ANTELOPE VALLEY COLLEGE

Academic Affairs
Course Outline of Record

Academic Affairs Only
☐ New Course
X COR Revision
X COR Update 3/27/2008
☐ Pre Req/Advisories
☐ Other Changes
☐ Effective Date

COURSE SUBJECT & NUMBER: GEOG 221

COURSE NAME: *Spatial Analysis in Geographic Information Systems (GIS)

COURSE UNITS: 3 **COURSE HOURS:** 3

COURSE REQUISITES: ***(Follow format of similar courses found in the college catalog.)***
Prerequisite: Completion of GEOG 205.
Advisory: Completion of MATH 080 and MATH 102, and Completion of or concurrent enrollment in MATH 115, and Eligibility for College Level Reading and ENGL 101.

COURSE DESCRIPTION: ***(Write a short paragraph providing an overview of topics covered. Be sure to identify target audience--transfer, major, GE, degree/certificate, etc. If repeatable, state the number of times at end of description.)***
This course provides a general survey of the fundamentals of spatial information systems and a survey of quantitative techniques applicable to spatial data. This course is focused on the functionality of GIS as an effective tool for modeling and analyzing complex spatial relationships. The applications of a variety of quantitative methods will be explored using GIS software including ArcGIS and ArcInfo. Students will use their knowledge to complete a GIS project. Before enrolling students must have computer skills, knowledge of georeferencing, coordinate systems, processes of data capture, data management and analysis, and the skills necessary to produce a GIS map. This course in intended for Geography/GIS majors and persons using GIS in professional settings. (CSU, UC, AVC)

COURSE OBJECTIVES: ***(Use Bloom's taxonomy to formulate concise, performance-based measurable objectives common to all students. Objectives must be closely aligned with course content, assignments, and methods of evaluation.)***

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

1. Develop skills with and knowledge of the use of GIS for spatial analysis.
2. Use a variety of the analytical functions available in ArcGIS and ArcInfo.
3. Demonstrate knowledge of how spatial data can be used in decision-making processes.
4. Complete a GIS project highlighting the GIS skills.

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COURSE CONTENT: ***(Enter course content in terms of specific topics or a specific body of knowledge that each instructor must cover. Put topics in outline form with major and minor headings. Title 5 requires that each instructor must cover all material listed below.)***

Elementary Spatial Analysis
- Introduction to GIS spatial analysis
- Simple analysis framework
- How GIS finds objects
- Attribute Tables
- Averages, means, and medians
- Standard deviation and regression
- Organizing spatial data

Components of spatial information
- Types of spatial problems
- Projections and Worldfiles
- Image Rectification

Point Data Interpolation
- Patterns created by points, lines, and areas
- Density, directionality, and connectivity

Measurements using GIS
- Length of linear objects
- Polygons, shape, sinuosity, and distance
- Area and volume

DEM-derived data
- Elevation / slope / aspect / hillshade
- Contours / viewshed

Classification
- Principal of classification and reclassification
- Neighborhood functions and buffers
- Image Classification

Statistical Surfaces
- Surfaces and surface mapping
- Sampling statistical surfaces
- Raster surfaces and raster analysis

Overlay: Comparing Coverage Variables
- Cartographic overlay
- Automating overlay processes

Remote Sensing Imagery
- 3-D modeling

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TYPICAL HOMEWORK ASSIGNMENTS: READING, WRITING, COMPUTATIONAL, OTHER
This information is necessary for all credit courses. Assignments should be closely related to course objectives, content, and methods of evaluation. (See sample of a "Model Outline" in the AP&P Standards & Practices handbook.) Include a range of assignments (minimum of three) from which faculty may choose when designing their syllabus.

1. ***Describe nature and frequency of typical reading assignments if applicable; note if any are required:***
Students will have weekly reading assignments that focus both on the fundamentals of spatial analysis and how to use GIS functionality to perform analytical processes. Readings may also be assigned from professional journals, white papers, and other industry standard sources.

2. ***Describe nature and frequency of typical writing assignments if applicable; note if any are required:***
Students will describe how and why various methods of analysis would be used to solve geographic problems. These short writing assignments will be given every 2-3 weeks.
Students will also design a computer project focusing on spatial analysis. Part of the design process includes preparing a written plan and project description. Students are required to create "metadata" files which are technical descriptions concerning the specifics of how data was collected and what methods of analysis were performed. (This is an industry standard).

3. ***Describe nature and frequency of typical computational assignments if applicable; note if any are required:***
Spatial analysis requires that students understand and use basic statistical computations on a weekly basis. Although the GIS software is able to perform most of the actual math students need to understand the results of calculations being performed. Students will explain why these calculations are important to the analytical processes.

4. ***Describe other types of homework assignments that students may be asked to complete; note if any are required:***
Students will also use GIS software in solving geographic problems.

5. Describe those critical thinking skills that are derived from assignments listed above; be sure that they reflect course objectives.

Students will develop projects that apply a variety of methods of spatial analysis to solve geographic problems. They must consider complex variables when designing projects and performing spatial analysis.

6. ***For categories 1-4, describe the estimated time per week it would take a student to complete homework assignments.***
Title 5 uses the Carnegie formula for establishing units using a 2:1 ratio as follows: 1 hr. lecture = 2 hrs .homework; 2 hrs. lecture = 4 hrs .homework; etc. For example: reading textbook—2 hours; writing reports—3 hours.

Reading: 2 hours

Writing: 2 hours

Computational: N/A

Other: Students will spend approximately 2 hours working on computer skills and 2 hours using GIS software.

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METHODS OF INSTRUCTION: ***(Methods must be consistent with content and appropriate to objectives; state in terms of what instructor will be doing in order to present course content to students: for example, lecture, demonstration, facilitate group work, etc. Do not list specific instructional equipment.)***

Lecture, demonstration, and supervision of hands on use of software.

METHODS OF EVALUATION: ***(These must be clearly related to course content, assignments, and objectives in order to comply with Title 5 requirements. Describe what instructor will be looking for when evaluating various assignments and tests in order to determine whether students have met course objectives. Grades must be based on demonstrated proficiency in subject matter and determined, where appropriate, by essays, objective and essay tests, research papers or projects, problem solving exercises, or skills' demonstrations.)***

Students will complete either:
at least 2 exams consisting of 3 or more short answer questions. These will focus on student understanding of the concepts of spatial analysis and have a practical skills component.
or,
a research project of at least 5 pages on an appropriate topic.

Practical application of GIS skills will be evaluated based upon the completion of a final project using two or more methods of spatial analysis in GIS. The project will include a written component including project goals, description, analysis, metadata, and evaluation of project.

Suggested Texts or other Instructional Materials ***(list several when possible; include title, author, publisher, date, and latest edition.)***
Chou, Y-H. 1996. Exploring spatial analysis. Onward Press, Santa Fe, NM.
Longley, P, and M. Batty (eds.). 2003. Advanced Spatial Analysis, the CASA book of GIS. ESRI Press, Redlands, CA.
Mitchell, A. 1999. The ESRI guide to GIS analysis, Volume1: geographic patterns & relationships. ESRI Press, Redlands, CA.