Identification	**Subject**	ENGR 210 Fluid Mechanics, 6 ECTS
	Department	Mechanical Engineering
	Program	Undergraduate
	Term	Fall 2025
	Instructor	Dr. Mehdi Kiyasatfar
	E-mail:	mkiyasatfar@khazar.org
	Phone:	
	Classroom/hours	
	Office hours	
Prerequisites	Dynamics, Differential equations	
Language	English	
Compulsory/Elective	Compulsory	
Course Description	Fluid mechanics is a branch of physics that studies fluids and their behaviors in response to different forces. This course provides students with an introduction to principal concepts and methods of fluid mechanics.	
Required textbooks and course materials	**Textbook:** • "Brief Introduction to Fluid Mechanics" by Donald F. Young, Bruce R. Munson, Theodore H. Okiishi, Wade W. Huebsch-A, Fifth Edition, published by Wiley Publication, 2010. • "Fluid Mechanics with Engineering Applications" by E. John Finnemore and Joseph B. Franzini, 10th. Edition, published by McGraw Hill, 2001	
Course Objective	The course helps students to gain a basic understanding of the properties of fluids and how to measure them. These knowledge lead to determination of behavior of fluids in various conditions. Moreover, the course enables students to apply the concepts in a broad range of engineering problems from blood in human body to galaxies. Students will work to formulate the models necessary to study, analyze, and design fluid systems through the application of these concepts, and to develop the problem-solving skills essential to good engineering practice of fluid mechanics in practical applications. Stress and strain rate descriptions, fluid statics, and use of differential and finite control volume analysis with continuity, momentum, and energy equations, Bernoulli and Euler equations, and incompressible viscous flow using Naiver-Stokes equations.	
Learning outcomes	Upon successful completion of this course, the student will be able: • Differentiate between fluids and solids and describe the continuum assumption. • Define and apply key fluid properties, including density, specific weight, specific gravity, and viscosity. • Explain and apply the principles of surface tension and capillarity. • Calculate pressure at a point in a fluid and understand its variation with depth. • Determine the magnitude, direction, and location of the hydrostatic force on submerged plane and curved surfaces. • Apply the principles of buoyancy and Archimedes' principle to solve problems involving submerged and floating bodies. • Differentiate between various flow descriptions, such as streamlines, path-lines, and streak-lines. • Apply the Reynolds Transport Theorem to convert between system and control volume formulations for mass, momentum, and energy. • Apply the continuity equation (conservation of mass) to solve problems for both incompressible and compressible flow. • Apply the Bernoulli equation (conservation of energy) to solve a wide range of fluid flow problems along a streamline. • Use the linear momentum equation to calculate forces exerted by a fluid on solid objects, such as nozzles, bends, and vanes.	

<table>
<tr><td></td><td colspan="3">Differentiate between laminar and turbulent flow and calculate the Reynolds number to determine the flow regime.
Calculate friction losses in pipes using the Darcy-Weisbach equation and the Moody chart.
Determine minor losses for pipe fittings and other components.
Analyze and solve problems for single-pipe systems as well as pipes in series and parallel.</td></tr>
<tr><td rowspan="2">Teaching methods</td><td colspan="2">Lecture</td><td>x</td></tr>
<tr><td colspan="2">Case analysis and assignments</td><td>x</td></tr>
<tr><td rowspan="7">Evaluation</td><td>Methods</td><td>Date/deadlines</td><td>Percentage (%)</td></tr>
<tr><td>Midterm Exam</td><td></td><td>25</td></tr>
<tr><td>Class Participation</td><td>At each lesson</td><td>5</td></tr>
<tr><td>Assignment</td><td>During the semester</td><td>20</td></tr>
<tr><td>Quiz</td><td>During the semester</td><td>10</td></tr>
<tr><td>Final Exam</td><td></td><td>40</td></tr>
<tr><td>Total</td><td></td><td>100</td></tr>
<tr><td>Policy</td><td colspan="3">Ethics
Copy of other students' work is highly discouraged. All assignments must be handled by the student himself. This is a university policy and violators will be reprimanded accordingly.
Preparation for class
The structure of this course demands your individual effort outside the classroom for extra practice of many problems within the textbook. After each session, every student needs to put sufficient time to practice and finish the assignments by the predetermined date.
Withdrawal (pass/fail)
This course strictly follows grading policy of the School of Science and Engineering. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be required to repeat the course the following term or year.
Cheating/plagiarism
Cheating or other plagiarism in handling the assignments, Mid-term and Final Examinations will lead to course failure. In this case, the student will automatically get zero (0), without any considerations.
Professional behavior guidelines
The students shall behave in a way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly discouraged.
Attendance
Students who attend the whole classes will get 5 marks. for three absence student loses 1 mark.
Quiz
There will be quizzes for checking understanding of content during class. We are not going to give make-up for a missing quiz due to any reason other than medical report.
Assignment
There will be a homework assignment for every chapter composed of exercises and problems.</td></tr>
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Tentative Schedule		
Week	**Topics**	**Textbook/Assignments**
1	Introduction to Fluid Mechanics	Chapter 1
2	Fluid Properties; Dimensions and Units	Chapter 1
3	Viscosity and Compressibility, Surface Tension	Chapter 1
4	Introduction to Fluid Statics	Chapter 2
5	Pressure calculation at a point, Pressure variations and measurements	Chapter 2
6	Hydrostatic force calculations	Chapter 2
7	Hydrostatic force calculations	Chapter 2
8	Review **Midterm Exams**	
9	Introduction to Fluid Kinematics	Chapter 3
10	Velocity and acceleration field	Chapter 3
11	Bernoulli equation	Chapter 4
12	Introduction to Control Volume analysis	Chapter 4
13	Reynolds Transport Theorem and conservation of mass	Chapter 5, 6
14	Conservation of Momentum and Energy	Chapter 5, 6
15	Fluid mechanics in Industrial applications	
16	**Final Exam**	

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