CE 640 – Open Channel Hydraulics
TR 14:00-15:20 in KEAR 202

INSTRUCTOR Dr. David Hill
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OFFICE HOURS TR 9:00-10:30

COURSE LEARNING OBJECTIVES
Enable you to understand and apply the fundamental principles governing open channel hydraulics to the design of engineering systems. Natural and engineered hydraulic systems affect many aspects of the physical world, and modern human conveniences (e.g., water supplies). This course represents a stepping stone in your professional development; it is intended to aid you in developing the skills you will need for systematic decomposition and solution of real-world problems.

ABET EDUCATIONAL OBJECTIVES
1. Gain a solid understanding of the basic principles of mathematics, science, and engineering.

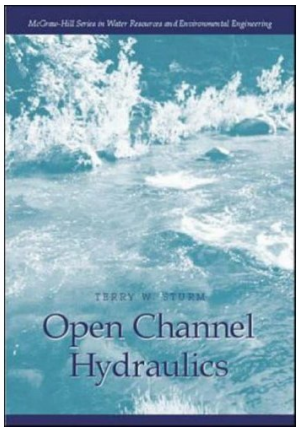
2. Be able to apply this understanding to advance your technical competency in Civil and Water Resources Engineering

3. Be able to use the techniques, skills, and modern engineering tools learned in this course for practice in Civil and Water Resources Engineering and/or graduate education.

ABET EDUCATIONAL OUTCOMES:
1. An ability to apply your knowledge of mathematics, science, and engineering.

2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

REQUIRED TEXT
Sturm, 2001, Open-Channel Hydraulics,
McGraw Hill



COURSE DESCRIPTION
This course offers a quantitative investigation of free-surface fluid flows, based upon a sound background in fluid mechanics. We will apply the fundamental laws of mechanics (conservation of mass, momentum, and energy) to a wide variety of flows, categorized by their spatial and temporal variability. We will use a variety of analysis methodologies, including theoretical, numerical, and experimental. Aspects of hydraulic design will also be considered. Sediment motion and transport in alluvial channels will be introduced and the term will conclude with an introduction to widely-used open channel hydraulic analysis software.

GRADING

Homework	50%
Midterms (2)	40%
In-class exercises	10%

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

A	= 92-100%
A-	= 90-92%
B+	= 88-90%
B	= 82-88%
B-	= 80-82%
C+	= 78-80%
C	= 70-78%
D	= 60-70%
F	< 60%

I reserve the right to adjust your grades. Your grade will only improve if adjustments are necessary. Feel free to contact me during office hours or by appointment if you have grade-related questions or concerns.

GUIDED NOTES
Lecture notes are prepared following the idea of guided note-taking. Incomplete versions will be available before class and students are expected to bring them to class daily. All material will be made available via the Oregon State University Blackboard website.

ON-LINE CLASS PARTICIPATION
All course emails and web postings will be made using the Blackboard course management software. You will need to regularly login (**my.oregonstate.edu**) to check course announcements, access homework assignments, and so on.

HOMEWORK
Homework will be assigned regularly and is due at the **beginning of class** on the specified due date. If you will be out of town, please make arrangements to have a friend or classmate turn in your homework for you, or turn it in early directly to me. Feel free to discuss your homework with your fellow students. However, you have to submit an individual homework and your submission should be an honest reflection of your effort and your grasp of the material.

Each assignment requires:

1. Your name on each page of **stapled** solutions
2. A legible and well-organized step-by-step presentation (**in pencil**) of the solutions (**include problem diagrams**). Some students prefer to type up solutions and that is perfectly fine. Handwritten assignments done in pen will not be accepted.
3. **Boxed** answers presented with proper units (when applicable)

Solutions will be made available after your assignments have been collected

MIDTERMS
While there is no final exam, there are two in-class midterms, to help me assess your understanding of the course material. Exams will be closed-book, though an extensive equation sheet will be included.

ACADEMIC DISHONESTY
The University's statement on academic dishonesty, which is reproduced (in abridged form) below, is available at

http://oregonstate.edu/studentconduct/regulations/index.php

[snip]

(a) Academic dishonesty is defined 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;

(b) It includes "cheating" (intentional use or attempted use of unauthorized materials, information, or study aid), "fabrication" (intentional falsification or invention of any information), "assisting in dishonesty" (intentionally or knowingly helping or attempting to help another commit an act of dishonesty), "tampering" (altering or interfering with evaluation instruments and documents), and "plagiarism" (intentionally or knowingly representing the words or ideas of another person as one's own).

[snip]

It is my expectation that graduate students have a good idea of what is meant by academic integrity. It is also my expectation that at all points during the term, your work (exams, homework, etc.) is just that; YOUR work. Copying someone else's homework violates this, as does looking at your neighbor's paper during an exam, as does referring to homework solution sets or exams from previous years.

COURSE SCHEDULE (subject to change)

Week	Date	Lecture	Topic	Reading
1	10-Jan	1	Introduction, engineered and natural open channel flows, review of conservation laws	Ch1
	12-Jan	2	Definition of specific energy, specific energy diagrams, flows over variable bathymetry	Ch2
2	17-Jan	3	Flows over bathymetry (cont.), flows through contractions and expansions	Ch2
	19-Jan	4	Uniform flow force balance, normal depth calculations, flows in composite channels	Ch4
3	24-Jan	5	Uniform flow – efficient channel design	Ch4
	26-Jan	6	Hydraulic jumps, momentum and energy analyses	Ch3
4	31-Jan	7	Hydraulic jumps (cont.), stilling basin design	Ch3
	2-Feb	8	Gradually varied flow, basic equation and profile classifications	Ch5
5	7-Feb	9	Gradually varied flow, numerical methods	Ch5
	9-Feb		MIDTERM EXAM 1: Lectures 1-9	
6	14-Feb	10	Unsteady flow, routing intoduction	7.1-7.2
	16-Feb	11	Unsteady flow, kinematic and dynamic methods	9.3-9.4
7	21-Feb	12	Hydraulic structures – weirs and flumes	2.8 and notes
	23-Feb	13	Hydraulic structures – culverts (HY8 introduction / demo)	6.5 and notes
8	28-Feb	14	Stream gaging techniques, shear stress estimates	Notes
	1-Mar	15	Sediment motion - Turbulent boundary layers, Shields parameter	Notes, 16.1-16.6
9	6-Mar	16	Sediment transport - bedload and suspended load	16.7-16.9
	8-Mar		MIDTERM EXAM 2: Lectures 10-16	
10	13-Mar	17	No-Class (field demonstration of stream gaging)	Notes
	15-Mar	18	HEC-RAS and HEC-GEORAS Introduction / demo	Notes