MAK 206 STRENGTH OF MATERIALS		Mechanical Engineering Department	
Credit Hours	3	**Theory**	3
ECTS	6	**Application/Recitation**	0
Year/Term	2021-2022 / Fall	**Laboratory**	0
Compulsory/Elective	Compulsory		
Prerequisite(s)	MAK 104 Statics		
Instructor(s)	Prof. Dr. Erdem ACAR Room: 119, Phone: 4257, E-mail: acar@etu.edu.tr		
Assistant(s)	To be announced		
Class/Laboratory Schedule	To be announced		
Catalogue Description	Concepts of stress and strain. Axial load, statically indeterminate axially loaded members, thermal stress. Torsion, angle of twist, statically indeterminate torque-loaded members. Bending, eccentric axial loading of beams. Transverse shear, shear flow in build-up members. Combined loadings. Stress and strain transformation. Deflection of beams and shafts, statically indeterminate beams and shafts.		
Course Learning Outcomes	The main learning outcomes of this course are: • ability to determine internal reactions (stress/strain) to external loadings; • ability to determine the maximum stress/strain values in a structural member; • a thorough understanding of the fundamental principles defining the relations between the mechanical/geometric properties of a structural member and the loadings that the member can safely withstand.		
Text Book	"Mechanics of Materials", R.C. Hibbeler, 9th Ed. (SI Units), Prentice Hall, 2013.		
References and Other Course Material	1. "Mechanics of Materials", F. Beer, E.R. Johnston, J. DeWolf, and D. Mazurek, 7th Ed., McGraw-Hill, 2015. 2. "Mechanics of Materials", J.M. Gere, S.P. Timoshenko, CBS, 2006. 3. Course website: http://acar.etu.edu.tr/mak206		
Contribution to the Curriculum (%)	Mathematics and Basic Sciences	20	
	Engineering Topics	50	
	Engineering Design	30	
	General Education	-	
Expected Performance Measures and Tentative Grading	**Performance Measures**	**Quantity**	**Contribution**
	Midterm exams	2	50 pts
	Quizzes	---	---
	Homework	5	10 pts
	Final exam*	1	40 pts

*** Note that if you do not take the final exam, you will get FF grade from this course regardless of your midterm exam or homework performance.**

COURSE OUTLINE	
Week	**Topics**
1	REWIEV OF STATICS: Equilibrium of a deformable body. STRESS: Average normal and shear stresses, allowable stress, factor of safety.
2	STRESS: Design of simple connections. STRAIN: Deformation, normal and shear strains. MECHANICAL PROPERTIES OF MATERIALS: Tension and compression tests, Hooke`s law, Poisson's ratio.
3	AXIAL LOAD: Elastic deformation of an axially loaded member, principle of superposition, statically indeterminate axially loaded members, thermal stress.
4	TORSION: Torsional deformation of a circular shaft, the torsion formula, power transmission, angle of twist, statically indeterminate torque-loaded members.
5	BENDING: Shear and moment diagrams.
6	BENDING: The flexural formula, unsymmetric bending.
7	TRANSVERSE SHEAR: Shear in straight members, the shear formula, shear flow in built-up and thin-walled members.
8	COMBINED LOADINGS: State of stress caused by combined loadings.
9	COMBINED LOADINGS: State of stress caused by combined loadings (continues).
10	STRESS AND STRAIN TRANSFORMATIONS: Plane-stress/plane-strain transformations.
11	STRESS AND STRAIN TRANSFORMATIONS: General equations for stress/strain transformations, Mohr's circle.
12	DEFLECTION OF BEAMS AND SHAFTS: The elastic curve, finding the displacement and slope by using the integration method.

RELATIONSHIP TO STUDENT OUTCOMES		
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	X
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
3	an ability to communicate effectively with a range of audiences	
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	
8	an ability to perform engineering skills in a workplace	

Prepared by: Prof. Dr. Erdem ACAR **Date:** 03/09/2021