SURV 53 Course Outline as of Spring 2017

CATALOG INFORMATION

Dept and Nbr: SURV 53 Title: ROUTE SURVEYING & DESIGN
Full Title: Route Surveying & Design
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	17.5	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:	CEST 53

Catalog Description:
Route surveying and design. Geometric design and construction staking of transportation routes. Use of electronic surveying equipment, computers, data collectors. Introduction to photogrammetry and Global Positioning Systems (GPS).

Prerequisites/Corequisites:
Course Completion of CEST 51 and SURV 60

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: Route surveying and design. Geometric design and construction staking of transportation routes. Use of electronic surveying equipment, computers, data collectors. Introduction to photogrammetry and Global Positioning Systems (GPS). (Grade Only)
Prerequisites/Corequisites: Course Completion of CEST 51 and SURV 60
Recommended:
Limits on Enrollment:

Transfer Credit: CSU;
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**	Effective:	Inactive:
CSU GE:	**Transfer Area**	Effective:	Inactive:
IGETC:	**Transfer Area**	Effective:	Inactive:

CSU Transfer:	Transferable	Effective:	Fall 1981	Inactive:	
UC Transfer:		Effective:		Inactive:	

CID:

Certificate/Major Applicable:
Certificate Applicable Course

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Describe the route location process
2. Properly set up and operate data collection equipment and software
3. Lay out civil engineering designs
4. Prepare and use photogrammetric control in topographic mapping
5. Perform complex computations used in civil engineering construction

Objectives:
Upon completion of this course, students will be able to:
1. Develop a route location for a transportation project
2. Summarize the proper use of the total station and data collector software and hardware
3. Perform a field survey for control, topographic and planimetric surveys
4. Prepare maps, plats and drawings from field data
5. Prepare a photogrammetric surveying layout
6. Perform complex computations related to photogrammetric surveys, right of way acquisition surveys, roadway alignments, earthwork volumes, slope staking, and global positioning surveys
7. Design and lay out roadways using civil and surveying Computer Assisted Drafting and Design (CADD) software/hardware and surveying equipment
8. Perform a field survey to slope stake a roadway
9. Compute earthwork and other construction volumes
10. Prepare route surveying documentation for different types of projects

Topics and Scope:

I. Route Location Process
 A. Site reconnaissance
 B. Ownership conflicts

C. Boundary and Easement Issues
D. Preliminary and Topographic Surveys
E. Preliminary and Final Route Design

II. Control Surveys
A. Quality Control (QC) / Quality Assurance (QA) network planning
B. Datum, projection and coordinate system considerations
C. Primary and secondary control placement
D. Network densification
E. Statistical adjustment

III. Data Collectors
A. Device configuration
B. Data upload for reconnaissance/stake out
C. Data download for export to CADD

IV. Photogrammetry
A. Basic theory
B. Aerial survey planning
1. Neat Model
2. Image overlap and sidelap
3 Image registration with survey data

V. Highway Geometrics
A. Straightline segments
B. Curves: tangent circular, spiral, parabolic
1. Curve geometry, layout and as built check
2. Vertical curvature, crown and drainage

VI. Highway Design and Layout
A. Freeway, roadway, railway, city street, bridges
B. Perspectives: plan view, profile view, cross-section, end section
C. Point of Beginning (POB), stationing, centerline, alignment, cross-sections
D. Crown, slope and drainage
E. Grade and vertical curve considerations

VII. Determining Construction Quantities
A. Area calculations: cross-sections, end area, plan area
B. Volume calculations: cross-section segments, vertical cuts and fills, borrow pits

VIII. Slope Staking
A. Centerline elevations
B. Cross-sectional, cut and fill calculations
C. Stake marking (labeling placement and flagging)

LABORATORY TOPICS AND SCOPE

I. Topcon University - Educational Videos Route and Construction Surveying Methods
II Route Location Research Exercise
III. Field Mapping and Data Collection Methods
A. Field notes and field books
B. Use of compass and tape
C. Field use of Terrestrial Positioning System (TPS) and Global Positioning System (GPS) surveying devices
1. Mission Planning / Reconnaissance Techniques
2. Types of devices and positional accuracy
3. GPS data collection methods
a. Navigation
b. Measurement
c. GPS device dashboard and controls

4. TPS data collection methods
    a. Navigation
    b. Measurement
    c. TPS device dashboard and controls

IV. Simple, Reverse and Compound Curve Stakeout Exercise
V. Radial Stakeout of a Roadway from Control Traverse Exercise
VI. Median Island Stakeout Exercise
VII. Bus Stop at Intersection Stakeout Exercise
VIII. Storm Drain and Catch Basin Stakeout Exercise
IX. Cul-du-Sac Curb and Gutter, Sanitary Sewer and Storm Drain Stakeout Exercise
X. Elevation Certificate Research
XI. Slope Staking Exercise
XII. Photogrammetry Survey Planning Exercise
XIII. Final comprehensive Planning and Design Staking Exercise
XIV. Office processing of field data
1. Data download and storage
2. Data QC/QA, reduction, edits and preparation
3. Baseline/Vector processing
4. Vector QC/QA, Loop closure check
5. Adjustment of final solutions
6. Report preparation

Assignment:

1. Textbook reading (1-3 chapters per week)
2. Homework assignments (6-10)
3. Field exercises and performance exams (8-12)
4. Midterm exams (1-4)
5. 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.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments and skill demonstrations are more appropriate for this course.	Writing 0 - 0%

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

Homework problem sets, Field work exercises and reports	Problem solving 25 - 35%

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

Field exercises, including performance exams	Skill Demonstrations 30 - 40%

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

Mid terms and final: Multiple choice, Matching items, Completion, Computational	Exams 30 - 45%

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

Class Participation	Other Category 0 - 10%

Representative Textbooks and Materials:
Surveying with Construction Applications (8th). Kavanaugh, B. Prentice Hall: 2014
Instructor prepared materials