

University of Toledo

Construction Engineering Technology

Master Syllabus

Course Title: Surveying Applications

Course Code & Number: CET-3210

Credit Hour Total: 3 **Weekly Contact Hours Lecture:** 2 **Lab Hours:** 2

Prerequisite(s): CET-1210

Text: Elementary Surveying 14th Ed.
Wolf & Ghilani ISBN: 978-0133758887
(Special Custom Edition, Chapters 12-22, 24-28)

Software: None

Course Coordinator: Loy

A. **Course Description** (Approved catalog description.)

This course covers the study of surveys for construction layout and mapping, including traverses, horizontal and vertical curves and boundaries. The laboratory stresses the organization of projects under actual field conditions using total stations and data collectors. Hand and computer solutions will be used to solve field problems.

B. **Related Program Outcomes:**

Upon successful completion of the Construction Engineering Technology program, graduates will have:

ABET/Student Outcomes

- a. an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
- e. an ability to function effectively as part of a team;
- f. an ability to identify, analyze, and solve broadly-defined engineering technology problems
- g. an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;

Program Criteria Outcomes

1. Effective communication skills related to the construction environment through the proper usage of oral, written and graphic techniques.
2. A development of mathematical skills sufficient to solve and analyze technical problems associated with construction projects including building, highway and heavy construction.
9. Proficiency in the use of surveying equipment to collect data and lay out projects to solve engineering problems.

Evidence of the success of these outcomes is provided by the collection and analysis of:

- Final Topography Collection Project

- Survey Field Book Grade
- Metes & Bounds Interpretation Problem

C. **Course Objectives:**

Upon completion of this course students will have the ability to:

1. Use proficiently the transit, tape, level, and compass
2. Prepare and interpret field notes
3. Run a traverse in the field by compass bearings, direct angles, deflection angles, and azimuths
4. Perform traverse computations, including: balancing angles, bearings, latitudes and departures, traverse adjustments and coordinates.
5. Perform area computations by DMD method and computer techniques.
6. Perform elementary triangulation calculations.
7. Locate topographical details in the field by using the following methods: transit-tape, transit-stadia, and offsets from a base line.
8. Complete curve calculations for both horizontal and vertical curves.
9. Stake out both horizontal and vertical curves.
10. Perform measurements by stadia to determine horizontal distances.
11. Construction staking problems (curbing, center lines, foundations, etc.)

D. **Course Outline – Major Content Areas**

1. Traversing
2. Topographic Surveying
3. Construction Surveying
4. Control Surveying
5. State Plane Coordinates
6. Horizontal & Vertical Curve Control
7. Construction Staking
8. Reduction of Existing Topography to Plan form

E. **Suggested Laboratory Tests**

1. Review of transit operations
2. Horizontal curve staking
3. Vertical curve staking
4. Sewer line staking (horizontal & vertical control)
5. Calculation of cut/fill using top of hub elevations
6. Total station operation (horizontal & vertical control)
7. Distances using a total station
8. Topographic data collection using total station and data collector
9. Reduction of traverse data with surveying software
10. Reduction of topographic data to planimetric & contours using surveying software

11. Topographic map reading and interpretation

12. Software programs for traverse computations for polygons and area calculations.