Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
Mechanical Engineering Department
2021-2022 Fall Semester
SYLLABUS

Code/Name	SEC 401.2 / Intermediate Strength of Materials
Type	Required
Credit/ECTS	5/5
Hour per Week	3 (3+0+0)
Level/Year	Undergraduate/1
Semester	Fall
Classroom	TBA
Content	Stress and strain analysis at a point. Plane stress and strain problems. Principal stress and strains. Octahedral and deviatoric stress. Airy stress function. Unbalanced bending and shear center in beams. Torsion in non-circular sections. Energy methods. Plastic behavior and residual stresses in basic structural elements.
Prerequisites	MEC 201 Strength of Materials I, MEC 202 Strength of Materials II
Textbooks	***Primary*** AC Ugural, SK Fenster, Advanced Mechanics of Materials and Applied Elasticity, Prentice-Hall, 5th edition, 2012 ***Supplementary*** RC Hibbeler, Mechanics of Materials in SI units, Pearson, 10th edition, 2018 FP Beer, ER Johnston, ER Dewolf, JT Mazurek, Mechanics of Materials, Mc Draw-Hill, 8th edition, 2020
Objectives	• To reinforce fundamental concepts of stress, strain, strain energy, deformation, equilibrium, and material behavior as related to solid bodies under load. • To Understand both the "strength of materials" approach and the "continuum mechanics" approach to the formulation and solution of problems in solid mechanics. • To develop the governing equations for solid bodies in equilibrium under loads resulting in small deformations and rotations.To prepare perspectives of machine parts • To apply the fundamental concepts to selected topics in solid mechanics
Course Outcomes	In this course you will be able to: CO1 Define three-dimensional state of stress CO2 Define different states of stresses and strains CO3 Determine the transformation of stresses and strains CO4 Determine the stresses and strains on solids subjected to bending and torsion CO5 Estimate the failure of solids under stress and strain C06 Use energy methods for calculating deformation and deflection of solids

Weekly Schedule of Topics

W	Topic
1	Analysis of stress and strain
2	Cauchy formula for traction, Examples on Calculation of Strains and Tractions, Principal Stresses and Directions
3	Two-dimensional problems in elasticity
4	Transformation of stresses, strains, and Mohr Circle in 3-D
5	Transformation of stresses, strains, and Mohr Circle in 3-D
6	Unsymmetrical bending of beams
7	Unsymmetrical bending of beams (Continued)

8	Torsion of Non-Circular Shafts
9	Torsion of Non-Circular Shafts (Continued)
10	Theories of Failure
11	Theories of Failure (Continued)
12	Energy Methods
13	Plastic Behavior of Materials
14	Overview of the semester

Professional Contribution	Ability to comprehensively explain engineering principles associated with the mechanical behavior of various construction materials

Contribution to Program Outcomes*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	4	3	1	3	1	2	1	1	0	0	2
CO2	4	3	1	3	1	2	1	1	0	0	2
CO3	4	3	1	5	1	2	1	1	0	0	2
CO4	4	5	1	5	1	2	1	1	0	0	2
CO5	4	5	1	5	1	2	1	1	0	0	2
CO6	4	1	1	1	1	2	1	1	0	0	0

* Contribution Level | 0: None | 1: Very Low | 2: Low | 3: Medium | 4: High | 5: Very High

Special Conditions	• Students work in groups for assignment. • The consequence of violation of the attendance rule is to receive a grade of **NA.**
Requirements	Basic knowledge of a dynamic analysis software
Evaluation	Midterm Exam I 20% Midterm Exam II 30% Final Exam 50% Total 100%
Rubric	A rubric will be announced after the exams based on the details of the answer keys.
Course Policy	1. You must attend at least 70% of the sessions including add-drop period. 2. Be in the class on time. 3. English should always be used to communicate with one another. 4. Mobile phone should be switched off and put away during the class. 5. You cannot talk to your friends during class no matter what the subject is.
Cheating & Plagiarism	• Copying or letting someone to copy your work on exams, assignments, or reports is cheating. • Cutting and pasting text, figures and tables from the web sources or any other electronic source is plagiarism. • The consequence of academic dishonesty is to receive a grade of **F** for the course.

Instructor

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Prepared by Fatih Darıcık on July 27, 2021