SOUTHWESTERN COLLEGE
COURSE OUTLINE

School of: Mathematics, Science, and Engineering
Department: Physical Sciences
Discipline: Geography
Course Designator and Number: GEOG 145
Title: Introduction to Mapping and Geographic Information Systems (GIS)

Origination Date: 09/08/2011
Modification Date: 09/19/2013
Effective Date: 2014 Fall
Effective Catalog Year: 2014–2015
Units 3 **Lec** 3 **Lab** 0
Total Contact Hours: 54

Same as other course(s) designator(s),

Grading Basis: Grade or Pass/No Pass option available

Repeatable: 0

Corequisite:
Limitation on Enrollment:
Prerequisite:
Recommended Concurrent Enrollment:
Recommended Preparation:
RDG 158 or equivalent or through the Southwestern College multiple measures placement processes

Course Description & Scope: (50 words or less)
Provides an introduction to Geographic Information Systems (GIS), cartography, and spatial analysis. Includes assessment of vector and raster systems, scale, resolution, map projection, coordinate systems, georeferencing, and Global Positioning Systems (GPS). [D; CSU; C-ID GEOG 155]

Measurable Course Objectives and Minimum Standards, as Determined by Standards set by the instructor, at 70% Proficiency for a Grade of "C":

1. Student will describe and explain the historical development of GIS and how GIS helps to solve problems of a spatial context.
2. Student will identify and describe the components of GIS.
3. Student will identify and describe basic types of maps and geographic data used with GIS.
4. Student will describe and demonstrate the procedure for collecting, locating, and accessing data to be used in a GIS.
5. Student will compare and contrast various types of data including quantitative data, attribute data, paper maps, aerial and satellite imagery, and global positioning systems (GPS).

6. Student will demonstrate proficiency in map reading, interpretation, and design principles, including map projections and the geographic grid.
7. Student will compare and contrast raster and vector data structures and operations.
8. Student will define and classify features and rasters.
9. Student will create, manipulate, and query tables, charts, images, and maps using GIS software.
10. Student will describe and organize tabular data and edit data tables.
11. Student will analyze feature and spatial relationships using overlaying, buffering, and basic spatial statistics.
12. Student will demonstrate geocoding addresses.
13. Student will develop and modify map layouts for appropriate cartographic presentation.
14. Student will apply spatial analysis functions on a GIS to solve a Geospatial problem.

Core Content to be covered in all sections:

1. Approximately 15% of course
   Introduction to GIS
   - Defining GIS
   - History
   - Hardware/software
   - Applications
   - GIS design
   - Research
   - GIS in the workplace
   - Future
2. Approximately 15% of course
   Introduction to cartography
   - Cartographic elements: color, scale, layout, symbols
   - Map design
   - Geographic grid
   - Coordinate system
   - Map projection
   - Map types: thematic, density, isopleth, chloropleth
   - Analog versus digital maps
3. Approximately 15% of course
   Cartography and GIS output
   - Displaying map data: cartographic output
   - Navigating a map
   - Symbolizing features and rasters
   - Classifying features and rasters
   - Labeling features
4. Approximately 10% of course
   Data collection, types, and sources
   - Global Positioning Systems (GPS)
   - Remote sensing
   - Scanning
   - Digitizing
   - Topologically integrated geographic encoding and referencing (TIGER), United States Geologic Survey (USGS), and other sources of data
   - Raster versus vector data
   - Digital elevation model (DEM) and triangulated irregular network (TIN)
5. Approximately 15% of course
   Editing data and data management

- Resolution
- Creating features and feature classes
- Editing features and attributes
- Building geodatabases
- Topology
- Geocoding addresses
- Preparing data for analysis
- Metadata

6. Approximately 15% of course
   Elementary spatial analysis
   - Feature attributes
   - Querying data
   - Joining and relating tables
   - Selecting features by location
   - Buffering
   - Overlay
   - Calculating attribute values
   - Terrain analysis: viewshed, statistical surfaces
   - Reclassification
   - Measurement
   - Elementary spatial statistics
   - Geoprocessing and modeling
7. Approximately 15% of course
   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 GIS and execute strategy to solve a geospatial problem
   - Apply principles of spatial analysis
   - Present results

NOTE: For specific details, see instructor's syllabus.

Method of evaluation to determine if objectives have been met by students:

1. Class activities
2. Competency-based written and practical tests
3. Computer assignments
4. Homework
5. Individual activity
6. Objective test
7. Problem solving
8. Quizzes
9. Skills demonstration
10. Student knowledge
11. Written assignments

Other Methods of evaluation:

Example of Assignments:

Reading

Read Chapters 1 through 3 of the textbook. Summarize (in a paragraph per chapter) the major objectives of each chapter.

Writing

In a two-page, typed and doubled-spaced essay, explain what impact scale has on how we experience our world and on how we model it.

Other

Describe the simplest possible method of measuring a line in raster format.

Critical Thinking

Assume you work for the San Diego Chargers and you are given the task of determining the best site to build a football stadium (in San Diego County...). What would be your major variables in your model and what would your model look like?

Instructional Methodology:
Requires a minimum of three (3) hours of work per unit, including class time.

1. Audiovisual
2. Demonstration
3. Discussion
4. Distance education
5. Individual assistance
6. Individualized Computer Assistance
7. Lecture
8. Other Methods
    1. Hands-on exercises using ESRI ArcGIS software.

Required and major optional reading(s), including textbook(s) and software: (Author: Last name, First name. Title. 2nd ed. (or higher edition) Location: Publisher, Year)

Required:

- Longley, Paul A., et al. Geographic Information Systems and Science. 3rd ed. West Sussex: John Wiley and Sons, 2011.ISBN: 9780470721445
- Wilpen Gorr and Kristen Kurland. GIS Tutorial 1: Basic Workbook for ArcGIS 10.1. Redlands, CA: ESRI Press, 2013.ISBN: 978-1-58948-335-

Optional:

Codes

Is this an approved special class for students with disabilities? No

Is this course a part of a cooperative work experience program? No

Funding Agency Category: Not yet Specified

Is this a basic skills course? No

Course Offered: Variable