<table>
<tr><td>Course Title</td><td colspan="5">Fluid Mechanics I</td></tr>
<tr><td>Course Code</td><td colspan="5">MME 216</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Level</td><td colspan="5">Undergraduate</td></tr>
<tr><td>Year / Semester</td><td colspan="5">2nd Year / 4th Semester</td></tr>
<tr><td>Teacher’s Name</td><td colspan="5">New hire</td></tr>
<tr><td>ECTS</td><td>6</td><td>Lectures / week</td><td>3+1 hours</td><td>Laboratories / week</td><td>1 hour</td></tr>
<tr><td>Course Purpose and Objectives</td><td colspan="5">The teaching of the basic principles of the flow of incompressible fluids and the training of the students to the solution of professional-type problems.</td></tr>
<tr><td>Learning Outcomes</td><td colspan="5">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.
Analyze fluid kinematics and characterize fluid motion.
Apply Control Volume Analysis to analyze mass and momentum flows.
Conduct Control Volume Analysis for advanced applications such as open channel flows, compressible flows in ducts, turbomachines etc.
Describe through the use of Control Volume Analysis the mathematical basis for the Navier-Stokes equations.
Understand dimensional analysis and similarity conditions.
Apply the Navier-Stokes equations to analyze viscous laminar flows.</td></tr>
<tr><td>Prerequisites</td><td colspan="2">MAS 025</td><td>Required</td><td colspan="2">None</td></tr>
<tr><td>Course Content</td><td colspan="5">Introduction to principal concepts and methods of fluid mechanics. Description of Fluids and their properties (density, viscosity, surface tension). Fluid statics: manometry, pressure, hydrostatics and buoyancy. Forces on submerged surfaces. Fluid shear and viscosity, Newtonian and non-Newtonian fluids. Open systems and control volume analysis; mass conservation, momentum and energy conservation for moving fluids. The Bernoulli equation & practical applications. Hydraulic jumps and waves in fluids. Differential fluid flow analysis, Continuity (mass conservation) and Navier-Stokes equation (momentum conservation); analytical solutions. Viscous fluid flows in pipes: Laminar, transitional and turbulent flows. Re-scaling and; boundary layers. External and internal flows. Forces on bodies, lift and drag. introduction to flow measurement techniques (pitot, orifice plate, Venturi etc).</td></tr>
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	Laboratory Exercises • Flow visualization • Manometry and Bernoulli's principle • Drag and lift around bodies (assignment, they print bodies) in a wind tunnel • Pipe Flow: frictional losses in pipes • Introduction to Flow metering techniques (manometers, pitot, Venturi, orifice)
Teaching Methodology	• Lectures • Tutorial sessions • Laboratory exercises • 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 Dynamics*. Prentice Hall. • White, F.M., *Fluid Mechanics*, 8th Edition. McGraw-Hill. • Munson, B.R., D.F. Young and T.H. Okiish, *Fundamentals of Fluid Mechanics*, 3rd Edition Update Edition. Wiley.
Assessment	• Laboratory reports 15% • Computational assignment 10% • Midterm exam 25% • Final exam 50%
Language	Greek