

Identification	Subject	Hydraulics
	Department	Civil Engineering
	Program (Undergraduate, Graduate)	Undergraduate
	Term	Autumn 2026
	Instructor	Aynura Aliyeva
	Email:	Aynurahasanova777@gmail.com
	Classroom/hours	
Prerequisites	Fluid echanics	
Language	English	
Compulsory/Elective	Elective	
Textbooks and course materials	Abdurahimov, S.H. (2023). <i>Hydraulics</i>. Baku: Azerbaijan State Oil and Industry University (ADNSU). Musayev, I.H., & Dashdamirov, Kh.Y. (2008). <i>Hydraulics and Aerodynamics</i>. Baku: Tafakkur University. Chow, V.T. (1959). <i>Open-Channel Hydraulics</i>. McGraw-Hill. Munson, B.R., Okiishi, T.H., Huebsch, W.W., & Rothmayer, A.P. (2013). <i>Fundamentals of Fluid Mechanics</i>. 7th Edition. Wiley. White, F.M. (2016). <i>Fluid Mechanics</i>. 8th Edition. McGraw-Hill Education.	
Course description	Hydraulics is the study of the behavior and application of fluids in engineering systems. The course introduces the fundamental principles of fluid statics and fluid flow and their applications in civil engineering. Topics include fluid properties, hydrostatic pressure, the fundamental equation of hydrostatics, pressure measurement, pipe flow, energy and momentum principles, open-channel flow, uniform and non-uniform flow, hydraulic structures, weirs, and flow measurement devices. The course emphasizes the application of theoretical principles to practical engineering problems involving water conveyance systems, pipes, channels, and hydraulic structures.	
Course objectives	1. To introduce students to the fundamental principles of hydraulics. 2. To develop an understanding of fluid properties and hydrostatic pressure. 3. To explain the fundamental equations governing fluid flow. 4. To analyze flow through pipes and hydraulic systems. 5. To introduce the principles of open-channel flow. 6. To analyze uniform and non-uniform flow in open channels. 7. To introduce hydraulic structures such as weirs. 8. To develop students' ability to solve practical hydraulic engineering problems. 9. To apply conservation of mass, energy, and momentum to hydraulic systems. 10. To develop engineering skills in hydraulic calculations and analysis.	
Learning Outcomes	Explain the fundamental principles of hydraulics and fluid mechanics. Determine hydrostatic pressure and pressure forces acting on surfaces. Apply the fundamental equation of hydrostatics to engineering problems.	

	Analyze flow in pipes and determine major and minor head losses. Apply the continuity, energy, and momentum equations to hydraulic systems. Distinguish between different types of open-channel flow. Calculate uniform flow in open channels. Analyze gradually varied and non-uniform flow. Determine flow rates using weirs and other hydraulic measurement devices. Solve practical hydraulic engineering problems using appropriate analytical methods.		
Teaching methods	Case analysis		x
	Group discussion		x
	Lecture		x
	Simulation		x
Evaluation Criteria	Methods	Date/deadlines	Percentage (%)
	Midterm Exam	TBA	30
	Quizzes		15
	Practical Assignments		5
	Activity		5
	Attendance		5
	Final Exam	TBA	40
	Total		100
Class Policy	Students are expected to attend classes regularly and participate actively in lectures, discussions, practical activities, and problem-solving sessions. Students should come to class prepared and complete all assigned work by the specified deadlines.Students are expected to follow university academic regulations and maintain academic integrity in all assignments, quizzes, and examinations. Late submissions may be subject to the course and university policies. Students may utilize GAI solely for code/syntax verification in fluid modeling or structuring final reports. The formulation of fluid dynamics equations, parameter selections, and physical interpretations must represent original student work. All AI usage must be clearly disclosed upon submission.		
Tentative Schedule			
Week	Date/Day (tentative)	Topics	Textbook/Assignments
1		Introduction to Hydraulics; fluid mechanics and hydraulics; units and dimensions	Abdurahimov, S.H. – <i>Hydraulics</i>
2		Fluid properties: density, specific weight, specific gravity, viscosity, surface tension and vapor pressure	Munson et al. – <i>Fundamentals of Fluid Mechanics</i>
3		Fluid hydrostatics: pressure, pressure variation and fundamental equation of hydrostatics	Abdurahimov, S.H. – <i>Hydraulics</i>
4		Pressure measurement: piezometers, manometers and pressure gauges	Musayev, I.H., & Dashdamirov, Kh.Y. – <i>Hydraulics and Aerodynamics</i>

5		Hydrostatic forces on plane and curved surfaces; center of pressure	Munson et al. – <i>Fundamentals of Fluid Mechanics</i>
6		Continuity equation, energy equation and Bernoulli equation	Abdurahimov, S.H. – <i>Hydraulics</i>
7		Pipe flow: flow characteristics, Reynolds number and head losses	Munson et al. – <i>Fundamentals of Fluid Mechanics</i>
		Midterm exam	
8		Pipe systems: major and minor losses; hydraulic and energy grade lines	Musayev, I.H., & Dashdamirov, Kh.Y. – <i>Hydraulics and Aerodynamics</i>
9		Open-channel hydraulics: classification of open-channel flow and flow characteristics	Abdurahimov, S.H. – <i>Hydraulics</i>
10		Uniform flow in open channels; Manning equation and Chezy equation	Abdurahimov, S.H. – <i>Hydraulics</i>
11		Uniform-flow calculations; hydraulic radius, hydraulic depth and most economical channel sections	Abdurahimov, S.H. – <i>Hydraulics</i>
12		Non-uniform flow; gradually varied flow and specific energy	Musayev, I.H., & Dashdamirov, Kh.Y. – <i>Hydraulics and Aerodynamics</i>
13		Hydraulic jumps; momentum principle and energy losses	Musayev, I.H., & Dashdamirov, Kh.Y. – <i>Hydraulics and Aerodynamics</i>
14		Flow measurement devices: sharp-crested and broad-crested weirs; discharge measurement	Abdurahimov, S.H. – <i>Hydraulics</i>
15		Hydraulic structures and comprehensive review of pipe and open-channel flow	Abdurahimov, S.H. – <i>Hydraulics</i>
		Final exam	