

COURSE OUTLINE **Introduction to GIS/GPS**

Course Description

SR 110. Introduction to GIS/GPS. 3 hours credit. Prerequisite: Minimum ASSET score of 37 in numerical math. Proficiency in basic keyboarding and computer skills in Word. Internet research, spread sheets, and databases is highly recommended. This course will enable the student to understand spatial referencing concepts, Geographic Information Systems (GIS) and Global Positioning Systems (GPS). The student will be introduced to GIS/GPS receivers and GIS/GPS software systems that are used to collect, correct, map, and analyze geospatial data.

Course Relevance

The skills learned in this class will introduce the student to the fundamentals of GIS/GPS to continue with his/her education in more advanced GIS/GPS courses.

Required Materials

Van Sickle, J. (2001). *GIS/GPS for land surveyors*. (3rd ed.). Michigan: Sleeping Bear Press.

Gorr, (2008) *GIS tutorial, workbook for ArcView 9 (wCD/DVD)* (3rd ed.). Redlands, CA: ESRI Press

Learning Outcomes

The intention is for the student to be able to

1. Use spatial referencing concepts and Global Positioning Systems (GIS/GPS) technology and its applications
2. Acknowledge the impact that GIS/GPS has had on the surveying industry
3. Apply the GIS/GPS technology to the successful creation and maintenance of a robust GIS

Primary Learning PACT Skills that will be DEVELOPED and/or documented in this course

Through the student's involvement in this course, he/she will develop his/her ability in the following primary PACT skill areas:

1. Field-Related Technology
 - The student will demonstrate proficiency in setting up and operating GIS/GPS software and hardware.

Secondary skills (developed but not documented):

Problem solving
Reading

Listening
Writing
Nonverbal communication
Teamwork
Ethical Conduct

Major Summative Assessment Task(s)

These learning outcomes and the primary Learning PACT skills will be demonstrated by:

1. Completing a practical GIS/GPS project

Course Content

- I. Themes – Key recurring concepts that run throughout this course:
 - A. GIS fundamentals
 - B. GPS fundamentals
- II. Issues – Key areas of conflict that must be understood in order to achieve the intended outcome:
 - A. GIS/GPS data format, accuracy and validation
 - B. Safety issues
 - C. Ethics in GIS/GPS
- III. Concepts – Key concepts that must be understood to address the issues:
 - A. Setting up and using GIS/GPS software and hardware
 - B. Correct use of common GIS/GPS data formats and accuracies
- IV. Skills/Competencies – Actions that are essential to achieve the course outcomes:
 - A. Understand the fundamental concepts of spatial relationships, georeferencing, and GIS/GPS
 - B. Understand the concepts of GIS/GPS navigation, tracking, and positioning
 - C. Demonstrate knowledge of the various GIS/GPS methodologies and accuracies
 - D. Demonstrate use of a consumer grade handheld GIS/GPS receiver to mark a position or navigate to a known position
 - E. Demonstrate an understanding of the concepts of GIS/GPS post-processed and real-time differential correction
 - F. Demonstrate use of a sub-meter accuracy GIS/GPS receiver to establish positions using post-processed or real-time corrections and navigate using real-time corrections
 - G. Post-process GIS/GPS field data using data from a local reference station or the national Continuous Operating Reference Station (CORS) network
 - H. Demonstrate an understanding of the difference between the real-time broadcast Coast Guard Beacon (GPS corrections and real-time Kinematic GPS).

Learning Units

- I. Fundamentals concepts of spatial relationships of georeferencing, GPS, and GIS systems
 - A. People
 - B. Software
 - C. Hardware
 - D. Data

- E. Spatial analysis
- II. Importance of georeferencing to GIS and stacking layers of information for analysis
- III. Concepts of GPS
 - A. Navigation
 - B. Tracking
 - C. Positioning
- IV. Various GPS surveys
 - A. Methodologies
 - B. Accuracies
- V. How to use a handheld GPS receiver
 - A. Mark positions
 - B. Navigate to known positions
- VI. Concepts of GPS
 - A. Post processed
 - B. Real time differential correction
- VII. Use a sub-meter accuracy GPS receiver to establish positions
 - A. Post-processed
 - B. Real-time corrections
 - C. Navigate using real-time corrections
- VIII. Post-process GPS field data
 - A. Use data from local reference station
 - B. Use data from Continuous Operating Reference Station (CORS) network
- IX. Real-time broadcast differences and corrections
 - A. Coast Guard Beacon DGPS
 - B. Real-Time Kinematic GPS
- X. Create new GIS
 - A. Layers
 - B. Databases
- XI. Modify existing GIS
 - A. Layers
 - B. Databases
- XII. Import GPS data from a variety of sources
 - A. Create a new layer
 - B. Modify an existing layer

- XIII. Access a variety of GIS data sources
 - A. Local reference stations
 - B. Continuous Operating Reference Station (CORS)

- XIV. Commonly used coordinate systems, datums, and projections
 - A. Federal government
 - B. State
 - C. County
 - D. Private sector

- XV. Use GIS software to convert GIS data from one system to another
 - A. Coordinate system
 - B. Datum
 - C. Projection

- XVI. Use GIS to
 - A. Perform elementary spatial analysis
 - B. Understand the importance of spatial analysis in decision support

Learning Activities

Learning activities will be assigned to assist the student to achieve the intended learning outcomes through lecture, instructor-led class discussion, guest speakers, group activities, drills/skill practice, and others at the discretion of the instructor.

Grade Determination

The student will be graded on learning activities and assessment tasks. Grade determinants may include the following: daily work, quizzes, chapter or unit tests, comprehensive examinations, student projects, student presentations, class participation, and other methods of evaluation employed at the discretion of the instructor.