ESOGU CIVIL ENGINEERING DEPARTMENT

COURSE INFORMATION FORM

Course Name	Course Code
STRENGTH OF MATERIALS I	**151413560**

Semester	Number of Course Hours per Week		ECTS
	Theory	Practice	
3	4	0	5

Course Category (Credit)				
Basic Sciences	**Engineering Sciences**	**Design**	**General Education**	**Social**
1	3	1		

Course Language	Course Level	Course Type
Turkish	Undergraduate	Compulsory

Prerequisite(s) if any	-
Objectives of the Course	Preparation of the necessary infrastructure for calculating the stress and deformation occurring in structural and machine elements due to external loads Examination of the behavior of beams, columns, and similar structural elements under the influence of external loads, and calculation of the stress and deformation caused by these loads on the elements Determination of the dimensions that a structural element must have to fulfill its function
Short Course Content	Basic principles and concepts. Stress, strain, and constitutive relations. Stress and strain analysis. Normal force. Torsion.

	Learning Outcomes of the Course	Contributed PO(s)	Teaching Methods *	Measuring Methods **
1	Gains general knowledge to be used in engineering designs	1, 2	1, 5, 10	A, K
2	Can calculate the stress and deformations that will result from loading effects	1, 2	1, 5, 10	A, K
3	Can determine the planes where the maximum stress and deformations occur	1, 2	1, 5, 10	A, K
4	Can calculate the stress and deformations resulting from section forces	1, 2	1, 5, 10	A, K
5	Learns the importance of material and sectional properties in design	1, 2	1, 5, 10	A, K
6	Can perform sizing by selecting material and/or section	1, 2	1, 5, 10	A, K
7				
8				

***Teaching Methods** **1:**Expression, 2**:**Discussion, **3:**Experiment, **4:**Simulation, **5:**Question-Answer, **6:**Tutorial, **7**:Observation, **8**:Case Study, **9:**Technical Visit, **10:**Trouble/Problem Solving, **11:**Induvidual Work, **12**:Team/Group Work, **13**:Brain Storm, **14:**Project Design / Management, **15:**Report Preparation and/or Presentation

****Measuring Methods** **A:**Exam, **B:**Quiz, **C:**Oral Exam, **D:**Homework, **E:**Report, **F:**Article Examination, **G:**Presentation, **I:**Experimental Skill, **J:**Project Observation, **K**:Class Attendance; **L**:Jury Exam

Main Textbook	Uğural, A.C., Mechanics of Materials, Mc Graw-Hill, 1991 İnan, M., Cisimlerin Mukavemeti, İTÜ Vakfı Yayını, 1990
Supporting References	Erol, H., Şengel, H.S. ve Özçelikörs, Y., Mukavemet I-II sunu ders notları. Omurtag M.H., Mukavemet (Cilt 1), Birsen yayınevi, 2011. Omurtag M.H., Mukavemet çözümlü problemler (Cilt 1), Birsen yayınevi, 2011.
Necessary Course Material	Calculator, protractor, compass, set square, pencil, eraser

Course Schedule	
1	Basic Principles: Introduction, types of forces and loads, conditions of equilibrium, examination of internal forces (sectional effects), components of internal forces, types of supports. Load, shear force, and moment relationships, sectional effect diagrams (integration method, cutting method)
2	Basic Principles: Introduction, types of forces and loads, conditions of equilibrium, examination of internal forces (sectional effects), components of internal forces, types of supports. Load, shear force, and moment relationships, sectional effect diagrams (integration method, cutting method)
3	Basic Principles: Introduction, types of forces and loads, conditions of equilibrium, examination of internal forces (sectional effects), components of internal forces, types of supports. Load, shear force, and moment relationships, sectional effect diagrams (integration method, cutting method)
4	Introduction, definition of stress, stress components, stress tensor, normal stress, average shear stress, bearing stress, application of stress in simple structural elements, thin-walled pressure vessels, safety stress, safety factor
5	Strain and Material Relationships: Introduction, unit strain, unit strain components, strain tensor
6	Properties of engineering materials, Hooke's Law, Poisson's ratio, generalized Hooke's Law, strain energy
7	Stress and Strain Analysis: Introduction, plane stress state
8	Mid-Term Exam
9	Stress and Strain Analysis: Principal stresses, maximum shear stress
10	Mohr's Stress Circle: Stress transformation and differential equilibrium equations
11	Plane Strain State: Measurement of strain
12	Plane Strain State: Stress-strain relationships
13	Axial Force State: Introduction, calculation of stress and strain in axially loaded elements
14	Hyperstatic Structural Elements under Axial Force: Application of the superposition method, strain and stresses resulting from temperature changes, stress components on inclined planes, stress concentrations, Saint-Venant's principle
15	Area Moments: Definition, changing axes, principal axes of inertia and moments
16,17	Final Exam

Calculation of Course Workload			
Activities	**Number**	**Time (Hour)**	**Total Workload (Hour)**
Course Time (number of course hours per week)	14	4	56
Classroom Studying Time (review, reinforcing, prestudy,….)	14	2	28
Homework	0	0	0
Quiz Exam	14	1	14
Studying for Quiz Exam	0	0	0
Oral exam	0	0	0
Studying for Oral Exam	0	0	0
Report (Preparation and presentation time included)	0	0	0
Project (Preparation and presentation time included)	0	0	0
Presentation (Preparation time included)	0	0	0
Mid-Term Exam	1	1.5	1.5
Studying for Mid-Term Exam	1	20	20
Final Exam	1	1.5	1.5
Studying for Final Exam	1	20	20
		Total workload	**141**

Total workload / 30	**4.7**
Course ECTS Credit	**5**

Evaluation	
Activity Type	**%**
Mid-term	40
Quiz	
Homework	
Bir öğe seçin.	
Bir öğe seçin.	
Final Exam	60
Total	100

RELATIONSHIP BETWEEN THE COURSE LEARNING OUTCOMES AND THE PROGRAM OUTCOMES (PO) (5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)

NO	PROGRAM OUTCOME	Contribution
1	Strong background in mathematics, science, and fundamental engineering principles; ability to apply theoretical and practical knowledge from these fields to model and solve engineering problems	4
2	Expertise in identifying, defining, and formulating complex engineering problems in civil engineering and related fields. Ability to select and apply appropriate analysis and modeling methods to solve these problems	4
3	Ability to design complex systems, devices, or products under realistic constraints and conditions. Proficiency in using modern design methods to meet specific objectives	
4	Competence in developing, selecting, and using modern techniques and tools for civil engineering applications. Effective utilization of information technologies to support engineering tasks	
5	Expertise in designing experiments, conducting tests, collecting data, analyzing results, and interpreting findings for civil engineering problem investigations	
6	Ability to work effectively in both intradisciplinary and interdisciplinary teams	
7	Effective Turkish oral and written communication skills and proficiency in using and developing foreign language skills	
8	Commitment to lifelong learning. Ability to access information, stay up-to-date with advances in science and technology, and continuously self-improve	
9	Strong sense of professional and ethical responsibility	
10	Knowledge of project management, risk management, and change management practices; awareness of entrepreneurship, innovation, and sustainable development principles	
11	Understanding of the global and societal impacts of engineering applications on health, the environment, and safety; awareness of national and international legal regulations, standards, and the legal implications of engineering solutions	
12		

LECTURER(S)				
Prepared by	Assis. Prof. Dr. Hasan Selim ŞENGEL			
Signature(s)				

Date: 06.06.2024