Forest Road Engineering
FE 415 Working Course Outline
Winter 2017

Instructor: **Jim Kiser**
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Office Hours: **TBA**

Prerequisites: FE 310 Forest Route Surveying

Course Format:

Two 1 ½ hour lectures, T, Th – 7:30 - 8:50 Stag 113
One 5-hour lab, T - 12:00 - 16:50

Required Texts:

1. FE 415 Forest Road Design Notes – (Handed out in class)
2. Surveying for Forestry and the Natural Resources 2nd ed. - Kiser

Supplemental Text:

1. USFS Preconstruction Road Handbook – Snell Hall
2. Various supplemental texts in the SLC – Snell Hall

Materials:

1. Hardhat - Provided
2. Handheld scientific calculator – TI30Xa recommended
3. Field boots
4. Traverse or Levels Field Book

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):

FE 415 Forest Road Engineering:
FE 415 is the first part of a two-course sequence in forest road engineering (FE415, FE416). FE 415 will utilize the knowledge and experience from FE 310, Forest Route Surveying to present fundamental instruction for forest road location and layout, components of road design, construction practices, and cost estimating.

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 design including best management practices related to location and layout of forest roads, design of horizontal and vertical curves particular to forest harvesting equipment, proper application of compaction calculations related to earthwork design, and engineering considerations of drainage structures, road maintenance practices, and decommissioning of forest roads.

The second goal, which is consistent throughout all Forest Engineering courses, is the development and application of good professional practices with the stated goals of development of safe, cost effective, and environmentally sound solutions.

Course Objectives:

Specific learning objective modules for the course are:

1. **Successfully solve engineering problems of location and layout of forest roads both in the office on paper and in the field.**

2. **Successfully design the components of forest roads using computer aided road design technology including plan, profile, and earthwork design.**

3. **Successfully solve horizontal curve design problems including curve widening for off-tracking and design of pullouts.**

4. **Successfully solve vertical curve and horizontal curve problems that include sight and stopping distance parameters.**

5. **Successfully design forest roads for significant features of horizontal and vertical alignment, switchback curves, and station balancing of cut and fill sections.**

6. **Successfully solve problems of intersection design for One-way and Two-way traffic using SSD parameters**

7. **Successfully apply preliminary cost-estimating to the design of forest roads**

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. Work which does not conform to the above requirements and the designated format may not be graded.
6. 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 415 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 a sum of total work performance in the following areas:

% of totals	Grade
100% - 90%	A
80% - 89%	B
70% - 79%	C
60% - 69%	D
< 60%	F

FE 415 Planned Schedule

Over the next 10 weeks we are going to be covering a connected series of topics related to the development, design, and construction of roads with a fundamental focus on Forest Roads. Many of the topics will go beyond the simpler concepts of forest roads, in particular for those going on to licensing as engineers to facilitate preparation for the licensing exam(s).

Topic Areas
Definition of Terms Used
Review of Traverse Adjustments
Road Design Process
Road Planning
Route Reconnaissance and Location
Review of Horizontal Curves
Horizontal and Vertical Alignment of the Road
Review of Vertical Curves
Areas and Volumes for Earthwork
Road Construction
Road Costing

The plan for the class is to supplement lecture material with lab and homework problems that will lead to a finished road design package as the final product of the class. There will be a small number of field labs and more focus on learning the design software ROAD ENG to facilitate the final project.

All work in the course will be individual although at times you will be working in groups, for example in the field. Each student is expected to develop and turn in their own individual work for grading.

FE 415 Planned Schedule

Week 1	Lectures: 1,2 Lab: Reading: Optional reading:	Introductions Road Design Process, Road Planning Review of Traverse Adjustments – **25 pts.** Homework 1 – 10 pts. FE 415 Course Notes, pp. 1-26 None
Week 2	Lecture: 3,4 Lab: Reading: Optional reading:	Road Anatomy Road Design parameters and specifications Horizontal Curve Review Road reconnaissance and location – **25 pts.** FE 415 Course Notes, pp. 27-61 FE 415 Course Notes, pp. 62-86 None
Week 3	Lecture: 5 COFE meeting Lab: Reading: Optional reading:	Road location by pegging Road reconnaissance and location Road Location by Pegging - **25 pts.** FE 415 Course Notes, pp. 87-122 FE 415 Course Notes, pp. 74-86 review None
Week 4	Lectures: 6, 7 Lab: Homework Reading:	Horiz and Vert Alignment Criteria Curve Design Parameters Intro to ROADENG – 10 pts Curve Problems- 10 pts. FE 415 Course Notes, pp. 123-148
Week 5	Lectures: 8,9 Lab: Reading	Curve Design Parameters – SSD parameters for curve design Vertical curves - Components Start design FE 415 Course Notes, pp. 149-211

Week 6	Lectures: 10,11 Lab: Reading:	Vertical curves – Design/stationing Vertical curves – Special Calculations Begin Earthwork Build design templates Continue design FE 415 Course Notes, pp. 187-211 FE 415 Course Notes, pp. 212--211

Week 7	Lecture: 12,13 Lab: Reading:	Earthwork – Cut/fill adjustments Mass diagrams Computation of end areas for irregular and partial sections by coordinates Earthwork adjustments Finalize design and setup for final report FE 415 Course Notes, pp. 212-251

Week 8	Lecture: 14,15 Lab: Reading:	Pit Volume computations Intersection design Complete term design project Kiser – 225 – 253 FE 415 Course Notes, pp. 251-274

Week 9	Lecture: 16,17 Reading:	Earthwork – Cut/fill adjustments Mass diagrams Kiser – 225 - 253

Week 10	Lecture: Lab: Homework: Reading:	Open Review for final No Lab No Homework none

Week 11	**FINAL EXAM – June 6th Monday 6:00 PM**	