Forest Route Surveying
FE 310 Working Course Outline
Spring 2017

Instructor: **Jim Kiser**
Office: **Snell 224**
Phone: **737 – 2192**
Email: **jim.kiser@oregonstate.edu**
Office Hours: **TBA**

Prerequisites: FE 208 Elementary Forest Surveying (or other surveying course), Should be familiar with Traverse PC software

Course Format: Three 1-hour lectures, MWF - 8:00 - 8:50
One 5-hour lab, Th - 12:00 - 16:50

Required Texts:

1. The Nature of Measurements – (Handed out in class)
2. Surveying for Forestry and the Natural Resources 2nd ed.

Supplemental Text:

1. Forestry Field Reference Book (from field school)

Materials:

1. Hardhat
2. Handheld scientific calculator – TI30Xa recommended
3. Transit and Level style field notebooks (per group)
4. Field boots
5. Field survey vest

Calculators:

*****Cell phone calculators may not be used on exams. I have several TI 30XA's if you need to borrow one during an exam***

The following calculators are acceptable (in line with the NCEES policy for engineering exams)

Casio: All fx-115 models. Any Casio calculator must contain fx-115 in its model name.

Hewlett Packard: The HP 33s and HP 35s models, but no others.

Texas Instruments: All TI-30X and TI-36X models. Any Texas Instruments calculator must contain either TI-30X or TI-36X in its model name. Examples of acceptable TI-30X and TI-36X models include (but are not limited to):

The Sequence of Surveying / Measurements Courses:
FE 310 is one course from an integrated sequence of three courses in Forest Surveying and Measurements (FE 208, FE 209, FE 310). FE 310 will utilize the knowledge and experience from FE 208 as applied to the specifics of forest route surveying and site surveys particular to forestry problems and their solutions. FE 310 provides fundamental instruction for forest road layout, horizontal and vertical curve staking, earthwork volume calculations, slope staking, and pit volume estimations. FE 310 is also intended to prepare forest engineering students for Forest Route Surveying, Control Surveying (CE 463), Property Surveying (CE469), and Survey Law (CE 465). This sequence of courses is designed to prepare students for the Fundamentals of Land Surveying exam that is necessary to become a Professional Land Surveyor.

Course Goals:
There are two primary goals for this course. The first is to learn and become proficient in understanding the basics of forest road layout and survey including P-line survey techniques, Horizontal curve layout and calculations, vertical curve computations, earthwork volume estimates and slope staking, and rock pit survey and volume calculations. The second goal, which is consistent throughout all Forest Surveying and Measurement courses, is the development and application of good professional practices.

Course Objectives:
The goals for this course will be to learn basic forest route survey techniques including traversing, leveling, cross sections, horizontal and vertical curves, earthwork computations, and site survey techniques. In addition, our constant goal in all of the course work will be the development and application of good professional practices.

Specific learning objective modules for the course are:

1. **Describe and apply the fundamentals of P-line survey including traversing, leveling, and cross sections.**

2. **Successfully solve surveying problems of location and staking of horizontal curves.**

3. **Successfully solve surveying problems of location and staking of vertical curves.**

4. **Describe the components of earthwork and compute earthwork quantities for both roads and pit areas.**

5. **Describe the components to construction staking and successfully solve slope-staking problems.**

6. **Describe the concepts of survey order and be able to design an appropriate field survey for a bridge site.**

Students with Disabilities
Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098.

Student Veterans
Veterans and active duty military personnel with special circumstances are welcome and encouraged to communicate these, in advance if possible, to the instructor.

Oregon State University policy on Student Conduct
http://oregonstate.edu/studentconduct/code/index.php Students are expected to uphold the Academic Honor Code published by their respective Academic Unit. The code is based on the assumption that all persons must treat one another with dignity and respect in order for scholarship to thrive, (2) Students are also expected to follow the academic and professional standards of the academic units, and (3) Choosing to join the Oregon State University community obligates each member to a code of responsible behavior.

College of Forestry Code of Professional Conduct
http://studentservices.forestry.oregonstate.edu/college-forestry-code-professional-conduct
The College of Forestry is a community of faculty, staff, students, and visitors that stretches across all spectrums. Every member of the College community is responsible for conduct that creates, promotes, and maintains a learning and work environment that is open to and welcomes all persons. As a community, we embrace each member through the acknowledgement, honoring, and celebration of our commonalities and our differences.
The foundation for maintaining this environment requires that all persons must treat all others with dignity and respect at all times. The College fully supports the mission and goals of Oregon State University and affirms its support of the University policy against discrimination (http://oregonstate.edu/dept/affact/policy/discrimination.html), as well as the University's policies on honesty, ethics, and substance abuse (including alcohol) (http://oregonstate.edu/admin/stucon/).

Course Policies

1. All assignments are due at 5:00 p.m. on the date assigned unless specifically stated as otherwise.
2. To receive credit, assignments must be turned in on time. ***Late assignments will be penalized by 10% for each day late.***
3. All work must be neat, legible, and complete following the guidelines (ABET) for engineering work. All steps should be shown. Repetitive calculations may be illustrated by sample calculations and a summary table. Use words to explain the computations where necessary. All assumptions should be stated and justified. Use sketches where required. Incomplete, undocumented work is unacceptable.
4. When work is completed as a crew, each page of calculations should indicate who completed them and who checked them.
5. All figures, drawings, and tables should be titled.
6. Work which does not conform to the above requirements and the designated format may not be graded.
7. There will be no make-up exams or quizzes unless arranged for prior to the day of the exam or quiz.
8. Any requests for deviations in the course policies, schedule, or deadlines must be made in writing to the instructor. These requests should be made in the form of a typed business style letter that clearly states and defends your request. This may be done by e-mail. **Confirm all emails.**

Engineering Assignment Format (ABET Format):

All papers in this course, except where specifically noted, will adhere to the ABET form illustrated below. The course number, assignment title, date submitted, student name, and sheet of sheets will be on the first sheet of every assignment. Sheets after the first will, as a minimum be identified by the students name and sheet of sheets. Except where otherwise required, all sheets shall be 8 1/2 inches x 11 inches with smooth edges. Assignments requiring computations will be completed on green engineering computation paper. All sheets will be fastened together by staple in the upper left corner. All papers, unless typed, will be printed with a soft lead pencil.

	FE 310 Lab 4	Alexander Creek Bridge Site Survey	John Smith 10 September 1997	Sheet 1 of 2
	Problem Number, Problem Statement Given: Solution: (includes any sketches) In the case of repetitive calculations, show an example followed by solutions in table format Commentary where useful			

Grades:

Final grades for the course will be based on performance in the following areas:

Item	Total points
Labs (9)	180
Homework (5)	50
Office Work (2)	40
Midterm Exams (2)	200
Final Exam	100
Totals	570

FE 310 Planned Schedule

Week 1 **Module 1** **Fundamentals of P-Lines** **Principles of P-Line Survey**	Lectures: 1,2,3 Lab: Homework: Reading: Optional reading:	Introductions P-Line basics Road Anatomy Route reconnaissance and baseline layout Traverse Survey (field) – 20 pts. Homework 1 – 10 pts. Kiser, pp. 175 - 184 Kramer, pp. 7 – 10, 43 – 46, 66 – 71 Nature of Measurements – Review parts 1 through 4 on measurement error (See Week 1 Introduction)

Week 2	Lecture: 4,5,6 Lab: Homework: Reading:	Survey Techniques and descriptions Control Surveys P-Line traverse survey (field) – 20 pts Homework 2 – 10 pts. Kiser, pp. 175 – 184, 185 - 192

Week 3	Lectures: 7,8,9 **EXAM:** Lab: Homework: Reading:	Control Surveys Cross Sections ***Midterm 1 Friday in lecture – 100 pts*** P-Line level loops (field) – 20 pts No Homework this week Kiser – 185 – 192

Week 4 **Module 2** **Location and staking of horizontal curves**	Lectures: 10,11,12 Lab: Homework Office Work I: Reading: Optional Reading:	Horizontal Curves – Parts of the curve Horizontal curve stationing Horizontal Curves – Staking P-Line Cross Sections – 20 pts Homework 3- 10 pts. Data reduction Plan / profile plotting (office) – 20 pts Kiser – 193-209 Chap. 24 – Horizontal Curves

Week 5 **Module 3** **Location and staking of vertical curves**	Lectures: 13,14,15 Lab: Homework: Reading:	Horizontal Cures - Stationing Horizontal Curves – Tangent offsets Vertical curves - Components Horizontal curve layout (field) – 10 pts Homework 4 – 10 pts Kiser – 193-209, 210 - 224

Week 6	Lectures: 16,17,18 Lab: Reading:	Vertical curves – Design/stationing Vertical curves – Special Calculations Rapid survey lab (field) – 20 pts Kiser - 210 - 224

Week 7 **Module 4** **Earthwork and compute earthwork quantities for both roads and pit areas**	Lecture: 19,20,21 **EXAM:** Lab: Reading:	Slope Staking Slope staking - Iterations ***Midterm 2 Friday in lecture – 100 pts*** Slope staking (field) – 20 pts Kiser - 253 - 261

Week 8 **Module 5 and 6** **Earthwork and compute earthwork quantities for both roads and pit areas** **concepts of survey order and be able to design an appropriate field survey for a bridge site**	Lecture: 22,23,24 Lab: Office Work II: Reading:	Earthwork – Definitions and calculations Earthwork sections Earthwork transitions Earthwork misc. Bridge site survey – 20 pts Earthwork volumes– 20 pts Kiser – 225 - 253

Week 9	Lecture: 25,26 Lab: Homework: Reading:	Earthwork – Cut/fill adjustments Mass diagrams Water/pit open lab – 20 pts Homework 5 - 10 pts Kiser – 225 - 253

Week 10	Lecture: 27,28,29 Lab: Homework: Reading:	Open Review for final No Lab No Homework none

Week 11	**FINAL EXAM –** **June 13th Tuesday** **6:00 pm**	100 pts