School of Civil and Construction Engineering.
Oregon State University
CE 553–Railroad Engineering
Fall 2014

Instructor: Dr. Kate Hunter-Zaworski Owen Hall 303 Phone: 737-4982 Hunterz@engr.orst.edu	Thursday 5:00-6:50 pm, Owen 110 Friday 11:00-11:50, Kear 205

Co-requisite: CE 392, or equivalent or permission of the instructor

Credits: 3 credits, class meets for 1 two hour and 1 one hour lectures per week.

Text: Railroad-What It Is, What It Does Armstrong, 5th Edition, (Simmons-Boardman Books Inc),

Other Texts: AREMA Practical Guide to Railroad Engineering

Course Description:(3 credits) Railroad Engineering. The principal subject of this course is the railway infra-structure. The course will contain practical elements and the techniques used to construct, monitor and maintain railway track, but will also introduce students to the detailed behaviour of the relevant engineering materials (ballast and steel rails), techniques of track analysis and alignment design and equipment as well as railroad operations, including track control and signal systems. Students will gain exposure to current issues in the US rail industry and particularly operational issues related to high speed passenger rail and freight rail (class 1 and regional rail).

Students will be expected to participate in all class field trips. Students will present class presentations on their project during dead and finals week.

Course Learning Objectives:
At the end of the course students will be able to

1. Explain the essential elements of railway track structure, construction and maintenance
2. Explain the principle components and terminology used in different aspects of rail transportation
3. Describe the different types of track geometry and switches
4. Understand basic Locomotives and Power delivery systems
5. Describe basic track control and signal systems
6. Synthesize the issues of shared track in HSR and Freight Operations

Course Schedule: (Subject to change)

Week	**Topic**	**Reading**
1 Oct 2	Introduction to Railroad Engineering, Safety, AREMA Field trip to Corvallis Sites	Armstrong: Ch 1, 2, 8,9

2 Oct 9	Railroad and Terminal Operations	Armstrong Ch 10-16
3 Oct 16*	OSU Football Game, no class on Thursday Basic Track	Armstrong Ch3, 18-23,Practical Guide Ch 3
4 Oct 23	Track Structure and Roadway	Practical Guide Chapter 4
5 Oct 30	Drainage	Practical Guide Ch 5
6 Nov 6	Geometric Design	Practical Guide Ch 6
7 Nov 13	Railway Structures Guest speaker	Practical Guide Ch 6
8 Nov20	Signals and Communication	Armstrong Ch 7, PG Ch 7
9 Nov 27*	Thanksgiving –No class	PG Ch 2 Armstrong 5,6
10 Dec 4	Class presentations	

Final Exam December 11, 2014 6:00 pm

Use of Class time: The class time will be used for:

- Discussion of weekly reading assignment
- Discussion of individual projects and Case Study
- Presentations
- Guest Speakers

Grading (Tentative)

Homework	20
Weekly Journal Summary	10
Midterm	25
Case Study	20
Research Paper and Presentation	25
Total	100 points

Class Assignments: All written materials must be type written 12. Pt Times Roman preferred 1.5 line spacing.

Office Hours:

Please set up an appointment via email to be sure that Dr. Hunter-Zaworski is available to meet with you.

Email:

Every student must have ENGR and ONID accounts. Read email daily. Note: a class email distribution list will be generated from ENGR accounts. You can "forward" ENGR or ONID to any account.

Class Activities

Case study: The case study for the class will examine the feasibility of operating passenger rail service on the Portland and Western tracks between Albany and Corvallis. The class will

be divided into two groups. Each group will investigate the rail structure that will be required to support mixed use freight and passenger rail, and the other group will investigate the rolling stock options

Deliverables: The groups will produce a 5 page document that identifies key issues for the structures (Due October 23, 2014) and rolling stock (Due November 20, 2014)
Homework: Assignments will be developed and handed out. These will be a mix of qualitative and quantitative problems.

Weekly Journal Summary: (these can be related to term project topic, and are individual assignments)
There is a lot of interest in the US on reinvigorating rail and in particular HSR in the US. At the same time there are many technical and political issues as well. You are required to read a journal article each week that is related to heavy freight and or intercity passenger rail operations (not urban light rail). You are required to write a ½ page critical thinking reflection of the article that you have reviewed. A copy of the article should be attached to the submission. These should be submitted by **email before 9:00 am** on the following Wednesdays. Due: Oct 8,15, 29, Nov 5,12,19,26 and Dec 3

Term Project and Presentation
The term project may be on any topic related to heavy rail operations for passenger and/or freight, in other words anything that is not light, urban rail or mag lev. Topics may be based on logistics, economics, operations, rail properties, rail/wheel interface or related to civil infrastructure. Topics must be submitted for instructor approval (discussion) by October 16, 2014. There will be some open class discussion to make sure that there is diversity of topics on October 17, 2014
Report: A 7-10 page research report is required to be submitted on or before December 5, 2014.
Class Presentation: A short 10 minute presentation on the report topic will be scheduled during dead and finals week. More details on deliverables will be provided.

Field Trips: **TBA**
For all Field Trips Solid closed toe footwear (hiking boots) must be worn. Safety vests, hard hats and safety glasses are available if you do not have your own!
PAY ATTENTION AT ALL TIMES, NO INAPPROPRIATE BEHAVIOR WILL BE TOLERATED …..
Each student will write a short "blog" on each of the field trips (more details to be provided). Pictures may be included in blog
Field Trip: TBA

Disruptive Behavior:
While the University is a place where the free exchange of ideas and concepts allows for debate and disagreement, all classroom behavior and discourse should reflect the values of respect and civility. Behaviors which are disruptive to the learning environment will not be tolerated. Your instructors are dedicated to establishing a learning environment that promotes diversity of race,

culture, gender, sexual orientation, and physical disability. Anyone noticing discriminatory behavior in this class, or feeling discriminated against should bring it to the attention of the instructors or other University personnel as appropriate.
The following specific behavior is never allowed:
• No cell phones or pagers in class.
• No use of Laptops or other electronic devices for activity outside of its use in THIS class (i.e., surf the web, email, pictures)
• No reading the Barometer during class.

CCE Honor Code:
CCE students and faculty are expected to uphold the OSU CCE Honor Code, as stated in the CCE Undergraduate Advising Guide. The purpose of this Honor Code is to create and maintain a community bound by standards of professional and academic conduct in which the CCE mission may be successfully advanced and to establish the respect of the professional community for the students, alumni, and faculty of CCE will endure.

Cheating and Student Conduct:
You are expected to be honest and ethical in your academic work. There is a "zero tolerance" policy in effect for cheating in this class. Any instance in which a student is caught cheating will be handled in strict accordance with the policies outlined at the following websites: http://oregonstate.edu/studentconduct/http:/%252Foregonstate.edu/studentconduct/code/index.php. In order to provide students with a positive learning environment OSU has adopted a pledge of civility, which can be found at http://oregonstate.edu/studentconduct/home/ .

Academic dishonesty is defined as an intentional act of deception in one of the following areas:
• Cheating- use or attempted use of unauthorized materials, information or study aids
• Fabrication- falsification or invention of any information
• Assisting- helping another commit an act of academic dishonesty
• Tampering- altering or interfering with evaluation instruments and documents
• Plagiarism- representing the words or ideas of another person as one's own

When evidence of academic dishonesty comes to the instructors' attention, the instructors will document the incident, permit the accused student to provide an explanation, advise the student of possible penalties, and take action. The instructors may impose any academic penalty up to and including an "F" grade in the course after consulting with the department chair and informing the student of the action taken.

Class Attendance: Attendance is mandatory. You are expected to attend every class and participate. If you are unable to attend for a good reason, notify the instructor before that class. If you do miss class, it is your responsibility to find out from another student what was covered and any administrative information presented.

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.

DAS e-mail address is Disability.Services@oregonstate.edu.

Tentative List of Guest Speakers

Week	**Topic**	**Guest Speakers**
1 Oct 2	Introduction to Railroad Engineering, Safety, AREMA	
2 Oct 9	Railroad and Terminal Operations	Bob Melbo, ODOT Rail
3 Oct 16*	OSU Football Game, no class on Thursday Basic Track	
4 Oct 23	Track Structure and Roadway	Kevin Jeffers
5 Oct 30	Drainage- John Schnaderbeck	Jeff Morrell Oct 31ODOT John
6 Nov 6	Geometric Design	Dan Gillins Nov 6
7 Nov 13	Railway Structures Guest speaker	Pasi
8 Nov20	Signals and Communication	ODOT John Schnaderbeck

Other events (Tentative)
Oct 22, AREMA meeting with Union Pacific Recruiters
Field Trip to Albany Yard
AREMA Knife River

Class Deliverable Calendar

Week/Date	Deliverable
2 /Oct 8	Journal Article #1
3/Oct 15 Oct 16	Journal Article #2 Submit Topic for Term Project
4/Oct 23	Case Study Structure
5/Oct 29	Journal Article #3
6/Nov 5	Journal Article #4
7/Nov 12	Journal Article #5
8/Nov 19 Nov 20	Journal Article #6 Case Study Rolling Stock
9/Nov 26	Journal Article #7
10/Dec 3 Dec 5	Journal Article #8 Term Paper Due