COURSE PROFILE

Course Name	Code	Semester	Term	Theory +PS+Lab. (hour/week)	Local Credits	ECTS
Introduction to Mathematical Engineering	MATH 252	Spring	4	3+0+0	3	5

Prerequisites	None

Course Language	English
Course Type	Required
Course Lecturer	• Prof.Dr. Esin İnan
Course Assistant	--
Course Objectives	This course aims to provide basic theory and applications of mathematical modeling and basic concepts from mechanics of materials.
Course Learning Outcomes	The students who succeeded in this course; • will be able to understand what the mathematical engineering is and why we use modeling. • will be able to learn needs, techniques, classification (linear or nonlinear, static or dynamic, deterministic or stochastic, discrete or continuous) and simple illustrations. • will be able to use mathematical models in physical sciences, engineering. mechanical problems, vibrations, waves and structural systems. • will be able to understand the concept of body, force, stress, strain and energy.
Course Content	Concept of mathematical modeling, examples from physics, mechanics, and engineering applications. Statics of rigid bodies, general principles; force and moment equilibrium. Structural analysis, modeling of 3D bodies as 1D body, internal loading, stress and strain, mechanical properties of materials. Analysis of bars under several type of loading.

COURSE CONTENT

Week	Subjects	Related Preparation
1	What is mathematical engineering? Modeling. Needs, techniques, classification and simple illustrations. Mathematical modeling through differential equations.	Ref. 1/ Chapter 1, 2

2	Mathematical models in physical sciences and engineering. Mathematical models of mechanical problems, vibrations, waves (conservation law).	Ref. 1/ Chapter 2, 5, 10
3	General Principles. Force Vectors. Force System Resultants.	Ref. 2/ Chapter 1, 2, 3
4	Equilibrium of a rigid body. Friction.	Ref. 2/ Chapter 4
5	Structural analysis.	Ref. 2/ Chapter 5
6	Geometrical properties Distributed loadings.	Ref. 2/ Chapter 6
7	Internal loading. Midterm Exam I	Ref. 2/ Chapter 7
8	Internal loading, MNT.	Ref. 2/ Chapter 8
9	Deformation and Strain.	Ref. 2/ Chapter 8
10	Stress, deformation and strain. Material models.	Ref. 2/ Chapter 9
11	Mechanical properties of materials. Axial Loading	Ref. 2/ Chapter 9, 10
12	Axial loading. Midterm Exam II	Ref. 2/ Chapter 10
13	Bending	Ref. 2/ Chapter 12
14	Torsion	Ref. 2/ Chapter 11

Course Textbooks	1- R.C.HIBBELER, Statics and Mechanics of Materials, (2004), Princeton Hall 2- J. N. KAPUR, Mathematical Modeling, (1990), Wiley Eastern
Recommended References	1- I. GRANET, Statics and Strength of Materials, Holt, Rinehart and Winston, 1982. 2- J.G. ANDREWS, R.R. MCLONE, Mathematical Modeling , (1976), Butterwords, 3- V. IVANOFF, Engineering Mechanics, McGraw-Hill, 1999.

Semester Requirements	**Number**	**Percentage of Grade**
Attendance/Participation	1	5
Laboratory	-	-
Application	-	-

Special Course Internship (Work Placement)	-	-
Quizzes/Studio Critics	3	5
Homework Assignments	6	10
Presentation	-	-
Project	-	-
Seminar/Workshop	-	-
Midterms/Oral Exams	2	30
Final/Resit Exam	1	50
Total	13	100

PERCENTAGE OF SEMESTER WORK	12	50
PERCENTAGE OF FINAL WORK	1	50
Total	13	100

Course Category	Core Courses	X
	Major Area Courses	
	Supportive Courses	
	Media and Management Skills Courses	
	Transferable Skill Courses	

COURSE'S CONTRIBUTION TO PROGRAM

#	**Program Qualifications / Outcomes**	*** Level of Contribution**				
		1	2	3	4	5
1	To have a grasp of basic mathematics, applied mathematics and theories and applications of statistics.					X
2	To be able to use theoretical and applied knowledge acquired in the advanced fields of mathematics and statistics,					X
3	To be able to define and analyze problems and to find solutions based on scientific methods,					X
4	To be able to apply mathematics and statistics in real life with interdisciplinary approach					X

	and to discover their potentials,					
5	To be able to acquire necessary information and to make modeling in any field that mathematics is used and to improve herself/himself,					X
6	To be able to criticize and renew her/his own models and solutions,					X
7	To be able to tell theoretical and technical information easily to both experts in detail and nonexperts in basic and comprehensible way,				X	
8	To be able to use international resources in English and in a second foreign language from the European Language Portfolio (at the level of B1) effectively and to keep knowledge up-to-date, to communicate comfortably with colleagues from Turkey and other countries, to follow periodic literature,				X	
9	To be familiar with computer programs used in the fields of mathematics and statistics and to be able to use at least one of them effectively at the European Computer Driving Licence Advanced Level,			X		
10	To be able to behave in accordance with social, scientific and ethical values in each step of the projects involved and to be able to introduce and apply projects in terms of civic engagement,			X		
11	To be able to evaluate all processes effectively and to have enough awareness about quality management by being conscious and having intellectual background in the universal sense,			X		
12	By having a way of abstract thinking, to be able to connect concrete events and to transfer solutions, to be able to design experiments, collect data, and analyze results by scientific methods and to interfere,				X	
13	To be able to continue lifelong learning by renewing the knowledge, the abilities and the compentencies which have been developed during the program, and being conscious about lifelong learning,					
14	To be able to adapt and transfer the knowledge gained in the areas of mathematics and statistics to the level of secondary school,				X	
15	To be able to conduct a research either as an individual or as a team member, and to be effective in each related step of the project, to take role in the decision process, to plan and manage the project by using time effectively.					

*1 Lowest, 2 Low, 3 Average, 4 High, 5 Highest

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	**Number**	**Duration (Hours)**	**Total Workload**

Course Hours (Including Exams)	14	3	49
Tutorials	-	-	-
Laboratory	-	-	-
Application	-	-	-
Special Course Internship (Work Placement)	-	-	-
Field Work	-	-	-
Study Hours Out of Class	13	2	26
Presentations / Seminar	-	-	-
Project	-	-	-
Preparatory reading	13	1	13
Homework Assignments	6	1	6
Quizzes	3	1	3
Midterm Exams	2	7	16
Final / Resit Exam	1	12	12
		Total Workload	**125**

COURSE CATEGORY

ISCED GENERAL AREA CODES	GENERAL AREAS	ISCED BASİC AREA CODES	BASIC EDUCATIONAL AREAS	
1	Education	14	Teacher Training and Educational Sciences	0
2	Humanities and Art	21	Art	0
2	Humanities and Art	22	Humanities	0
3	Social Sciences, Management and Law	31	Social and Behavioral Sciences	0
3	Social Sciences, Management and Law	32	Journalism and Informatics	0
3	Social Sciences, Management and Law	38	Law	0
4	Science	42	Life Sciences	0

4	Science	44	Natural Sciences	0
4	Science	46	Mathematics and Statistics	70
4	Science	48	Computer	0
5	Engineering, Manufacturing and Civil	52	Engineering	30
5	Engineering, Manufacturing and Civil	54	Manufacturing and Processing	0
5	Engineering, Manufacturing and Civil	58	Architecture and Structure	0
6	Agriculture	62	Agriculture, Forestry, Livestock, Fishery	0
6	Agriculture	64	Veterinary	0
7	Medicine and Welfare	72	Medical	0
7	Medicine and Welfare	76	Social Services	0
8	Service	81	Personal Services	0
8	Service	84	Transport Services	0
8	Service	85	Environment Protection	0
8	Service	86	Security Services	0