ADVANCED SURVEYING W/ LAB
CET 2212

Catalog Course Description:

Use of total stations, data collectors, GPS systems, surveying software, and AutoCAD. Field applications of traversing, topo-mapping, profiling and cross-sectioning, and construction stakeout. Related topics in surveying astronomy, photogrammetry, and horizontal and vertical curves.

Entry Level Standards:

Students with previous surveying experience may be admitted with instructor approval providing they can demonstrate proficiency with trigonometry, geometry, and algebra as well as the use of automatic and dumpy levels, transits and theodolites.

Prerequisites:

None

Textbook(s) and Other Course Materials:

Text:
Reference:
Surveying Principles and Applications, Kavanagh
Surveying Theory and Practice, Davis, et.al.
Surveying Practice, Kissam
Other:
- Field Note Book
- Scientific Calculator
- Emerphis Tables
- 2 - 3 1/2" Floppy Disk
- Paper - Pencil
- Flashlight (night students only)

I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
</table>
| 1    | Lecture: Review traverse calculations (Lat, Dep & Area)  
Lab: Traverse Calculations |
| 2    | Lecture: Review traverse calculations (Misc.)  
Lab: Use of GTS 300 Total Station & FC48 Data Collector |
| 3    | Lecture: Topographic Surveying |
Lab: Traverse Survey (Point to Point & Radial)
4
Lecture: Topographic Surveying
Lab: Introduction to Computer Applications

5
Lecture: Earth Volume Calculations
Lab: Large Area Topo Computer Applications

6
Lecture: Earth Volume Calculations
Lab: Large Area Topo Computer Applications

7
Lecture: Lunar & Solar Calculations
Lab: Lunar and Solar Observations

8
Lecture: Horizontal Curves
Lab: Highway Centerline Stakeout

9
Lecture: Vertical Curves
Lab: Highway Cross Section

10
Lecture: Vertical Curves; EXAM 2
Lab: Computer Applications

11
Lecture: Construction Surveying
Lab: Computer Applications

12
Lecture: Property Surveying
Lab: Computer Applications

13
Lecture: Photogrammetry
Lab: Field Trip

14
Lecture: GPS/GIS
Lab: Computer Applications

15
FINAL EXAM

II. Course Objectives*:

A. Understand the methods, equipment, field data and computations necessary for traverses, contour mapping, building stakeout and stakeout of horizontal and vertical curves. (A, B, F, G, H, I, J, K, M)

B. Select the proper method and equipment for any surveying task. (A, B, J)

C. Accurately calculate all surveying data manually and by computer. (F, G, I, K)

D. Efficiently use a Topcon GTS 300D Total Station with a FC48 Data Collector. (A, B, J)

E. Demonstrate self initiative to complete all assignments on time. (E)

*Letters after course objectives reference CET Program Outcomes (as required by ABET).

III. Instructional Processes*:

Students will:
1. Actively listen to class lectures and participate in class activities that develop and reinforce comprehension of the theories, concepts, principles and applications of distance measurement using surveying instruments. *Communication Outcome, Technological Literacy Outcome, Active Learning Strategies*

2. Observe class demonstrations on the proper care and use of surveying equipment and then integrate cognitive and manipulative skills to successfully complete laboratory assignments. *Technological Literacy Outcome, Active Learning Strategies*

3. Work individually and in teams to complete lab assignments related to the theories, concepts and principles covered in the lecture portion of the course. *Communication Outcome, Technological Literacy Outcome, Active Learning Strategies, Transitional Strategies*

4. Keep accurate, complete and neat field notes for all laboratory assignments. *Communication Outcome, Mathematics Outcome, Active Learning Strategies*

5. Collect, analyze and tabulate data in an orderly format using EXCEL Spreadsheets, WordPerfect/Word or other appropriate software. *Communication Outcome, Technological Literacy Outcome, Mathematics Outcome, Active Learning Strategies*

*Strategies and outcomes listed after instructional processes reference TBR’s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.*

**IV. Expectations for Student Performance**: Upon successful completion of this course, the student should be able to:

1. Accurately calculate latitudes, departures and areas of traverses. A,C
2. Adjust Lat. and Dep. by the compass or transit rule. A,C
3. Compute traverse areas by one or more methods. A,C
4. Utilize computer software to complete Traverse Calculations. A,C,D
5. Collect and Convert appropriate field data into topographic maps. A,B,C,D
6. Utilize computer software to draw topographic maps. B,C,D
7. Accurately compute earthwork volumes. A,C
8. Compute and stake out a horizontal and vertical curve. A,B,C,D
9. Utilize computer software to upload stakeout data. A,B,C,D
10. Compute and stake out slope and grade stakes. A,B,C,D
11. Determine true North from Astronomical observations. A,C
12. Properly select the equipment, plan the survey and obtain the necessary field data for traverses, profiles, cross sections and mapping. A,B
13. Properly select the equipment, plan the survey and obtain the necessary field data for construction site layout. A,C
15. Demonstrate proficiency and knowledge in the use of a total station. D
16. Demonstrate proficiency and knowledge in the use of a data collector. D
17. Demonstrate ability to upload/download survey data from computer software to data collector. C,D
18. Demonstrate ability to complete standard drawings on the computer. C,D
19. Demonstrate knowledge in the use of AUTOdesk software. C,D
20. Demonstrate knowledge in the use of autocad. D

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures:

Three examinations are scheduled. They will be True/False, Multiple Choice, Matching, Short Answer Essay and Problem Solving. There will also be take-home problem solving exams.
Examinations will normally be given as scheduled. Should a student have a planned vacation, operation, etc. occur during a scheduled exam, every effort should be made to take the exam prior to the scheduled absence. When a student misses an exam due to illness, he must contact the instructor immediately upon return and make-up the exam within one week.

B. Laboratory Expectations:

**Quizzes:**
Quizzes may be given by the instructor. Most quizzes will be un-scheduled and randomly given. They cover the previous sessions materials or the reading assignment for that day. There is no make-up or extra credit given for quizzes missed.

**Homework:**
A minimum of one written report will be required. It will require outside reading and research. Topics will be provided by the instructor.
Students may also be required to hand in answers to select questions at the end of each chapter or other appropriate homework at the instructor's discretion. All written assignments must be handed in on 8 1/2 x 11" engineering notepad paper, paper with smooth edges, or forms provided by your instructor.
All written assignments will be assessed a 10% penalty for each school day it is late.
All student work submitted for evaluation may be retained by the instructor.

C. Field Work:

N/A

D. Other Evaluation Methods:

A subjective evaluation based on attendance, classroom participation and attitude may be included.

E. Grading Scale:

CLASSROOM (55-60%)
Final grades will be computed from the grades obtained on homework, quizzes and examinations as follows:

Quizzes & Homework = 20% - 25%
Examinations = 35% - 40%

LAB (40-45%)
Final grades will be determined by grades obtained on field exercises. Each exercise is graded on completeness of field data, precision of field measurements, accuracy of calculations and graphic representation of data.

Attendance/Equipment Usage 15%-20%
Computations and drawings 15%-20%
Field Notes 40%-50%
Lab Final 20%

Grades are based on the following:
90 - 100 A
85 - 89 B+
80 - 84 B
75 - 79 C+
70 - 74 C
60 - 69 D
Below 60 F

VI. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course (Pellissippi State Catalog). Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.

It is the student's responsibility to attend every scheduled class activity on time. Students are responsible to get assignments missed and to make-up any work missed during an absence.

B. Academic and Classroom Misconduct:

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices: Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments. In addition to other possible disciplinary sanctions that may be imposed as a result of academic misconduct, the instructor has the authority to assign either (1) an F or zero for the assignment or (2) an F for the course.

C. Accommodations for disabilities:

If you need accommodation because of a disability, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately. Privately after class or in the instructor's office.
To request accommodations students must register with Services for Students with Disabilities:
Goins 127 or 131, Phone: (865) 539-7153 or (865) 694-6751 Voice/TDD.