Oregon State University
School of Civil and Construction Engineering
CE 313 Hydraulic Engineering (4 Credits) Winter 2014

Instructor: Arturo Leon, Ph.D., P.E.
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Course webpage (For software and material from previous offerings):
http://web.engr.oregonstate.edu/~leon/Teaching_hydraulic_engineering.html

Blackboard for handouts, homeworks, quizzes, exams, and project:
https://my.oregonstate.edu/webapps/portal/frameset.jsp

Meeting times:

Lectures:	MWF	9:00-9:50 am	COVL 221
Computer Labs:	**Some Mondays** (see course schedule), 9:00-9:50 am (Owen 241)		
Recitation/Labs:	Thursday	08:00-09:50am	KEAR 312
	Thursday	12:00-13:50 pm	KEAR 312

Instructor office hours: Monday 10:00-12:00 (213 Owen Hall)
Wednesday 10:00-12:00 (213 Owen Hall)

Teaching Assistants and office hours:

Wei Cheng "Johnny" Wu **Office:** COVELL 040 **Email:** wuw@engr.orst.edu **Office Hours:** Tuesday 3-5pm Wednesday 4-5pm	**Parnian Hosseini** **Office:** Owen 324 **Email:** hosseinp@onid.oregonstate.edu **Office Hours:** Monday 4:00-5:00 pm Thursday 3:00-5:00 pm

Textbook: Munson, B.R. Okiishi, T.H., Huebsch, W.W., Rothmayer, A.P. (2012) *Fundamentals of Fluid Mechanics*, 7th ed., John Wiley & Sons, NY. Note: Previous editions of this textbook are essentially the same for the sections covered in CE 313. Homework problems and examples may be different.

Catalog Description: CE 313 HYDRAULIC ENGINEERING (4). Analysis of large civil engineering fluid systems including conduit flow, multiple reservoirs, pipe networks, pumps, turbines, open channel flow, and hydraulic structures. PREREQ: CE 311

Course Information: Course information will frequently be posted on Blackboard (e.g., syllabus, HW assignments, HW and quiz solutions, etc. You may also receive notices via e-mail from the instructor or TA. Please read your campus email daily.

Student Learning Outcomes:

1. Successfully apply the energy equation to pipe flow problems and calculate flow rates, pressures, and head losses in pipe networks and reservoir systems.
2. Successfully apply Water Hammer flow principles to calculate forces and propagation speeds for Water Hammer analysis.
3. Successfully apply the energy and momentum equation to open channel flow and calculate water depths and flow rates for various flow configurations.
4. Successfully apply the energy equation to pumps and turbines, and calculate pump energy, power requirements, optimal penstock diameter, and optimal flow discharge for power generation.

LECTURES: Theory and practice will be presented mostly from the textbook, however additional material will be used from various sources. Example problems will be solved in class. Practical applications will be presented. Students are responsible for all lecture and recitation material. There is no attendance policy, however, there will be a significant amount of information that will be covered in class that is not found in the textbook. **All lectures will be scanned and posted in Blackboard after each class.**

RECITATION: Recitations will be given by the Graduate Teaching Assistant for helping with homework problems, laboratory demonstrations and for proctoring quizzes. In few occasions, the recitation time will be used by the instructor for completing lecture material.

HOMEWORKS: Homework problems will be assigned mostly from textbook.

QUIZZES: Quizzes will be given on recitation times as indicated in Table 1. Quizzes questions will be drawn from FE-style practice exams, textbook, and homework. Most quizzes will be multiple choice questions.

EXAMS: There will be **two midterms** and **one final exam**. Exams are **closed-book, closed-notes**. No electronic devices other than NCEES calculators will be allowed (see calculator policy).

STUDY SESSIONS: A study session will be scheduled in the evening (e.g., from 6 to 8 pm) one or two days before each mid-term and the final exam. Any last minute questions you have about the exam review, homeworks and quizzes will be answered then.

GRADING:

Quizzes ……..…….	20%
Homework ……	20%
Mid-Term #1 ……..…….…...	20%
Mid-Term #2 …….……	20%
Final Exam……...…….....	20%
	100%

Letter grades will be based on the weighted average specified above and assigned as follows:

A	> 95%	**B-**	75– 79.99%	**D**	52– 59.99%
A-	90– 94.99%	**C+**	70-74.99%	**F**	< 51.99%
B+	85– 89.99%	**C**	65-69.99%		
B	80– 84.99%	**C-**	60-64.99		

Special Assistance: Accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD). Students with accommodations approved through SSD 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 SSD should immediately contact the Students with Disabilities Office, Room A200, Kerr Admin. Building, 737-4098 or T.D.D. 737-3666, e-mail Disability.services@orst.edu.

Calculator Requirement for CE and CEM students

The School of Civil and Construction Engineering has adopted a School-wide policy that mirrors the list of calculators allowed on NCEES (National Council of Examiners for Engineering and Surveying) exams including the Engineer in Training (EIT) taken by most engineering students near graduation. Only the below calculators will be allowed in CE, CCE and CEM courses.

Casio: All fx-115 models. Any Casio calculator must contain fx-115 in its model name. Examples of acceptable Casio fx-115 models include (but are not limited to) fx-115 MS, fx-115 MS Plus, fx-115 MS SR and fx-115 ES.

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) TI-30Xa, TI-30Xa SOLAR, TI-30Xa SE, TI-30XS Multiview, TI-30X IIB, TI-30X IIS, TI-36X II, TI-36X SOLAR

Professionalism: Professional behavior is expected from all students in this class. Examples of *un-professional* behavior include arriving late for class; talking while someone else is talking; eating, drinking, or sleeping in class; inappropriate cell phone or notebook computer use; or any behavior that interferes with other students' ability to learn or that shows disrespect for others.

Academic Dishonesty: At Oregon State University academic dishonesty is defined by the Oregon Administrative Rules 576-015-0020.1.a-c as: *An intentional act of deception in which a student seeks to claim credit for the work or effort of another person or uses unauthorized materials or fabricated information in any academic work.* Academic dishonesty includes:

CHEATING - use or attempted use of unauthorized materials, information or study aids or an act of deceit by which a student attempts to misrepresent mastery of academic effort or information. This includes unauthorized copying or collaboration on a test or assignment or using prohibited materials and texts.

FABRICATION - falsification or invention of any information (including falsifying research, inventing or exaggerating data and listing incorrect or fictitious references).

ASSISTING - helping another commit an act of academic dishonesty. This includes paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, or taking a test/doing an assignment for someone else (or allowing someone to do these things for you). It is a violation of Oregon state law to create and offer to sell part or all of an education assignment to another person (ORS 165.114).

TAMPERING - altering or interfering with evaluation instruments and documents.

PLAGIARISM - representing the word or ideas of another person as one's own OR presenting someone else's words, ideas, artistry or data as one's own. This includes copying another person's work (including unpublished material) without appropriate

referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project, then submitting it as one's own.

The **CCE Honor Code**, **Student Code of Conduct**, and more information about the University's policies and procedures in this area can be found at: http://cce.oregonstate.edu/undergraduate-academics.

Table 1: Course Schedule (Subject to change)

Wk	Mon	Lecture/topic	Wed	Lecture/topic	Thur	Recitation	Frid	Lecture/topic
1	6-Jan	Review of Syllabus, **Quiz #0 (will not be part of your score)**	8-Jan	Pipe flow characteristics (Laminar, turbulent). Fully developed flow, pressure and shear stress (8.1)	9-Jan	Problems on flow in pipes	10-Jan HW 1 out	Major losses, Moody diagram, Colebrook and Haaland's equations (8.4.1)
2	13-Jan	Flow in pipes. Minor losses and non-circular conduits (8.4.2-8.4.3)	15-Jan	Pipe flow examples in single pipes (8.5.1)	16-Jan	Problems on flow in pipes	17-Jan	Multiple pipes and pipe networks (8.5.2 and handout)
3	20-Jan	**No Class**. Martin Luther King, Jr. Day	22-Jan HW1 due/ HW2 out	Multiple pipes and pipe networks (8.5.2 and handout)	23-Jan Quiz #1	Problems on flows in pipe networks Quiz on HW 1 topics	24-Jan	Pipe flow measurements (8.6)
4	27-Jan	Hands on Matlab for solving pipe flows in complex pipe networks	29-Jan HW 2 due/ HW3 out	Waterhammer flow, fundamental concepts and examples of application (handout will be provided)	30-Jan Quiz #2	Problems on waterhammer Quiz on HW 2 topics	31-Jan	Waterhammer flow, fundamental concepts and examples of application (handout will be provided)
5	3-Feb	Open-Channel Flow, General characteristics, Froude Number effects (10.1, 10.2.2)	5-Feb	Open-Channel Flow, Specific energy (10.3.1)	6-Feb	Problems on open-channel flows	7-Feb	Uniform depth channel flow (Chezy and Manning equations) (10.4)
6	10-Feb	**Midterm #1 review, Computer Lab:** Hands on Annel2 (Matlab) -- Open Channel Flows	12-Feb HW 3 due/ HW 4 out	**Midterm #1**	13-Feb Quiz #3	Problems on open-channel Quiz on HW 3 topics	14-Feb	Rapidly varied flow, hydraulic jump (10.6.1)
7	17-Feb	Rapidly varied flow, sharp-crested weirs, broad-crested weirs and underflow gates (10.6.2-10.6.4)	19-Feb HW 4 due / HW 5 out	Turbomachines: Introduction and pump performance characteristics (12.1, 12.4.2)	20-Feb Quiz #4	Prob. on pumps Quiz on HW 4 topics	21-Feb	Turbomachines: System characteristics and pump selection (12.4.4)
8	24-Feb	Hands on Matlab for solving pipe flows in pipe networks with pumps	26-Feb	Turbomachines: Similarity laws and specific speed (12.5.1, 12.5.2)	27-Feb	Problems on pumps / turbines	28-Feb	Impulse and Reaction Turbines. Optimal discharge and penstock diameter (handout)
9	3-Mar	**Computer Lab:** Hands-on OSU Hydro turbine	5-Mar HW 5 due	**Midterm #2 review**	6-Mar Quiz #5	Problems on Turbines Quiz on HW 5 topics	7-Mar	**Midterm #2**
10	10-Mar	**Special topics:** Geysers in combined storm-sewer systems, Operation of Reservoirs.	12-Mar	Video on Hydraulic Engineering.	13-Mar Quiz #6	Solve problems for final exam Quiz on special topics and	14-Mar	**Final exam review**
11		**Final Cumulative Exam,** March 18th, Tuesday noon (our classroom)						