Identification	**Subject**	ENGR 210 Fluid Mechanics, 6 ECTS	
	Department	Mechanical Engineering	
	Program	Undergraduate	
	Term	Fall 2023	
	Instructor	Dr. Mehdi Kiyasatfar	
	E-mail:	mkiyasatfar@khazar.org	
	Phone:		
	Classroom/hours	Monday, 17:00 -18:30 & Wednesday 17:00 -18:30	
	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 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 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	• Determination of basic characteristics of fluids, • Calculation of hydrostatic pressure at any given point in fluids, • Calculation of forces exerted by fluids, • Describing properties of fluid flows under various conditions, • Formulating conservation of mass, moment, and energy for different systems of fluids, • Apply governing equations of fluid flows to different engineering problems, • Navier-Stokes equation, • Turbulent flow, • Reynolds equation, • One dimensional pipe flow, • Non-Newtonian fluid flow, • The Rabinowitsch equation,		
Teaching methods	**Lecture**		x
	Case analysis and assignments		x
Evaluation	**Methods**	**Date/deadlines**	**Percentage (%)**
	Midterm Exam		25
	Class Participation	At each lesson	5
	Assignment	During the semester	20
	Quiz	During the semester	10
	Final Exam		40
	Total		100

Policy	▪ **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.

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
14	Conservation of Momentum and Energy	Chapter 5
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.