COURSE OUTLINE OF RECORD

Number: GEOG G190    TITLE: Introduction to Geographic Information Systems

ORIGINATOR: Laszlo Mariahazy    EFF TERM: Spring 2015
FORMERLY KNOWN AS:   DATE OF
OUTLINE/REVIEW: 12-02-2014
CROSS LISTED COURSE:   TOP NO: 2206.10
CID: GEOG 155

SEMESTER UNITS: 2.0
HRS LEC: 27.0    HRS LAB: 27.0    HRS OTHER: 0.0
CONTACT HRS TOTAL: 54.0
STUDY NON-CONTACT HRS RECOMMENDED: 54.0

CATALOG DESCRIPTION:
This is an introductory course designed to familiarize students with the technology, capabilities, and functionality of Geographic Information Systems (GIS) and geospatial inquiry. Visualization and analysis of distributions and relationships of physical, social, cultural, and economic features to support decision-making is emphasized. Spatial analysis methods are presented and interactively practiced by students to examine and solve social and scientific problems. Students learn proper techniques for sourcing, manipulating, and managing social and scientific data, making logical queries of that data, measuring and validating results, and then presenting their findings in a professional, constructive manner.

C-ID GEOG 155

JUSTIFICATION FOR COURSE:

PREREQUISITES:

COREQUISITES:

ADVISORIES:
- Students should have successfully completed or be concurrently enrolled in English G098 - Developmental Writing/Reading or the equivalent, and students should have successfully completed or be concurrently enrolled in Math G010 - Elementary Algebra or the equivalent.

ASSIGNED DISCIPLINES:
Geography

MATERIAL FEE: Yes [ ] No [X] Amount: $0.00

CREDIT STATUS: Noncredit [ ] Credit - Degree Applicable [X] Credit - Not Degree Applicable [ ]

GRADING POLICY: Pass/No Pass [ ] Standard Letter [X] Not Graded [ ] Satisfactory Progress [ ]

OPEN ENTRY/OPEN EXIT: Yes [ ] No [X]

TRANSFER STATUS: CSU Transferable[ ] UC/CSU Transferable[X] Not Transferable[ ]

BASIC SKILLS STATUS: Yes [ ] No [X]    LEVELS BELOW TRANSFER: Not Applicable

CALIFORNIA CLASSIFICATION CODES: Y - Not Applicable

NON CREDIT COURSE CATEGORY: Y - Not applicable, Credit Course

OCCUPATIONAL (SAM) CODE: E

REPEATABLE ACCORDING TO STATE GUIDELINES: No [X]    Yes [ ] NUMBER REPEATS:

REQUIRED FOR DEGREE OR CERTIFICATE: No [ ] Yes [X]

Anthropology(Associate in Arts for Transfer)
Geography(Associate in Arts for Transfer)

GE AND TRANSFER REQUIREMENTS MET:
COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:

1. Identify and demonstrate societal and environmental trends that have contributed toward the development of geographic information technologies.

2. Describe and interpret the impact of geographic information in measuring and understanding social media, sustainability, demographics, and globalization.

3. Demonstrate critical thinking and problem-solving techniques in evaluating and presenting geospatial technologies as they relate to social, cultural, and geo-political issues of a diverse population.

4. Articulate and interpret proper methods of geographic representation in consideration of ethical, accessible, legal, and privacy concerns and the perception of places at a variety of scales.

COURSE OBJECTIVES:

1. Define geographic patterns presented in a digital context and relate them to societal issues.
2. Organize, categorize, and interpret geographic data utilizing a variety of spatial analysis techniques.
3. Explain and illustrate map projections, themes, models, files, and representations.
4. Demonstrate and evaluate digital mapping applications with respect to social needs such as urban planning and welfare, health, economics, politics, and cultural concerns.
5. Locate, create, manage, and modify sources of geographic data and integrate them with problem-solving tools to create interactive maps.
6. Apply cartographic, communicative, and critical-thinking skills to organize, design, and produce presentation-quality real-world mapping projects.

COURSE CONTENT:

LECTURE CONTENT:

A. Introduction and Basic Concepts
   1. Windows Navigation
      a. Network file system
      b. Accessing laboratory exercises
   2. GIS Terminology and Overview
      a. Definition of GIS
      b. Social and environmental spatial data
      c. Database attributes
      d. Computer cartography
   3. Essential elements of a GIS system
      a. Essential components of a GIS
      b. Software requirements
   4. ArcMap Environment
      a. View window
      b. Layout window

B. Exploring ArcMap
   1. Displaying social and environmental map data
   2. Navigating a map
   3. Opening a map document
   4. Identifying features

C. Exploring ArcCatalog
   1. Browsing map data
   2. Searching for social and environmental map data
3. Adding data to maps

D. Creating and Editing Data
   1. Creating shapefiles
   2. Digitizing and editing features
   3. Editing feature attribute values
   4. Exporting data

E. Base Maps, Coordinate Systems and Map Projections
   1. Defining a map projection
   2. Projecting data for display
   3. Geographic grids
   4. Latitude and Longitude
   5. State Plane coordinate system
   6. Universal Transverse Mercator coordinate system
   7. Converting digital data to a uniform projection and scale

F. Types of Geographic Data and Representations
   1. Vector Data
      a. Point features
      b. Line features
      c. Polygon (area) features
   2. Raster Data
      a. Aerial photographs
      b. Topographic images
      c. Digital surfaces
   3. Attribute files
      a. Adding new variables
      b. Calculating new variables
   4. Introduction to converting data from raster to vector and vector to raster

G. Cartographic Principles and Map Design
   1. Map composition essentials
      a. Map scales
         i. Fractional
         ii. Verbal
         iii. Graphical
      b. Legend
      c. Neatline
      d. Inset maps
      e. Title
      f. North Arrow
      g. Source(s)
      h. Date(s)
   2. Cartographic Symbology
      a. Point
      b. Line
      c. Polygon
      d. Text
      e. Color
      f. Graphics
   3. Map Layout and Design
      a. Laying out the page
      b. Creating a cartographically-accurate map
      c. Adding final touches to the map
      d. Setting the print and page options

H. Data Collection & Database Management
   1. Internet sourcing
   2. Recognizing and identifying valid sources of GIS data
3. Working with compressed files
4. Changing file sizes
   a. File and workspace organization
5. Metadata

I. Spatial Data Analysis
   1. Database queries based on spatial data operations
   2. Creating buffers
   3. Overlays
   4. Clip
   5. Dissolve
   6. Geocoding
   7. Georeferencing
   8. Global Positioning Systems (GPS) data collection and input
9. Additional types of spatial analysis
   a. Interpolation and surface analysis
   b. Network analysis
   c. Applications in decision making
   d. Modeling

J. GIS Applications
   1. Public and Private Sector Applications
      a. Environmental
      b. Urban Planning
      c. Government
      d. Business and Marketing
      e. User needs assessment

K. Final Project Design
   1. Asking geographic questions
   2. Identifying a problem of a geospatial nature
   3. Solving problems with GIS
   4. Locating relevant geographic data sources
   5. Designing and evaluating a plan to acquire relevant geographic data sources
   6. Analyzing data by using tools and queries
   7. Applying geographic knowledge in a specific application
   8. Presenting results

LABORATORY CONTENT:

A. Introduction to Geographic Information Systems Techniques
   1. The GIS technician and the Graphical User Interface (GUI)
   2. GIS desktop environment and network access

B. Introduction to GIS Maps and Data
   1. Exploring the GIS in the laboratory
      a. Displaying map data
      b. Navigating around a map
      c. Looking at features and attributes
   2. Exploring map libraries
      a. Browsing for map data
      b. Searching for specific map data
      c. Adding data to a GIS

C. Displaying Map Data in a GIS
   1. Symbolizing features and rasters
      a. Changing symbology on a map
      b. Symbolizing features by attribute categories
      c. Using styles and creating layer files
      d. Symbolizing raters
   2. Classifying features and rasters
a. Classifying features through standard methods
b. Classifying features manually
c. Density Mapping
d. Graduated and chart symbology

3. Labeling features
   a. Utilizing dynamic labeling
   b. Establishing rules for label placement
   c. Interactive labels and annotation

D. Obtaining Information about Map Features
   1. Querying data
      a. Finding, identifying, and hyperlinking features
      b. Selecting features by attribute
      c. Creating reports
   2. Joining and Relating tables
      a. Joining tables
      b. Relating tables

E. Analyzing feature Relationships
   1. Selecting features by location
      a. Using location queries
      b. Combining attribute and location queries
   2. Preparing data for analysis
      a. Dissolving features
      b. Creating graphs
      c. Clipping layers
      d. Exporting data
   3. Analyzing spatial data
      a. Buffering features
      b. Overlaying data
      c. Calculating attribute values
   4. Projecting map data
      a. Projecting map data on the fly
      b. Defining a map projection

F. Creating and Editing Data
   1. Building geodatabases
      a. Creating and using a personal geodatabase
      b. Creating different feature classes
      c. Adding fields and domains
   2. Creating features
      a. Drawing features
      b. Using feature construction tools
   3. Editing features and attributes
      a. Modifying and deleting features
      b. Splitting and merging features
      c. Editing feature attribute values
   4. Geocoding addresses
      a. Creating an address locator
      b. Matching addresses
      c. Rematching addresses and correcting errors

G. Presenting Data
   1. Making maps from prepared templates
      a. Opening an existing map template
      b. Adding x,y, and z data to a map
      c. Drawing customized graphics on a map
   2. Making maps for presentation
      a. Laying out the map display page
b. Adding a legend, title, and text boxes
c. Adding a north arrow, scales, and sources
d. Customizing with graphics and printing options

H. Introduction to GIS Modeling Techniques
   1. Designing and creating a model
      a. Starting a model
      b. Building out a model
      c. Enhancing and customizing a model

METHODS OF INSTRUCTION:
   A. Lecture:
   B. Lab:

INSTRUCTIONAL TECHNIQUES:
   1. Lecture
   2. Audio/Visual demonstrations
   3. Laboratory assignments illustrating lecture topics
   4. Collaborative assignments and peer reviews
   5. Handouts/review of current GIS literature and applications

COURSE ASSIGNMENTS:
   Out-of-class Assignments
      A. ArcMap Users Guide
      B. ArcGIS Shortcuts
      C. Current Events in GIS
      D. Thinking Spatially
      E. The 20 Essential GIS Skills
      F. Opportunities for Geospatial Careers
      G. Geospatial Industry Outlook
      H. GeoBusiness Intelligence
      I. GIS Education - Pathways
      J. Geospatial Demand
      K. Careers in Geoscience
      L. CA State GIO - Technology Report

   Writing Assignments
      A. Writing/Research/Application Analysis Project - Draft
      B. Writing/Research/Application Analysis Project - Final

   Reading Assignments
      A. Intro to ArcGIS
      B. Intro to ArcMap
      C. Exploring ArcCatalog
      D. Symbolizing Features and Rasters
      E. Labeling Features
      F. Classifying Features and Rasters
      G. Querying Data
      H. Joining and Relating Tables
      I. Selecting Features by Location
      J. Preparing Data for Analysis
      K. Spatial Analysis of Data
      L. Projection of Data
M. Introduction to Geodatabases
N. Creating Features
O. Editing Features
P. Geocoding
Q. Making Maps from Templates
R. Making Maps for Presentation
S. Creating GIS Models
T. Integration of Geospatial Data

METHODS OF STUDENT EVALUATION:
Midterm Exam
Final Exam
Projects (ind/group)
Problem Solving Exercises
Oral Presentations
Skills Demonstration

Demonstration of Critical Thinking:
Searching, selecting, evaluating, interpreting, manipulating, and integrating disparate and interactive spatially-referenced social and environmental information.

Required Writing, Problem Solving, Skills Demonstration:
1. Evaluation and interpretation of laboratory exercises.
2. Peer review of maps and projects.
3. Short answer/multiple choice examinations.
4. Practical examinations.
5. Final project demonstrating introductory knowledge and application of GIS.

TEXTS, READINGS, AND RESOURCES:
TextBooks:

LIBRARY:
Adequate library resources include:

Comments:

Attachments:
Attached Files