GAU, Faculty of Engineering

Course Unit Title	Fluid Mechanics
Course Unit Code	CVEN309
Type of Course Unit	Compulsory, All civil engineering students
Level of Course Unit	3rd Year BSc
National Credits	3
Number of ECTS Credits Allocated	5 ECTS
Theoretical (hour/week)	3
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	3
Semester when the course unit is delivered	5
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisities and co-requisities	MT206
Recommended Optional Programme Components	Basic background in calculus, physics, and engineering mechanics

Objectives of the Course:

- To cover the basic principles and equations of fluid mechanics
- To present numerous and diverse real-world engineering examples to give students a feel for how fluid mechanics is applied in engineering practice
- To develop an intuitive understanding of fluid mechanics by emphasizing the physics and physical arguments.

Learning Outcomes

When this course has been completed the student should be able to		Assesment.
1	Learn the various properties commonly used in fluid mechanics like density, viscosity...	1
2	Understand and calculate the forces applied by fluids at rest or in rigid-body motion	1
3	Use the Lagrangian and Eulerian descriptions of flows, flow visualization, vorticity	1,2
4	Apply the fundamental conservation laws of mass, momentum, energy and Bernoulli equations to engineering problems	1,2
5	Apply the Reynolds transport theorem to linear and angular momentum using control volume analysis	1
6	Apply Buckingham Pi theorem of dimensional analysis and similarity	1,2
7	Learn how to analyze the flow of fluids inside pipes	1,2
8	Learn how to derive and apply the differential equations of fluid motion	1
9	Learn how to analyze the flow of fluids over bodies that are immersed in a fluid	1,2
10	Understand the basic principles of open-channel flows	1,2

Assesment Methods: 1. Written Exam, 2. Assignment 3. Project/Report, 4.Presentation, 5 Lab. Work

Course's Contribution to Program

		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	5
2	Ability to design and conduct experiments as well as to analyze and interpret data	2
3	Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct	1
4	Ability to apply systems thinking in problem solving and system design	3
5	Knowledge of contemporary issues while continuing to engage in lifelong learning	4
6	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	2
7	Ability to express their ideas and findings, in written and oral form	1
8	Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints	4
9	Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner	3
10	Ability to manage time and resources effectively and efficiently while carrying out civil engineering projects	3
11	Ability to combine knowledge from different areas of civil engineering for problem solving and system design with an ethical and sustainable approach	5

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate 4: High, 5:Very High)

Course Contents

Week			Exams
1	Chapter 1	Introduction and basic concepts	
2	Chapter 2	Pressure and fluid statics	
3	Chapter 3	Fluid kinematics	
4	Chapter 4	Mass, Bernoulli and energy equations	
5	Chapter 5	Momentum analysis of flow systems	
6			
7	Chapter 6	Dimensional analysis and modeling	
8			Quiz
9			Midterm
10	Chapter 7	Flow in pipes	
11	Chapter 8	Differential analysis of fluid flow	
12			
13	Chapter 9	Flow over bodies: Drag and Lift	
14	Chapter 10	Open-channel flow	Quiz
15			Final

Recommended Sources

Textbook: Y. A. Çengel and J. M. Cimbala, Fluid Mechanics: Fundamentals and Applications, McGraw-Hill, New York, 2006.

Supplementary Material (s): Frank M. White, Fluid Mechanics, Mc Graw Hill

Assessment

Project/ Assignments	10%	
Midterm Exam (Written)	40%	
Quiz (Written)	10%	
Final Exam (Written)	40%	
Total	100%	

ECTS Allocated Based on the Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including the Exam week)	15	3	45
Labs and Tutorials	-	-	-
Assignments	2	5	10
Project/Presentation/Report Writing	-	-	-
E-learning Activities	-	-	-
Quizzes	3	10	30
Midterm Examination	1	20	20
Final Examination	1	26	26
Self Study	14	2	28
Total Workload			159
Total Workload/30 (h)			5.3
ECTS Credit of the Course			5