

COURSE CODE: CE-253
COURSE NAME: Fluid Mechanics
CREDIT HOURS: Theory = 3 Practical = 1 Total = 4
CONTACT HOURS: Theory = 48 Practical = 48 Total = 96
PREREQUISITE: None
MODE OF TEACHING: Three hours of lecture per week (75%)
Two hours of lab per week (25%)

COURSE DESCRIPTION:

In-depth knowledge, understanding, and applications of the laws and properties in Fluid mechanics. Utilize the acquired knowledge for problem analysis.

COURSE OBJECTIVES:

Comprehensive proficiency of the principles and laws of fluid mechanics is covered in this course. Moreover, students participate in problem analysis that fosters engineering knowledge, encourages innovative thinking, and enhances individual skills.

RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):

The course is designed so that students will achieve the PLOs:

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|------------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|
| 1 Engineering Knowledge: | <input checked="" type="checkbox"/> | 7 Environment and Sustainability: | <input type="checkbox"/> |
| 2 Problem Analysis: | <input checked="" type="checkbox"/> | 8 Ethics: | <input type="checkbox"/> |
| 3 Design/Development of Solutions: | <input type="checkbox"/> | 9 Individual and Teamwork: | <input checked="" type="checkbox"/> |
| 4 Investigation: | <input type="checkbox"/> | 10 Communication: | <input type="checkbox"/> |
| 5 Modern Tool Usage: | <input type="checkbox"/> | 11 Project Management: | <input type="checkbox"/> |
| 6 The Engineer and Society: | <input type="checkbox"/> | 12 Lifelong Learning: | <input type="checkbox"/> |

COURSE LEARNING OUTCOMES:

Upon successful completion of the course, the student will demonstrate competency by being able to:

Sr. No.	CLO	Domain	Taxonomy Level	PLO
1	UNDERSTAND the basic concepts of Fluid mechanics	Cognitive	2	1
2	APPLY the knowledge of Fluid mechanics to environmental engineering.	Cognitive	3	2
3	Adapt the concepts of Fluid mechanics in the laboratory.	Psychomotor	4	1
4	Maintain ethical conduct in lab and adhere to lab safety procedures while contributing effectively towards individual and/ or group goals.	Affective	5	9

TOPICS COVERED:

Week	Topic Covered	Reading Assignment/ Homework	CLO #
1	Introduction to Fluid mechanics kinematics, hydrodynamics, and hydraulics	Chapter 1	1
2	System of units, Related problems	Chapter 2 Quiz 1 (tentative)	1
3	Properties of Fluid Mechanics	Chapter 2	1
4	Fluid Statics	Chapter 3 Assignment 1 Quiz 2 (tentative)	1 1,2
5	Measurement of pressure, using different instrument	Chapter 3	1,2
6	Buoyancy and floatation, Forces on Submerged Surfaces	Chapter 9 Assignment 2 Quiz 2 (tentative)	1
7-8	Fluid kinematics Fluid Kinematics, steady and unsteady flow, laminar and turbulent flow, uniform and non-uniform flow	Chapter 4 Quiz 3 (tentative)	2
9	Mid Semester Exam		

10	Uniform and non-uniform flow. Eq. Of continuity & related problems	Chapter 4 Assignment 3	1, 2
11	Hydrodynamics Bernoulli's equation	Chapter 5 Quiz 4 (tentative)	1,2
12	Measurement Venturi meter, Orifices, Mouthpieces and Nozzles, Pitot tube, Weirs, Notches, and Flumes	Chapter 11	1, 2
13	Steady Flow through Pipes, Losses in pipelines	Chapter 11 Assignment 4 Quiz 5 (tentative)	1, 2
14	Pipes network. Pipes in series and parallel	Chapter 11	1,2
15-16	Uniform flow in open channels, Chazy's and Manning's equations. Bazin's and Kutter's Formula, Most economical rectangular and trapezoidal section	Chapter 11 Quiz 6 (tentative)	1
17	Projects submission/ Presentation		2
18	End Semester Exam		

LIST OF PRACTICALS:

Sr. No.	Practicals	CLO #
1	Orientation	3
2	Determining the density of water	3
3	Studying the distribution of pressure within static liquids to verify Pascal's Law	3
4	Calibrating a Bourdon Type Gauge	3
5-6	Determining the hydrostatic thrust and location of center of pressure of a submerged body	3
7	Investigating stability of ship in relation to the position of its metacenter	3
8	Investigating and verifying the Bernoulli's Theorem in steady flow	3
9	Investigating the flow characteristics of various types of flow meters	3
10-11	Investigating the reaction forces produced by change in momentum of fluid flow	3
12	Investigating velocities of different materials in fluids	3

13-14	Flow visualization for illustrating streamlines around solid bodies using flow Visualization Table.	3
15	Determining the Coefficients of velocity, contraction, and discharge of a small orifice.	3
16	Revision.	3

TEXT AND MATERIAL:

Textbook (s)

1. Fluid Mechanics – With Engineering Application by E. John Finnemore & Joseph B. Franzini. (10th Edition)_2011, McGraw-Hill Education, ISBN: 1259002276
2. Irving Shames, Mechanics of Fluid, Fourth Edition, 2002, McGraw-Hill, ISBN: 0072472103

References Material:

1. Fundamentals of fluid Mechanics by Bruce R. Munson and Donald F. Young (6th edition)

ASSESSMENT SYSTEM:

Theoretical/Instruction	75%
Assignments	10%
Quizzes	15%
Mid Semester Exam	25%
End Semester Exam	50%
Practical Work	25%
Lab Attendance	20%
Lab Report	20%
Lab Quiz	30%
Lab Rubrics	30%