Course: CE 21000 – Introduction to Geomatics

Type of Course: Required for the Civil Engineering program. Formally CE 200 Fundamentals Of Surveying

Catalog Description: Basic surveying operations and computations; theories of errors and their analysis; fundamental concepts of horizontal, vertical, and angular measurement; horizontal and vertical control systems; traverse computations; location of man-made structures; use of topographic maps; computation of horizontal and vertical curves.

Credits: 3

Contact Hours: 5

Prerequisite Courses: ENGR 12000, MA 16500

Corequisite Courses: None

Prerequisites by Topics: Graphical Communications and Spatial Analysis, Calculus I


Course Objectives: The main objective of this course is to learn the principles of plane surveying and gain sufficient practical training on advanced surveying instruments and techniques.

Course Outcomes: Students who successfully complete this course will be able to:
1. Apply mathematics concepts in Geomatics. [1]
2. Measure and layout elevations and relative heights between points. [1, 3,6]
3. Understand units, significant figures, and filed notes. [1]
4. Understand the theory of errors in observations. [1]
5. Carry out profiling and grid leveling, for generation of profiles, contour maps, and earth works computations. [1,3,5,6]
6. Measure horizontal and vertical angles. [1,7]
7. Determine coordinates of traverse (control) and surveyed objects. [1,3,5,6]
8. Conduct quality control of the surveying works (e.g. checking of field results and computations), emphasizing ethical and professional responsibility. [3, 6]
9. Design basic horizontal alignment of a curve. [1,7]
10. Design basic vertical alignment of the curve. [1,7]
11. Function in a team during field work. [3,5]
12. Ability to use the techniques, skills, and modern surveying equipment and computer tools necessary for engineering practice. [1,5,6,7]

**Lecture Topics**
1. Introduction
2. Units, Significant Figures, and Field Notes
3. Theory of Errors in Observations
4. Leveling—Theory, Methods and Equipment
5. Leveling—Field Procedures and Computations
6. Distance Measurement
7. Angles, Azimuths, and Bearings
8. Total Station Instruments; Angle Measurements
9. Traversing
10. Traverse Computations
11. Coordinate Geometry in Surveying Calculations
12. Area
13. Horizontal Curves
14. Vertical Curves

**Computer Usage**
- Low

**Laboratory Experience**
- High

**Design Experience**
- Low

**Coordinator**
- Fawad S. Niazi, Ph. D.

**Date**
- 8 August 2018