Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
Mechanical Engineering Department

SYLLABUS

Code/Name	MCE 202/ Strength of Materials II
Type	Required
Credit/ECTS	3/5
Hour per Week	3 (3+0+0)
Level/Year	Undergraduate/2
Semester	Spring
Classroom	A203
Content	Transformations of stress and strain, principal stresses, Mohr's circle, yield criteria, and fracture criteria under plane stress. Deflection of beams, equation of the elastic curve, method of superposition, and statically indeterminate beams. Columns, stability of structures, Euler's Formula, and design of columns under acentric load. Energy methods, strain energy, work and energy under a single load, deflection under a single load by the work-energy method, Castiglione's theorem, deflections by Castiglione's theorem, and statically indeterminate problems.
Prerequisites	MEC 201 Strength of Materials I
Textbooks	***Primary*** Ferdinand P. Beer et.al., Mechanics of Materials, McGraw-Hill, 6th Ed., 2012. ***Supplementary*** Hibbeler, R. C., Mechanics of Materials, 9th ed., Prentice Hall, Pearson, 2013.
Objectives	• To analyze and understand principal stresses due to the combination of two-dimensional stresses on an element and failure mechanisms in materials. • To calculate displacement of beams using different methods. • To understand buckling theory for columns. • To learn fundamental concepts for energy methods.
Course Outcomes	In this course you will be able to: CO1 Recognize physical phenomenon in the context of strength of materials CO2 Demonstrate an understanding of the structural mechanics theory for deformable bodies. CO3 Apply structural mechanics of deformable bodies to solve engineering problems. CO4 Demonstrate an understanding of the relationships between loads, member forces and deformations and material stresses and strains. CO5 Demonstrate an understanding of the assumptions and limitations of the structural mechanics theory. CO6 Competence in problem identification, formulation and solution.

Weekly Schedule of Topics

W	Topic
1	Stresses under Combined Loadings.
2	Design of Transmission Shafts.
3	Deflection of Beams by Integration, Equation of the Elastic Curve, Boundary Conditions for Beams.
4	Solution of the Second-Order Moment Equation.
5	Direct Determination of the Elastic Curve from Load Distribution.
6	Analysis of Statically Indeterminate Beams.
7	Using Singularity Functions to Determine the Slope and Deflection of a Beam.
8	Method of Superposition and Its Application to Statically Indeterminate Beams.

9	Columns. Euler's Formula for Pin-Ended Columns. Extension of Euler's Formula.
10	Design of Columns under a Centric Load. Johnson's Formula for Steel Columns.
11	Energy Methods.
12	Work and Energy under a Single Load.
13	An Important Application: Impact Loading.
14	Work and Energy under Several Loads. Castigliano's Theorem.

Professional Contribution	Ability to calculate stress and strain under various conditions

Contribution to Program Outcomes*

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

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

Special Conditions	• Students work in groups for presentation and assignment. • The consequence of violation of the attendance rule is to receive a grade of **NA.**
Requirements	Basic knowledge of statics
Evaluation	Midterm Exam 30% Quizs 10% Final Exam 60% Total 100%
Rubric	A rubric will be announced prior to presentation sessions. The rubric has 2 main parts for the grading: technical assessment (50%) and writing or presentation performance (50%)
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 Sefa Yıldırım