HANYANG UNIVERSITY

2019 HISS Syllabus

Fluid Mechanics

Professor:	**Balaram Kundu**
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Home Univ.:	Jadavpur University
Dept.:	Mechanical Engineering

Description:	This class would provide students with an introduction to principal concepts and methods of fluid mechanics for both compressible and incompressible fluid flow. Topics would be covered in the course include pressure, hydrostatics, and buoyancy; open systems and control volume analysis; mass conservation and momentum conservation for moving fluids; viscous fluid flows, flow through nozzles; boundary layers, and lift and drag on objects. 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.

Objective:	a) Understanding basic laws, principles and phenomena in the area of fluid mechanics, b) To solve simplified examples of fluid mechanics, c) To establish approaches for the analysis of compressible flow in different applications with consideration of an actual flow, and d) Enabling students to apply the acquired knowledge and skills in professional and specialist courses.
Preparations:	A good understanding and intuition on calculus and physics are the prerequisites for learning this course.

Credits		Contact Hours	
Schedule:	Week 1	Basic concepts of fluid mechanics. Fundamental terms. Physical values. Fluids and their properties. Forces inside fluid. Pascal's law. Euler's equation of fluid statics. Measurement of pressure. Euler and Lagrangian specification of fluid flow.	
	Week 2	Control volume, continuity equation. Basic laws of fluid dynamics – conservation	

		of mass, conservation of linear momentum, conservation of energy. Ideal fluid flow. Laminar and turbulent flow. Boundary layer. Velocity profile. Momentum integral equation.
	Week 3	Differences between compressible and incompressible flow; Ideal gas, speed of sound, Mach number. Isentropic and actual relations for 1-D compressible adiabatic duct flow, critical properties; Converging nozzles, convergingdiverging nozzles, choking.
	Week 4	Reference conditions for isentropic and actual flow of an ideal gas. Normal shocks in converging-diverging nozzles, property changes across shocks, Fanno and Rayleigh line flow.

Evaluation(%)	Midterm	Final	Attendance	Assignments	Participation	Etc.
	45	45	10	60	00	