**CE10-Geomatics**

**Fall 2017**

**The University of Vermont**

Lectures: MWF 2:20 – 3:10; Votey 105

Labs: Section A01: Monday 8:30 – 11:40, Votey 229

Section A02: Wednesday 8:30 – 11:40, Votey 229

Section A03: Friday 8:30 – 11:40, Votey 229

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Graduate teaching assistants:

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**I. Geomatics definition and course objectives**

Geomatics is a field of activities which, using a systematic approach, integrates all the means used to acquire and manage the spatial data required as part of scientific, administrative, legal and technical operations involved in the process of the production and management of spatial information.

This course focuses on the *tools and methods used in civil engineering to locate features in spatial terms on the surface of the earth.* The central theme of the lectures is the variety of ways to measure location and the level of accuracy and appropriateness of each method for civil and environmental engineering uses. After an introduction to global positioning systems (GPS) and the use of absolute geographic coordinates, the lectures turn to planar surveying, survey control, reference datum, and the calculations needed to establish a control traverse. The remainder of the course focuses on photogrammetry, remote sensing, and geographic information systems (GIS).

The laboratory component of the course allows students to undertake electronic measurement of angles, distance and elevation in order to use software (ArcGIS) to produce spatial representations of features on campus. The lab is hands-on, real-world, problem-based learning. **All students must attend every lab or receive a zero grade.** Lab handouts must be read **prior to the lab sessions** and **field notebooks should be prepared for data collection in advance.**

Course materials (lecture and lab handouts, homework, etc.) will be posted on the course Blackboard site.

The goals of the course are to:

* present the basic concepts of engineering surveying and their significance
* apply these concepts to the solution of basic practical problems
* develop engineering judgment in dealing with systematic and random errors in surveying measurements
* develop skills for working as a team
* acquire mechanical aptitude for the operation of survey instruments in making field measurements
* introduce students to a number of advanced computer-based surveying/mapping tools including total stations, global positioning systems (GPS), and geographic information systems (GIS)

1. **Expected outcomes**

Students will be evaluated in this class (using field survey assignments, homework assignments, mid-term exams, and a final exam) on their ability to accomplish the following course outcomes.

1. To apply mathematics for the purpose of measuring location on the surface of the earth. (ABET 3a)[[1]](#footnote-1)\*
2. To analyze field-measured distance, angles and elevations to create a survey document. (ABET 3b)
3. To understand the difference between various spatial data measurement techniques and the appropriate uses for the resulting data. (ABET 3c)
4. To work together as a survey crew to collect data and post-process it. (ABET 3d)
5. To communicate (both create and use) technical graphical information. (ABET 3g)
6. To appreciate the changing technology and new directions in the field of geomatics. (ABET 3i)
7. To properly use the following computerized tools: electronic survey instruments, global positioning systems receivers, and geographic information systems. (ABET 3k)
8. **Course Components**

**A. Readings.** The attached course schedule contains readings that are taken from the course texts available at the bookstore. Students must read the assignments *before* class. Note that test questions may come from the reading as well as the lecture.

Required texts :

1. Wolf, P.R., and C.D. Ghilani (2012) Elementary Surveying: An Introduction to Geomatics. Upper Saddle River, NJ: Prentice-Hall, Thirteenth edition or later.
2. Field book: “Rite in the Rain” TRANSIT No. 303. J.L. Darling Corp., Tacoma, WA
3. Bolstad, P. (2008) GIS Fundamentals Atlas Books, Third edition or later.

**B.** **Lectures and labs.** Attendance is the key to success in this course. Attendance in lectures is expected, and attendance in labs is mandatory.

1. **Homework**. A total of 11 homework assignments will be given throughout the semester (see course schedule below).
2. **Laboratory.** There are a total of 12 laboratory exercises. Six of these will be on surveying and six will be computer-based GIS labs. **Attendance at labs is mandatory.** Otherwise, a grade of zero will be given. The surveying-based labs are taught outdoors. Students should wear proper field attire, including warm clothes, gloves and shoes that cover toes. It is highly recommended that you complete your field book work during lab time when the TA can help you. Late work will NOT be accepted!

**E. Tests**. There will be three tests during this course. Tests will cover material from lectures, readings, and lab exercises. Each of the mid-term exams will be worth 15% of the grade, and the final exam will be worth 25%. **The final exam is scheduled for Monday, December 11th, 4:30 - 7:15 in Votey 105.** The final exam cannot be taken at any other time.

Course grading summary:

Mid-term exams (2 at 15% = 30%)

Final exam (25%)

Homework (15%)

Labs and field notebooks (30%)



1. \* ABET accredits engineering programs nationally and requires that certain objectives be met through the full four-year curriculum. Each course within the CE program aims to accomplish a subset of the complete set of ABET objectives. [↑](#footnote-ref-1)