

Identification	Subject	CIV 451, Hydraulic structures, 6 ECTS
	Department	Civil Engineering
	Program	Undergraduate
	Term	Fall 2023
	Instructor	Aynura Aliyeva
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	Classroom/hours	
	Office hours	
Prerequisites	Fluid mechanics-hydraulics	
Language	English	
Compulsory/Elective	Elective	
Description	<p>Topics:</p> <ul style="list-style-type: none"> • Open channel hydraulics including uniform and non-uniform flow. • Pipe flow and its characteristics. • Hydraulics of different flow measurements device such as sharp and broad crested weirs. • Fluid hydrostatics. 	
Required textbooks and course materials	<ul style="list-style-type: none"> • Novak, P., Moffat, A. Nalluri, C. and Narayanan, R., Hydraulic Structures, 3 ed Ed., 2001. • Varshney, R., Gupta, S. and Gupta, R., Theory and Design of Irrigation Structures, 1982. • Ray, K., et al, Water Resources Engineering, McGraw-Hill, 1992. • U.S. Bureau of Reclamation, Design of Small Dams, U.S. Government Office, 1987. • Peterka, A., Hydraulic Design of Stilling Basins and Energy Dissipators, Engineering Monograph No. 25, Bureau of Reclamation, 1978. 	
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	<p>Students completing this course successfully will be able to:</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • An ability to apply knowledge of mathematics, science, and engineering, • An ability to design a system, component, or process to meet desired needs with realistic constrains., • An ability to identify, formulate, and solve engineering problems. 	

	<ul style="list-style-type: none"> • An ability to articulate professional ideas clearly and precisely, prepare written materials, and make oral and written presentations. 		
Teaching methods	Lecture		x
	Experiential exercise		x
	Assisted work		x
	Assisted lab work		x
Evaluation	Methods	Date/deadlines	Percentage (%)
	Midterm Exam		30
	Class Participation and Attendance		5
	Quizzes		10
	homework		5
	Project (3 phases)		10
	Final Exam		40
	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) • 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. • BE ON TIME! 		

Tentative Schedule			
Week	Date/Day (Tentative)	Topics	Textbook/Assignments
1		Introduction, Importance of HS, Classification of HS according to use.	Chapter 1
2		Dams, Historical review, Type of dams, Selection of type of dam.	Chapter 2
3		Spillways, General.	Chapter 3
4		Types of spillways, Ogee type spillway.	Chapter 4
5		Quiz 1/ Delivery of assignments	Chapter 4
6		Energy Dissipation, Energy dissipations on spillways,	Chapter 4
7		Midterm exam	-
8		Case study	-
9		Case study	-
10		Hydraulic jump energy dissipation	Chapter 5
11		Regulators, Channel diversion, Head regulator, Cross regulator	Chapter 5
12		Regulators, Channel diversion, Head regulator, Cross regulator	Chapter 6
13		Cross structures, Aqueducts and transitions	Chapter 7
14		Culverts, Bridges.	Chapter 8
15		Flow measurement structures.	Chapter 8
		Final Exam	

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