Course Title	**Fluid Mechanics II**				
Course Code	**MME 316**				
Course Type	Compulsory				
Level	Undergraduate				
Year / Semester	3rd Year / 6th Semester				
Teacher's Name	Triantafyllos Stylianopoulos				
ECTS	6	Lectures / week	3+1 hours	Laboratories / week	1 hour
Course Purpose and Objectives	This course is a continuation of Fluid Dynamics I. The course objective is to teach students how to solve independently fluid mechanics problems related to fluid pumps and power engines.				
Learning Outcomes	• Understand the properties of boundary layers. • Understand similarity laws and preform dimensional analysis for engineering problems. • Formulate and solve basic problems in fluid mechanics. Including networks of internal and external flows. • Analyze simple compressible flow systems and understand the concepts of subsonic, sonic, supersonic and hypersonic flows. • Understand the operation of power engines such as pumps & fans. • Familiarize with modeling and experimental techniques used in fluid dynamics.				
Prerequisites	MME 216		Required	None	
Course Content	Frictional flow resistance in single pipes and pipe networks, Moody diagram. Local losses and friction factors in fittings. losses in series, energy line and hydraulic gradient. Darcy-Weisbach equation, friction factors for laminar and turbulent pipe flows. Dimensional analysis and similarity, scale modelling. Low and high-speed aerodynamics. Boundary layers, Blasius solutions and separation. Compressible flows, Subsonic, sonic, supersonic and hypersonic flows, shock waves, connection with thermodynamics. Introduction to turbulent flows, transition criteria and turbulence modelling. Fluid Machinery: Turbomachinery: conservation of angular momentum, principles of energy exchange, machine losses and characteristics; fluid pumps and fans operating point; non-dimensional groups. Cavitation. Experimental techniques in fluid dynamics. **Laboratory Exercises** • Hydraulic gradient in a pipe network • Pump performance & operational envelopes • Experimental techniques in fluid dynamics (measurement in a BL with hot wires, pitot tubes, venture meters)				

Teaching Methodology	• Lectures • Tutorial sessions • Laboratory assignments • Demonstrations • Communicative, Collaborative • During the first week of the semester the students receive the course syllabus, which includes the course content, bibliography, learning outcomes, assessment and office hours.
Bibliography	• Course notes • Alexandrou, A., *Principles of Fluid Mechanics*. Prentice Hall. • Papaioannou, A., *Fluid Mechanics II* (in Greek). • Bird, R.B., W.E. Stewart and E.N. Lightfoot, *Transport Phenomena*, Revised 2nd Edition. Wiley.
Assessment	• Laboratory reports 15% • Assignments 10% • Midterm exam 25% • Final exam 50%
Language	Greek