



**T.C. ESKİŞEHİR OSMANGAZI UNIVERSITY
ARCHITECTURE AND ENGINEERING FACULTY
MECHANICAL ENGINEERING DEPARTMENT**

COURSE INFORMATION FORM

SEMESTER	Fall
-----------------	------

COURSE CODE	151815346	COURSE NAME	Numerical Analysis
--------------------	-----------	--------------------	--------------------

SEMESTER	WEEKLY COURSE PERIOD			COURSE OF			
	Theory	Practice	Laboratory	Credit	ECTS	TYPE	LANGUAGE
5	3	0	0	3	5	COMPULSORY (X) ELECTIVE ()	ENGLISH

COURSE CATAGORY

Basic Science	Basic Engineering	Engineering Subjects [if it contains considerable design, mark with (√)]	Social Science
	X	()	

ASSESSMENT CRITERIA

	Evaluation Type	Quantity	%
MID-TERM	Mid-Term	1	40
	Quiz		
	Homework		
	Project		
	Report		
	Others (.....)		
FINAL EXAM		1	60

PREREQUIEITE(S)

--

COURSE DESCRIPTION

Introductory concepts and definitions, The continuity equation, Euler equations of motion, Hydrostatics, Navier-Stokes equations, Some solutions of Navier-Stokes equations, The Bernoulli equation, Extended Bernoulli equation (Energy equation), Engineering applications of the Bernoulli equation, Momentum theorems, Dimensional analysis and similitude, Analysis of flow in pipes and over surfaces, Laminar and turbulent boundary layers, Potential flow.

COURSE OBJECTIVES

Derivations of continuity equation, Euler's equations of motion, Navier-Stokes equations, Bernoulli equation, energy equation, and momentum equations used in science of Fluid Mechanics, and their use and utilization in engineering applications. Hydraulic energy conversion, importance of hydropower in hydroelectric power plants.

ADDITIVE OF COURSE TO APPLY PROFESSIONAL EDUATION

Physical properties of fluids, transport of fluids in pipes and ducts, hydraulic energy conversion, analysis of hydraulic systems, calculation of hydraulic losses, calculation of efficiencies of fluid machinery, and utilization of hydropower in hydroelectric power plants.

COURSE OUTCOMES

1. Capable to know the basic equations of fluid mechanics. 2. Recognizes the streamlines and stream function. 3. Able to analyse hydrostatic problems. 4. Comprehends some exact solutions of the Navier-Stokes equations. 5. Realizes the engineering applications of Bernoulli and energy equations. 6. Applies the momentum theorems to many different flows. 7. Identifies dimensionless parameters employed in fluid mechanics. 8. Calculates the hydraulic losses in pipes and pipe fittings. 9. Capable to solve pipe system and pump, and pipe system and hydroturbine problems.

TEXTBOOK

Frank M. White, " Fluid Mechanics ", Fifth Edition, McGraw-Hill Book Company, 2003.

OTHER REFERENCES	Yunus Ali Çengel and John M. Cimbala, “ Fluid Mechanics, Fundamentals and Applications ”, Second Edition, McGraw-Hill Book Company, 2010. Kadir Kırkköprü ve Erkan Ayder, “ Akışkanlar Mekaniği ”, 1. Basım, Literatür Yayıncılık, 2004.
TOOLS AND EQUIPMENTS REQUIRED	

COURSE SYLLABUS	
WEEK	TOPICS
1	Introduction to Fluid Mechanics, Concepts and Definitions.
2	The Continuity Equation, Streamlines and Stream Function.
3	Euler’s Equation of Motion.
4	Hydrostatics, Problems.
5	Navier-Stokes Equations.
6	Some Solutions of Navier-Stokes Equations.
7	Bernoulli Equation, Extended Bernoulli Equation (Energy Equation). Engineering Applications of the Bernoulli Equation.
8	Mid-Term Examination
9	Mid-Term Examination
10	Momentum Theorems, Problems.
11	Dimensional Analysis and Similitude, Problems.
12	Turbulent Pipe Flow, Problems.
13	Major and Minor Losses in Pipe Flow, Hydraulic Diameter, Problems.
14	Pipe Flow Problems.
15,16	Final Exam

NO	PROGRAM OUTCOMES	3	2	1
1	Sufficient knowledge of engineering subjects related with mathematics, science and own branch; an ability to apply theoretical and practical knowledge on solving and modeling of engineering problems.	[X]	[]	[]
2	Ability to determine, define, formulate and solve complex engineering problems; for that purpose an ability to select and use convenient analytical and experimental methods.	[X]	[]	[]
3	Ability to design a complex system, a component and/or an engineering process under real life constraints or conditions, defined by environmental, economical and political problems; for that purpose an ability to apply modern design methods.	[]	[]	[X]
4	Ability to develop, select and use modern methods and tools required for engineering applications; ability to effective use of information technologies.	[]	[]	[X]
5	In order to investigate engineering problems; ability to set up and conduct experiments and ability to analyze and interpretation of experimental results.	[]	[X]	[]
6	Ability to work effectively in inner or multi-disciplinary teams; proficiency of interdependence.	[]	[X]	[]
7	Ability to communicate in written and oral forms in Turkish/English; proficiency at least one foreign language.	[]	[X]	[]
8	Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement.	[X]	[]	[]
9	Understanding of professional and ethical issues and taking responsibility	[X]	[]	[]
10	Awareness of project, risk and change management; awareness of entrepreneurship, innovativeness and sustainable development.	[]	[]	[X]
11	Knowledge of actual problems and effects of engineering applications on health, environment and security in global and social scale; an awareness of juridical results of engineering solutions.	[]	[]	[X]

1:None. 2:Partially contribution. 3: Completely contribution.

Prepared by: Doç. Dr. Necati MAHİR

Date:

Signature(s):