

CWR 5235 – Open Channel Hydraulics

Wednesday 5:00-7:40 pm (via Zoom)

INSTRUCTOR Dr. Arturo S. Leon, Ph.D., P.E. D.WRE

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RESEARCH WEBSITE <https://web.eng.fiu.edu/arleon/>

ZOOM LINK FOR LECTURES:

<https://fiu.zoom.us/j/98851266975?pwd=aHp6QkZxeE5Dck5nSHV3NVdvSkdPd09>

OFFICE HOURS: by appointment (please send me an e-mail)

CATALOG DESCRIPTION

Theoretical treatment and application of hydraulics. Flow in open channels with special reference to varied flow, critical state hydraulic jump, and wave formation.

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 supply). 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.

SUGGESTED TEXTS

1. Open Channel Hydraulics, T. Sturm (Second Edition), 2010, McGraw Hill.
2. Hydraulics of Open Channel Flow, H. Chanson, 2004, Elsevier.

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. The course will also include an introduction to sediment motion and transport in alluvial channels. The course will also cover an introduction to HEC-RAS, a widely-used open channel hydraulic analysis software.

COURSE MATERIAL

Course material (lecture notes, homeworks), etc will be made available through Canvas (<https://canvas.fiu.edu/>). **Old** course material and software is posted in the course website at https://web.eng.fiu.edu/arleon/Teaching_open_channel.html

GRADING

Homework	30%
Midterm	20%
Term project	30%
Oral Presentation	10% (8%- Content, 2%-Delivery),
Written Report	20% (15% - Content, 5% - Composition)
Final Exam	20%
Assistance/Participation	5% (Extra)

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

92.0 or higher	A
90.0 – 91.99	A-
88.0 – 89.99	B+
82.0 - 87.99	B
80.0 – 81.99	B-
78.0 – 79.99	C+
65.0 - 77.99	C
45.0 - 64.99	D
44.99 or lower	F

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. A legible and well-organized step-by-step presentation of the solutions (**include problem diagrams**). Some students prefer to type up solutions and that is perfectly fine.
2. **Boxed** answers presented with proper units (when applicable)

EXAMINATIONS

There will be one mid-term and one final examination, to help me assess your understanding of the course material.

STUDENT ATTENDANCE

Attendance is mandatory and up to one unjustified absence will not affect your Assistance/ Participation score. **Eight absences or more will result in a course grade of “F”.** For a number of absences between 2 and 8, points will be deducted depending on the number of absences up to a maximum of 5 points.

ACADEMIC DISHONESTY

Academic or scholarly dishonesty is an 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 or research, either through the student's own efforts or the efforts of another. FIU Students are expected to uphold the standards of academic integrity and the policies of the University regarding conduct. Cheating and plagiarism will not be tolerated; these offenses could result in failing the course, and suspension or expulsion from the University. Refer to the FIU Student Code of Conduct for full details on what constitutes academic dishonesty and misconduct, as well as the procedures for resolution of pertaining matters within the University judiciary procedures - <https://studentaffairs.fiu.edu/get-support/student-conduct-and-conflict-resolution/>

Course Schedule (Subject to Change):

Wk	Wed	Lecture/Topic	Notes
1	13-Jan	Definitions and Basic Principles and Specific Energy Ch. 1, Ch. 2	HW 1 posted
2	20-Jan	Specific Energy, Momentum Ch. 2, Ch. 3	
3	27-Jan	Momentum Ch. 3	
4	3-Feb	Uniform Flow Ch. 4	HW 1 due HW 2 posted
5	10-Feb	Uniform Flow, Gradually Varied Flow (GVF) Ch. 4, Ch. 5	
6	17-Feb	GVF Ch. 5	
7	24-Feb	GVF (Cont.), Annel2 demo, Hec-Ras demo Ch. 5	
8	3-Mar	Mid-term Review Hec-Ras demo	HW 2 due HW 3 posted
9	10-Mar	Hec-Ras demo (cont.)	
		Midterm #1 (Topics HW1 – HW2)	
10	17-Mar	Underflow gates, Spillways Ch. 6	
11	24-Mar	Stilling basins Ch. 3	
12	31-Mar	Culverts Ch. 6	
13	7-Apr	Intro to sediment Transport (Chanson Book)	HW 3 due HW 4 posted
14	14-Apr	Intro to sediment Transport (Chanson Book)	
15	21-Apr	Project Presentation	HW 4 due
16	Final Exam and Project Report Due		