



National Institute of Technology Meghalaya
An Institute of National Importance

CURRICULUM

Programme	Bachelor of Technology in Mechanical Engineering	Year of Regulation	2018
Department	Mechanical Engineering	Semester	III

Course Code	Course Name	Credit Structure				Marks Distribution				
		L	T	P	C	INT	MID	END	Total	
ME 205	Fluid Mechanics	3	0	0	3	50	50	100	200	
Course Objectives	To understand the various types and properties of fluids and flows and the various forces on fluid elements as well as on submerged bodies.	Course Outcomes	CO1	(a) Explain fluid properties and rheology of fluids (Understanding). (b) Explain and solve problems on hydrostatic pressure and buoyancy (Applying)						
			CO2	Explain different terminologies of fluid kinematics. (Understanding) Solving fluid kinematics problem in different types of flow domain (Applying).						
	CO3		Formulate and make use of conservation equations to solve incompressible and compressible fluid flow problems - (Applying).							
	CO4		(a) Explain the basic theories of dimensional analysis (understanding) (b) Illustrate and Analyzed the use of dimensional analysis tool in constructing nondimensional numbers associated with fluid flows. (Applying).							
	CO5		(a) Explain and apply the N-S equations in various problems along with the pipe friction and various losses. (Applying) (b) Explain the basic theories of compressible flows (Understanding). (c) Formulate and solve the compressible flows problem (Applying).							
	CO6		(a) Formulate and solve boundary layer flows (Applying/Analysing) (b) Understand flow separation and control methodologies (Understanding).							
Course Objectives	To derive and understand the governing equations pertaining to fluid flows and the approximations involved to study various flows.									
	To understand flow measurement devices and solve problems pertaining to flow through pipes.									

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	2	0	0	0	0	0	2	0	0	0	2	3	2	0
2	CO2	3	2	2	2	0	0	0	2	0	0	0	2	3	2	0
3	CO3	3	2	2	0	0	0	0	2	0	0	0	2	3	2	0
4	CO4	3	2	2	2	0	0	0	2	0	0	0	2	3	2	0
5	CO5	3	2	2	0	0	0	0	2	0	0	0	2	3	2	0
6	CO6	3	2	2	2	0	0	0	2	0	0	0	2	3	2	0

SYLLABUS

No.	Content	Hours	COs
I	Fundamental Concepts: Fluid properties, Ideal and real fluids, Concept of shear stress, Newtonian and non-Newtonian fluids	03	CO1
II	Fluid Statics: Forces on fluid elements, Normal stresses in stationary fluid, Pressure measurements, Thrusts on submerged bodies, Buoyancy, Stability	05	CO1
III	Fluid Kinematics: Description of flow fields, Steady and unsteady flow, Uniform and non-uniform, Laminar and turbulent flow, Stream lines, Streak lines, Path lines, Stream tubes, Stream function and velocity potential, Vorticity.	05	CO2
IV	Fluid Dynamics: Continuity equation, Euler's equation of motion, Momentum equation, Energy equation	05	CO3
V	Dimensional Analysis: Types of physical similarity, Dynamic similitude, Buckingham's theorem	03	CO4
VI	Incompressible Flows: Couette flow, Hagen Poiseuille flow, Losses in pipes, Darcy-Weisbach equation, Hydraulic mean radius, Pipes in series and parallel, Water hammer in pipes, Flow measuring devices	05	CO5
VII	Compressible Flows: Laws for perfect gases, Thermodynamic relations, Pressure field, Flow through nozzles, Stagnation pressure, Sonic properties, Shock waves	05	CO5
VIII	Boundary Layer Flows: Boundary layer parameters and equations, Blasius solution, Momentum integral equations, Turbulent boundary layer, Boundary layer separation and control	05	CO6
Total Hours		36	

Essential Readings

1. Introduction to Fluid Mechanics and Fluid Machines – Som, Biswas and Chakraborty, TMH, 3rd Edition, 2011.
2. Fluid Mechanics – Cengel and Cimbala, McGraw Hill, 4th Edition, 2017

Supplementary Readings

1. Fluid Mechanics – Frank White, TMH, 8th Edition, 2015
2. Fluid Mechanics – Streeter, Wylie and Bedford, TMH, 9th Edition, 2010
3. Mechanics of Fluids – Massey, ELBS, 9th Edition, 2011