

**SURV 56 Course Outline as of Fall 2016****CATALOG INFORMATION**

Dept and Nbr: SURV 56 Title: INTRO TO GPS SURVEYS

Full Title: Introduction to GPS Land Surveying

Last Reviewed: 12/13/2021

| Units   |      | Course Hours per Week |      | Nbr of Weeks | Course Hours Total |        |
|---------|------|-----------------------|------|--------------|--------------------|--------|
| Maximum | 4.00 | Lecture Scheduled     | 3.00 | 17.5         | Lecture Scheduled  | 52.50  |
| Minimum | 4.00 | Lab Scheduled         | 3.00 | 8            | Lab Scheduled      | 52.50  |
|         |      | Contact DHR           | 0    |              | Contact DHR        | 0      |
|         |      | Contact Total         | 6.00 |              | Contact Total      | 105.00 |
|         |      | Non-contact DHR       | 0    |              | Non-contact DHR    | 0      |

Total Out of Class Hours: 105.00

Total Student Learning Hours: 210.00

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**

An introduction to the principles and applications of satellite-based land surveys, coordinate systems, global positioning systems (GPS) and Global Navigation Satellite Systems (GNSS) including the concepts and practice of precise location, navigation, GNSS signal interpretation, data collection, data processing, statistical adjustment and reporting.

**Prerequisites/Corequisites:**

Course Completion of APTECH 191 and SURV 60; OR Course Completion of APTECH 191 and SURV 50 and SURV 51

**Recommended Preparation:****Limits on Enrollment:****Schedule of Classes Information:**

Description: An introduction to the principles and applications of satellite-based land surveys, coordinate systems, global positioning systems (GPS) and Global Navigation Satellite Systems (GNSS) including the concepts and practice of precise location, navigation, GNSS signal interpretation, data collection, data processing, statistical adjustment and reporting. (Grade Only)

Prerequisites/Corequisites: Course Completion of APTECH 191 and SURV 60; OR Course Completion of APTECH 191 and SURV 50 and SURV 51

Recommended:

Limits on Enrollment:

Transfer Credit: CSU;

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

|                      |                      |                        |                  |
|----------------------|----------------------|------------------------|------------------|
| <b>AS Degree:</b>    | <b>Area</b>          | <b>Effective:</b>      | <b>Inactive:</b> |
| <b>CSU GE:</b>       | <b>Transfer Area</b> | <b>Effective:</b>      | <b>Inactive:</b> |
| <b>IGETC:</b>        | <b>Transfer Area</b> | <b>Effective:</b>      | <b>Inactive:</b> |
| <b>CSU Transfer:</b> | Transferable         | Effective: Spring 2009 | Inactive:        |
| <b>UC Transfer:</b>  |                      | Effective:             | Inactive:        |

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

### **Outcomes and Objectives:**

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

1. Identify types of control surveys and their applications in civil engineering and land surveying.
2. Operate both navigation grade and survey grade GPS/GNSS equipment for determining location.
3. Use conventional electronic surveying instruments (total stations) as well as the GPS equipment for control and topographic surveys, navigation, staking and mapping.
4. Determine and utilize appropriate field procedures for horizontal and vertical control of surveys.
5. Define apply and give illustrative examples of map projections and their associated data.
6. Determine the geographic coordinates and plane coordinates of points within the two California Coordinate Systems.
7. Summarize the use and setup of electronic surveying equipment such as total station global positioning systems.
8. Reduce, analyze, compile (post-process) and summarize GPS/GNSS land survey data using post-processing software.

### **Topics and Scope:**

#### **I. Introduction to GPS**

- A. definitions
- B. principles
- C. applications
- D. skills
- E. equipment

## II. State plane and geographic coordinate systems

- A. reference ellipsoid models
- B. datums and epochs
- C. map projections
- D. computations

## III. Navigating using GPS

- A. uploading navigational coordinates
- B. locating by different coordinate systems
- C. establish locations
- D. determine positions

## IV. Planning a survey

- A. survey types, including control, topographic and layout
- B. implications for Terrestrial, LiDAR and photogrammetric control surveys
- C. project planning
- D. mission planning
- E. field data collection methods

## V. Performing a survey

- A. survey styles
- B. collection methods
- C. occupations
- D. observations
- E. data collection devices and methods
- F. recording observation data

## VI. Post-processing data

- A. downloading field data into desktop analysis environment
- B. uploading field data into online analysis environment
- C. reduction and analysis of data in desktop and online environments
- D. adjustment of data
- E. reporting of data

## VII. Related Mapping

- A. control
- B. topographic
- C. planimetric
- D. 3D (GIS and CAD)

VIII. Topics I thru VII mentioned above will also be studied by means of field laboratory exercises and lab reports during the laboratory portion of the course.

### **Assignment:**

1. Textbook reading: 1-2 chapters per week
2. Additional Readings: 1-2 selected topical articles or handouts weekly or biweekly
3. Homework: 5-10 problems weekly or biweekly
4. Weekly field / laboratory exercises and performance evaluations
5. Written lab reports (3-5)
6. Midterm exams (1-3)
7. Quizzes: (0-5)
8. One final exam

### **Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Lab reports

Writing  
10 - 20%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Field exercises (hand calculators), homework computations (hand calculators or PC software)

Problem solving  
20 - 30%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Operate GPS receivers, proper acquisition of data

Skill Demonstrations  
30 - 55%

**Exams:** All forms of formal testing, other than skill performance exams.

Quizzes, mid-term exam and final exam, including: multiple choice, completion, true-false, short answer, short essay, and/or oral presentation

Exams  
15 - 30%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

Class Participation

Other Category  
0 - 10%

### **Representative Textbooks and Materials:**

Introduction to GPS the Global Positioning System, Ahmed El-Rabbany; Artech House 2nd Ed., 2006 (classic)

GPS for Land Surveyors, Jan Van Sickle, CRC Press 4th Ed, 2015.

Instructor prepared materials