

Identification	Subject	Hydraulics (6 ECTS)
	Department	Civil Engineering
	Program	Undergraduate
	Term	Fall, 2019
	Instructor	Ziaaddin Zamanzadeh
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	Classroom/hours	
	Office hours	
Prerequisites	Hydraulics	
Language	English	
Compulsory/Elective		
Description	Hydraulics consists of the application of fluid mechanics to water flowing in an isolated environment (pipe, pump) or in an open channel (river, lake, ocean). Civil engineers are primarily concerned with open channel flow, which is governed by the interdependent interaction between the water and the channel.	
Required textbooks and course materials	Novak, P., Moffat, A. Nalluri, C. and Narayanan, R., Hydraulic Structures, 3 ed Ed., 2001. U.S. Bureau of Reclamation, Design of Small Dams, U.S. Government Office, 1987.	
Course outline	<ul style="list-style-type: none"> • Introduction, Importance of HS, Classification of HS according to use. • Dams, Historical review, Type of dams, Selection of type of dam, Forces acting on dam, Gravity dams, Arch dams. • Spillways, General, Types of spillways, Ogee type spillway. • Energy Dissipation, Energy dissipations on spillways, Hydraulic jump energy dissipation. • Regulators, Channel diversion, Head regulator, Cross regulator. • Cross structures, Aqueducts and transitions, Culverts, Bridges. • Other Structures, Flow measurement structures, Gates, Valves. 	
Course objectives	<ul style="list-style-type: none"> • Students completing this course successfully will be able to: • Use the knowledge and skills studied previously, especially, on fluid mechanics, hydraulics and hydrology into this course. • Recognize the different types of hydraulic structures, to understand its purpose and function and to select the most appropriate structure and location for a specific problem. • Design, to analyze and to proof that the hydraulic structure is save and economical. • Broaden skills in team work, communication and planning through small projects. 	
Learning outcomes	<p>An ability to apply knowledge of mathematics, science, and engineering.</p> <p>An ability to design a system, component, or process to meet desired needs with realistic constrains.</p> <p>An ability to identify, formulate, and solve engineering problems.</p> <p>An ability to articulate professional ideas clearly and precisely, prepare written materials, and make oral and written presentations.</p>	
Teaching methods	Lecture	
	Experiential exercise	X
	Assisted work	X
	Assisted lab work	X
	Others	X
	Methods	

Evaluation	Midterm Exam	Date/deadlines	Percentage (%)
	Class Participation		10
	Quizzes (4-6)		30
	Midterm		25
	Final Exam		35
	Total		100
Policy	<ul style="list-style-type: none"> • NO CELL PHONES are allowed during lecture and lab sessions. PLEASE turn them off before lecture! (Not silent or vibrating mode). This is a university policy and violators will be reprimanded accordingly. • Participation and interaction in classes are more important than just attendance. • No late assignments will be accepted without prior arrangement with the instructor for acceptable excuses. Medical and family emergency will be considered on case-by-case basis. • No late homework will be accepted. Homework is to be completed on an individual basis. Students may discuss homework with classmates, but students are responsible for your own work. If students have consulted classmates, please note the individuals name on the top of students' assignment. • Quizzes may be given unannounced throughout the term and will count as one homework. There will be no make-up quizzes. • No make-up exams. If students miss an exam, a zero score will be assigned to the missed exam. • If students should miss class due to personal emergency or medical reasons, please notify the instructor by email immediately. A doctor's note will be required for make-up work. • Students are responsible for completing the reading assigned from the textbook related to the covered topics and for checking email regularly for important information and announcements related to the course. • University policy on academic honesty concerning exams and individual work will be strictly enforced. <p>BE ON TIME!</p>		

100

Tentative Schedule		
Week	Topics	Textbook/Assignments
1	Summary of Fluid mechanics in Civil Engineering	Chapter 1
2	Introduction to hydraulics	Chapter 1
3	Open channel flow and geometry	Chapter 1
4	Steady uniform flow in open channels	Chapter 2
5	Open channel flow with varying conditions	Chapter 2
7	Resistance in circular pipe flow	Chapter 2
8	Hydrostatics thrust of plane surfaces	Chapter 2

9	Midterm Exams	
10	Pipe sizing	Chapter 3
11	Noncircular conduits and local losses	Chapter 3
12	Hardy cross method	Chapter 4
13	Turbines and pumps	Chapter 4
14	Hazen William equation and other local losses	Chapter 4
15	Specific energy and critical flow	Chapters 4
	Final Exam	

This syllabus is a guide for the course and any modifications to it will be announced in advance.