically referenced data.
D. Analyze problems associated with acquisition and accuracy of data used in spatial analysis.
E. Examine the problems associated with statistical analysis and quantification of spatial features.
F. Analyze and manipulate geographically referenced data, and apply spatial analysis in the decision making process.
G. Identify the principles of remote sensing and digital image processing.
H. Identify the applications of remote sensing and GIS to solve real world problems.
I. Apply experience in the use of image processing and GIS software.

III. **COURSE CONTENT**

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

Lecture

Topics	Hours
1. Brief overview of GIS	1.00
2. Spatial Data	3.00
3. Quantifications of Spatial Features	3.00
4. Single-layer operations	3.00
5. Multi-layer Operations	3.00
6. Analysis of Point Features	3.00
7. Network Analysis	3.00
8. Spatial Modeling	3.00
9. Surface Analysis	3.00
10. Grid Analysis	3.00
11. Spatial Analysis in Decision Making	3.00
12. Principles of aerial photography and satellite remote sensing	3.00

Total Hours	34.00

Lab

Topics	Hours
1. Fundamental Spatial Analysis	3.00
2. Point Pattern Analysis	6.00
3. Line Data Analysis	6.00
4. Network Analysis	6.00
5. Surface Analysis	6.00
6. 3-D Analysis	6.00
7. Remote Sensing Learning	6.00
8. Remote Sensing Principles	6.00
9. Remote Sensing Interpretation and Use	6.00
Total Hours	51.00

IV. METHODS OF INSTRUCTION

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

V. METHODS OF EVALUATION

A. Exams/Tests
B. Quizzes
C. Research Projects
D. Homework
E. Lab Projects
F. Essays and research papers

VI. EXAMPLES OF ASSIGNMENTS

A. Reading Assignments
   1. Read Module One, Enhancing Images, and prepare to discuss the different procedures to improve the visual appearance of an image, allowing for easier interpretation.
   2. Read an article, choosing a popular or peer reviewed publication, from your particular field of interest that deals with the use of GIS spatial analysis within that discipline. Prepare an oral presentation for in class discussion based upon the use.

B. Writing Assignments
   1. Write a 500 word response focusing on the history of GIS use in water resources to the following article: Use of Geographic Information Systems (GIS) in Water Resources: A Review.
   2. Write a 750 word critique investigating the potential of GIS as powerful evidence-based practice tools for early problem detection and solving, from the article: Towards evidence-based, GIS-driven national spatial health information infrastructure and surveillance services in the United Kingdom.

C. Out-of-Class Assignments

1. Prepare a poster that outlines your final project and include the flow diagram as created in Model Builder in ArcGIS. A Powerpoint poster template is available on Blackboard.
2. Complete one of the three ESRI Virtual Campus courses: Creating and Integrating Data for Natural Resource Applications, Performing Spatial Interpolation Using ArcGIS, Distance Analysis Using ArcGIS, and present your certificate of completion for assignment credit.

VII. **RECOMMENDED MATERIALS OF INSTRUCTION**

Textbooks:

A. Keranen, K., Kolvoord, R. Making Spatial Decisions Using GIS and Remote Sensing: A Workbook . 1st Edition. ESRI Press, 2013.

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