

---

## **ERE 371 – SURVEYING FOR ENGINEERS COURSE SYLLABUS – FALL 2014**

---

### **INSTRUCTOR**

Lindi Quackenbush

Phone: 470-4727

URL: [www.esf.edu/ere/quackenbush](http://www.esf.edu/ere/quackenbush)

Office: 416 Baker Lab (mailbox in 402 Baker)

E-mail: [ljquack@esf.edu](mailto:ljquack@esf.edu)

Office hours: TBA

### **CLASS MEETING TIMES**

Lecture: Tuesday/Thursday 9:30–10:50 AM

Lab: Monday 1:55–4:55 PM; or Tuesday 12:30–3:20 PM; or Thursday 12:30–3:20 PM

### **TEXTS AND EQUIPMENT**

Required:

*Elementary Surveying* by Ghilani and Wolf (Thirteenth edition)

A scientific calculator

A pencil with hard (3H or 4H) and sharp lead but no eraser

Recommended:

*GPS for Land Surveyors* by Van Sickle (Third edition): on reserve in Moon Library

### **COURSE DESCRIPTION**

The principles of plane surveying and position determination for engineers. Subject matter areas include introduction to the theory of measurement and errors, reference surfaces, coordinate systems and datums, horizontal and vertical measurements, traversing and computations, construction surveying including circular and parabolic curves, the analysis and treatment of systematic and random errors, foundations and applications of global positioning systems. Laboratory fieldwork and computations culminate in a topographic map.

### **COURSE LEARNING OUTCOMES**

Many programs at ESF aim at training students in designing solutions to problems associated with managing and developing land resources. A basic tenet of this training is an ability to locate and quantify the resource being managed or problem being solved. In addition, professionals involved with the design and construction of facilities must acquire knowledge of the principles and practices of construction surveying. ERE 371 introduces surveying for these and other tasks associated with engineering or construction management practice.

At the conclusion of this course, the student will be able to:

- Use the principles and procedures of plane surveying for data collection, mapping, and construction layout;
- Analyze and reduce survey field measurements to produce a topographic map;
- Assess the accuracy and precision of field measurements, evaluate the sources of systematic and random errors in those measurements, and determine the suitability for calculating derived quantities;
- Perform, as a member of a team, many of the procedures of surveying field data collection (including the use of many types of equipment), professional documentation and communication, surveying computations and adjustments, and surveying data representation.

**PROGRAM OUTCOMES**

Within the context of the course description and course outcomes presented above, this course will contribute to students achieving the following outcomes related to the accredited ERE undergraduate degree:

- Apply knowledge of mathematics, science, and engineering:
  - Utilize analytical and computation approaches;
  - Demonstrate mathematical capacity for problem solving.
- Design and conduct experiments, as well as to analyze and interpret data:
  - Analyze field data to detect errors, reduce measurements and produce a map.
- Function on multidisciplinary teams:
  - Work with other students to perform and complete a semester-long project.
- Identify, formulate, and solve engineering problems:
  - Understand and apply basic mathematical and spatial principles to creatively solve problems.
- Understand professional and ethical responsibility:
  - Participate in a semester-long project that is presented in a professional context;
  - Function in situations requiring high expectations for ethics, self-discipline, and perseverance.
- Communicate effectively:
  - Learn and master effective recording of field data collection results and methods;
  - Demonstrate graphical communication by producing a professionally acceptable, accurate, and complete topographic map;
  - Practice professional communication by composing transmittal and project conclusion memorandums.
- Use the techniques, skills, and modern engineering tools necessary for engineering practice:
  - Become accomplished users of a variety of data collection tools.

**RESPONSIBILITIES AND ATTITUDES**

In order to be successful, everybody involved in this course must assume certain responsibilities. The professor's responsibilities include managing the overall course conduct, preparing and presenting instructional activities, preparing laboratory exercises, writing and grading exams, and supervising the teaching assistant(s). The TAs are responsible for conducting and grading lab exercises, helping grade exams, helping to prepare materials, and providing help during class times and office hours. The student's responsibilities are to learn the material and apply it to their profession and career. This responsibility includes attending class, completing assigned work, preparing for exams, and doing whatever is necessary for truly understanding and retaining the subject. Academic dishonesty is unacceptable evidence of character and will be dealt with severely.

**ASSIGNMENTS**

Readings and homework problems assigned in lecture are important. There will be no formal grading of these assignments but completing assigned homework is highly recommended as many exam problems will be similar to the homework problems. The homework problems and associated solutions will be available through Blackboard.

**COMPUTER USE**

Word processing and spreadsheet software packages are considered basic tools in modern life. These types of programs are used for written and graphic communication and many types of

quantitative analyses. E-mail will be used frequently for communicating outside class times. All students have access to an e-mail account through the Syracuse University system. Computer clusters at ESF and SU provide access to the Internet for those who do not have home access.

## GRADING

The course grade will be computed based on the following components:

|                            |            |
|----------------------------|------------|
| Exam 1                     | 20 %       |
| Exam 2                     | 20 %       |
| Exam 3                     | 20 %       |
| In class exercises         | 5 %        |
| Field work/Lab submissions | 20 %       |
| Final map                  | 12 %       |
| Final map computations     | <u>3 %</u> |
|                            | 100%       |

A final exam will be offered during the scheduled final exam period. This final exam will cover material from the whole course. If you take all four exams, only the three highest exam grades will count towards your course grade. You must take the final exam if you miss one of the regularly scheduled exams. The field work and lab book grades are largely based on proper note taking procedures, neatness, and organization.

The numerical scores you earn on class assignments will average to a final numerical score for the course. Letter grades will be assigned based on the scale shown below. The grade cutoffs may be adjusted by a point when actually assigning final grades at the end of the semester.

| Letter Grade | Range of Numerical Grade |
|--------------|--------------------------|
| A            | 90 and above             |
| A-           | 87 to just less than 90  |
| B+           | 84 to just less than 87  |
| B            | 80 to just less than 84  |
| B-           | 77 to just less than 80  |
| C+           | 74 to just less than 77  |
| C            | 70 to just less than 74  |
| C-           | 67 to just less than 70  |
| D            | 60 to just less than 67  |
| F            | less than 60             |

## ATTENDANCE POLICY:

Participation in lectures and labs is essential to success in this course. As shown on the grading schedule above, in-class exercises count toward the overall grade and inherently track attendance. Attendance in laboratory sessions is required because of the emphasis on group work.

**ACADEMIC DISHONESTY**

Academic dishonesty is a breach of trust between a student, one's fellow students, or the instructor(s). By registering for courses at ESF you acknowledge your awareness of the ESF Code of Student Conduct (<http://www.esf.edu/students/handbook/StudentHB.05.pdf>), in particular academic dishonesty includes but is not limited to plagiarism and cheating, and other forms of academic misconduct. The Academic Integrity Handbook contains further information and guidance (<http://www.esf.edu/students/integrity/>). Infractions of the academic integrity code may lead to academic penalties as per the ESF Grading Policy (<http://www.esf.edu/provost/policies/documents/GradingPolicy.11.12.2013.pdf>).

**SOURCES OF SUPPORT AND CLASS ABSENCE:**

If you experience academic or personal difficulties that affect your studies or life, there are people and resources that will help you. There is a website that serves to answer many student questions: <http://www.esf.edu/students/success>. In addition, the ESF Office of Student Life, 110 Bray Hall (470-6660) will provide academic support, career guidance, personal counseling, or direct you to the proper source of help. If you encounter a situation beyond your control in which you will be missing 3 or more days of classes, you should contact the Office of Student Life and they will get in touch with all your instructors for you. Supportive documentation may be required.

**ACCOMMODATIONS FOR STUDENTS WITH LEARNING AND PHYSICAL DISABILITIES:**

SUNY-ESF works with the Office of Disability Services (ODS) at Syracuse University, who is responsible for coordinating disability-related accommodations. Students can contact ODS at 804 University Avenue- Room 309, 315-443-4498 to schedule an appointment and discuss their needs and the process for requesting accommodations. Students may also contact the ESF Office of Student Affairs, 110 Bray Hall, 315-470-6660 for assistance with the process. To learn more about ODS, visit <http://disabilityservices.syr.edu>. Authorized accommodation forms must be in the instructor's possession one week prior to any anticipated accommodation. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

**RELIGIOUS OBSERVANCE:**

ESF recognizes the diversity of faiths represented among the campus community and protects the rights of students to observe religious holy days according to their tradition. Students will be provided an opportunity to make up any exam or work requirements that may be missed due to a religious observance provided they give the instructor reasonable advance notification.

**ERE 371 – SURVEYING FOR ENGINEERS**  
**LECTURE SCHEDULE – FALL 2014**

| DATE   | LECTURE TOPIC                                 | READINGS                                     |
|--------|---|--|
| 26 Aug | Introduction to Surveying                     | Ch 1; Ch 2: sec 6-11; Ch 3: sec 1-7          |
| 28 Aug | Horizontal Distance Measurement               | Ch 6: sec 1-16                               |
| 2 Sep  | Horizontal Distance and Angle Measurement     | Ch 6: sec 17-24; Ch 7: sec 1-9               |
| 4 Sep  | Horizontal Measurement                        | Ch 7: sec 10-16; Ch 8: sec 1-5, 20-22        |
| 9 Sep  | Surveying as a Measurement Science            | Ch 2: sec 1-5; Ch 3: sec 1-14                |
| 11 Sep | Surveying as a Measurement Science            | Ch 3: sec 15-21                              |
| 16 Sep | Position Determination                        | Ch 19: sec 1, 2, 6-10                        |
| 18 Sep | Coordinate Systems                            | Ch 20: sec 1-5, 12                           |
| 23 Sep | Mapping                                       | Ch 17: 1-6, 9; Ch 18: 1-12, 16-17            |
| 25 Sep | Traversing                                    | Ch 9: sec 1-8, 10, 11; Ch 10 sec 1-6         |
| 30 Sep | <b>** EXAM 1 – Through Mapping **</b>         |  |
| 2 Oct  | Traverse Adjustment                           | Ch 10: sec 7-8, 10-11, 16-17; Ch 16: Sec 1-3 |
| 7 Oct  | Coordinate Geometry and Area Calculation      | Ch 11: sec 1-4; Ch 12: sec 1-5, 9-12         |
| 9 Oct  | Measurement of Vertical Distance              | Ch 4: sec 1-14, 15.5 ; Ch 19: sec 6.4, 6.5   |
| 14 Oct | Measurement of Vertical Distance              | Ch 5: sec 1-6, 9-14                          |
| 16 Oct | Construction Layout; Intro. To Horiz. Curves  | Ch 23; Ch 24: sec 1-2                        |
| 21 Oct | Horizontal Circular Curves                    | Ch 24: sec 3-8, 21-22                        |
| 23 Oct | Vertical Curves                               | Ch 25: 1-5, 12-14                            |
| 28 Oct | Earthwork                                     | Ch 26: 1-9, 14, 15                           |
| 30 Oct | <b>** EXAM 2 – Through Vertical Curves **</b> |  |
| 4 Nov  | Overview of GPS                               | Ch 13: sec 1-4                               |
| 6 Nov  | Positioning and GPS errors                    | Ch 13: sec 5-6; Ch 14: sec 6-7               |
| 11 Nov | <i>GPS demonstration</i>                      |  |
| 13 Nov | GPS enhancement and GNSS                      | Ch 13: sec 7-11                              |
| 18 Nov | <i>Guest Lecture</i>                          |  |
| 20 Nov | GPS Techniques and Project Planning           | Ch 14: sec 1-7, Ch 15: sec 10                |
| 25 Nov | <b><i>NO CLASS – THANKSGIVING</i></b>         |  |
| 27 Nov | <b><i>NO CLASS – THANKSGIVING</i></b>         |  |
| 2 Dec  | <b>** EXAM 3 – Earthwork and GPS **</b>       |  |
| 4 Dec  | Review  |  |

**ERE 371 – SURVEYING FOR ENGINEERS**  
**LAB SCHEDULE – FALL 2014**

| MONDAY LAB SCHEDULE |                                  | TUESDAY LAB SCHEDULE |                                  | THURSDAY LAB SCHEDULE |                                  |
|---------------------|----------------------------------|----------------------|----------------------------------|-----------------------|----------------------------------|
| DATES               | LABORATORY EXERCISE              | DATES                | LABORATORY EXERCISE              | DATES                 | LABORATORY EXERCISE              |
| 25 Aug              | Introduction to Lab & Taping     | 26 Aug               | Introduction to Lab & Taping     | 28 Aug                | Introduction to Lab & Taping     |
| 1 Sep               | <b>LABOR DAY – NO LAB</b>        | 2 Sep                | GPS Collection & Station Tie-ins | 4 Sep                 | GPS Collection & Station Tie-ins |
| 8 Sep               | GPS Collection & Station Tie-ins | 9 Sep                | Horizontal Measurement           | 11 Sep                | Horizontal Measurement           |
| 15 Sep              | Horizontal Measurement           | 16 Sep               | Horizontal Measurement           | 18 Sep                | Horizontal Measurement           |
| 22 Sep              | Horizontal Measurement           | 23 Sep               | Map Data Collection              | 25 Sep                | Map Data Collection              |
| 29 Sep              | Map Data Collection              | 30 Sep               | Map Data Collection              | 2 Oct                 | Map Data Collection              |
| 6 Oct               | Map Data Collection              | 7 Oct                | Traverse Comp's & Mapping        | 9 Oct                 | Traverse Comp's & Mapping        |
| 13 Oct              | Traverse Comp's & Mapping        | 14 Oct               | Introduction to Leveling         | 16 Oct                | Introduction to Leveling         |
| 20 Oct              | Introduction to Leveling         | 21 Oct               | Leveling of Traverse             | 23 Oct                | Leveling of Traverse             |
| 27 Oct              | Leveling of Traverse             | 28 Oct               | Profile Leveling                 | 30 Oct                | Profile Leveling                 |
| 3 Nov               | Profile Leveling                 | 4 Nov                | Horizontal Curve Stakeout        | 6 Nov                 | Horizontal Curve Stakeout        |
| 10 Nov              | Horizontal Curve Stakeout        | 11 Nov               | Mapping and Map Data Collection  | 13 Nov                | Mapping and Map Data Collection  |
| 17 Nov              | Mapping                          | 18 Nov               | Mapping                          | 20 Nov                | Mapping                          |
| 24 Nov              | <b>THANKSGIVING – NO LAB</b>     | 25 Nov               | <b>THANKSGIVING – NO LAB</b>     | 27 Nov                | <b>THANKSGIVING – NO LAB</b>     |
| 1 Dec               | Mapping                          | 2 Dec                | Mapping                          | 4 Dec                 | Mapping                          |

**PRELIMINARY MAP: Due at the start of lab on 27 Oct (M) / 21 Oct (Tu) / 23 Oct (Th)**

**FINAL MAP: Due by 4 pm on Friday 5 December**