

Tennessee Technological University  
Department of Civil & Environmental Engineering  
CEE 3020 – Surveying  
Required  
Fall Semester 2007, Spring Semester 2008

2007 Catalog Data:	CEE 3020. Surveying. Lecture 2. Lab 2. Credit 3. Introduction to the fundamental principles, instruments and techniques associated with surveying for highway purposes. Prerequisites: ENGR 1120, Math 2110.
Textbook:	Barry F. Kavanagh, <i>Surveying With Construction Applications</i> , Prentice Hall, Fifth edition, 2004.
Reference:	TBA
Coordinator:	L. K. Crouch, Professor of Civil Engineering
Goal:	To introduce students to the fundamental principles, instruments, and techniques associated with elementary surveying for highway and construction purposes.

Course learning objectives:

1. To acquaint the student to basic surveying instruments including the chain, automatic level, laser level, global positioning systems, total station and electronic field book.
2. To introduce the student to basic surveying concepts and operations including error theory, distance measurement, leveling (differential, cross sectioning, profiling), coordinate geometry, bearings and azimuths, angular measurement, electronic surveying instruments, legal and boundary surveying, traversing (closed loop and radial methods), layout, topographic mapping and geomatics.
3. To develop student proficiency in basic surveying calculations including area determination, misclosure evaluation, traverse adjustment, coordinate geometry, and data reduction for the activities in objective 2.

Course measurable outcomes:

Students will be expected to:

1. operate (at a basic level) a chain, automatic level, and total station;
2. demonstrate a basic understanding of surveying terms and error theory;
3. perform basic calculations associated with distance measurement;
4. perform calculations related to leveling;
5. calculate bearings, azimuths, areas, coordinates, latitudes, and departures;
6. demonstrate a basic understanding of angular measurements;
7. demonstrate a basic understanding of electronic surveying instruments;
8. demonstrate a basic understanding of legal and boundary surveying;
9. perform calculations related to traversing and traverse adjustment;
10. demonstrate a basic understanding of topographic mapping and related calculations;
11. perform basic earthwork calculations; and
12. have a basic understanding of surveying and its application to various construction projects.

Topics covered: (Two lecture classes per week, 55 minutes each; one lab class per week, 2 hours each)

1. Introduction and review (1 class)
2. Errors and distance measurements by taping (2 classes)
3. Leveling (3 classes)
4. Coordinate geometry, bearings and azimuths (3 classes)
5. Surveying instruments including the total station (3 classes)
6. Traverse and area computations (3 classes)
7. Topographic surveys and stadia (2 classes)
8. Boundary surveys, (metes and bounds / U.S. public land) (2 classes)
9. Circular curve calculations and layout (2 classes)

10. Cross-sections and earthwork (2 classes)
11. Construction surveying (2 classes)
12. Surveying licenses requirements (1 class)
13. Tests (2 classes plus two-hour final exam)

Contribution of the course to meeting professional component:

This course is a part of engineering topics of the curriculum.

ABET category content (as estimated by faculty member who prepared this course description):

Engineering science: 3 credits or 100%

Relation of course to program outcomes:

- Outcome 1: The graduates will have a broad understanding of relevant principles of mathematics, science, and engineering.
- Outcome 2: The graduates will have a general comprehension of four technical areas appropriate to civil engineering.
- Outcome 4: The graduates will be capable of design activities and have the ability to identify, formulate, and solve civil engineering problems.
- Outcome 7: The graduates will have an understanding of experimental processes.
- Outcome 8: The graduates will have the ability to use techniques, skills, and modern engineering tools needed for engineering practice.

Relation of course to ABET Criteria:

General Criteria

Bloom's Level of Achievement

- |  |   |
|--|---|
| (3a) Knowledge of math, science, and engineering                   | 3 |
| (3b) Design, conduct experiments; analyze and interpret data       | 4 |
| (3e) Identify, formulate, and solve engineering problems           | 4 |
| (3k) Techniques, skills, and modern tools for engineering practice | 3 |

Program Criteria:

Bloom's Level of Achievement

- |   |   |
|---|---|
| 1. Apply knowledge of math and sciences   | 3 |
| 2. Conduct civil engineering experiments and analyze and interpret the resulting data | 3 |

Computer usage: Laboratory assignment in laboratory project 5

Laboratory projects:

1. Taping and batter boards (2 labs)
2. Leveling (differential, profile, and topographic maps (3 labs)
3. Traverse with the total station (set-up, radial, control survey, and data collectors) (4 labs)
4. Layout with total station (circular curve and building site) (2 labs)
5. Boundary survey with the total station (1 lab)
6. Courthouse visit (1 lab)
7. Resectioning or free station calculations (1 lab)

Prepared by: L.K. Crouch

Date: September 2007