

MM 601 Advanced Fluid Mechanics				MECHANICAL ENGINEERING DEPARTMENT					
Semester	Methods of Education							Credits	
	Lecture	Recit.	Lab.	Project/Field Study	Homework	Other	Total	Credit	ECTS credit
1,2	30	12				146	188	3	7.5
Language	Turkish								
Compulsory / Elective	Optional								
Prerequisites	-								
Course Contents	Introduction to fluid mechanics. Scalar, vector and tensor analysis. Definition of continuum. Lagrangian and Eulerian description of fluid motion. Transport theorem. Kinematics of fluid motion; streamline, streak line, pathline, vorticity circulation and deformation. Fundamental equations and constitutive relations; continuity, momentum and energy equations. Subsonic potential flow. Application of complex functions to two-dimensional potential flows. Conformal mapping. Surface waves.								
Course Objectives	To describe the basic approaches used for flow analysis. To derive basic equations governing fluid flows. To teach and apply basic analytical methods employed for solution of these equations. To solve engineering problems analytically by simplifying governing equations.								
Learning Outcomes and Competences	Understanding of the basic characteristics of fluid motion. Learning and applications of methods used to solve flow problems. Interpret the results of solution of flow problems.								
Textbook and /or Reference	1. Currie, I. G. Fundamental Mechanics of Fluids. McGraw-Hill Book Company. 2. White, F. M. Viscous Fluid Flow. McGraw-Hill Book Company. 3. Schlichting, H. Boundary Layer Theory. McGraw-Hill Book Company.								
Assessment Criteria					If any, mark as (X)		Percentage (%)		
	Midterm Exams				X		40		
	Quizzes								
	Homeworks								
	Projects								
	Term Paper								
	Laboratory Work								
	Other								
	Final Exam				X		60		
Instructors	Prof. Hasmet TURKOGLU								
Week	Subject								
1	Introduction: Definitions, Continuum Approach, vector and Tensor Analysis								
2	Basic Laws: Conservation of Mass, Newton's Second Law, The First Law of Thermodynamics								
3	Viscous Flows: Constitutive Relations, Governing Equations, Boundary Conditions								
4	Analysis of Viscous Flows: Solution of Viscous Flows								
5	Analysis of Viscous Flows: Solution of Viscous Flows								
6	Kinematics of Flow: Streamline, Pathline, Streakline and Timeline, Vortex, Circulation, Fluid Rotation and Deformation								
7	Inviscid Flow: Complex Functions, Complex Potential, Complex Velocity								
8	Midterm Exam 1								
9	Inviscid Flow: Elementary Plane Flows, Uniform Flow, Source Flow, Sink Flow, Vortex Flow and Doublet								
10	Inviscid Flow: Superposition of Elementary Plane Flows								
11	Inviscid Flow: Conformal Transformation, Joukowski Transformation, Schwarz-Christoffel Transformation								
12	Inviscid Flow: Analysis of Flow over Ellipse and Airfoils								
13	Midterm Exam 2								
14	Surface Waves: Governing Equations of Surface Waves, Diffusion of Surface Waves, Standing and Moving Surface Waves								