

Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
 Mechanical Engineering Department
 2024-2025 Fall Semester
SYLLABUS

Code/Name	MEC 305 / Machine Elements I
Type	Required
Credit/ECTS	5/5
Hour per Week	3 (3+0+0)
Level/Year	Undergraduate/3
Semester	Fall
Classroom	TBA
Content	Introduction to mechanical engineering design. Load and stress analysis: bending, torsion, and thick-walled cylinders. Fatigue failure and endurance limit. Design of machine elements under static and fatigue loading. Stress concentration and reliability in design. Design of shafts, fasteners, and pressure vessels. Combined stress and failure theories.
Prerequisites	MEC 201 Strength of Materials I
Textbooks	Primary Ansel C. Ugural, Mechanical Design of Machine Components, CRC Press, 2nd Ed., 2014. Supplementary R. G. Budynas, J. K. Nisbett, Shigley's Mechanical. Engineering Design, McGraw Hill 9th SI Edition, 2014.
Objectives	to teach the fundamentals of machine design, including stress analysis and failure prevention. to introduce fatigue failure and endurance limit concepts. to teach the design of machine elements such as shafts, fasteners, and pressure vessels.
Course Outcomes	In this course you will be able to: CO1 Understand the machine design process and its steps CO2 Apply the factor of safety and safety philosophy in design. CO3 Determines the stresses and deflections on machine members subjected to single, 3D or combined loading. CO4 Understand static and fatigue failure theories and applies these to design machine members. CO5 Designs shafts and shaft components considering both deflection and stresses. CO6 Use failure theories to design against static and fatigue failure.

Weekly Schedule of Topics

W	Topic
1	Introduction to Mechanical Engineering Design
2	Materials, Material Strength and Stiffness, Materials Selection
3	Load and Stress Analysis; Bending, Torsion, Thick-Walled Cylinders
4	Stress Concentration and Reliability in Design
5	Curved Beams
6	Deflection and Stiffness; Beam deflection methods
7	Fatigue Failure and Endurance Limit
8	Fatigue Strength and Modified Endurance Limit
9	Design of Shafts and Shaft Components
10	Design of Fasteners and Bolted Joints
11	Design of Pressure Vessels

12	Combined Stresses and Failure Theories
13	Fluctuating Stresses and Fatigue Design
14	Review and Case Studies

Professional Contribution Ability to analyze and design machine parts; prevent failure

Contribution to Program Outcomes*

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

* 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	40%
Final Exam	60%
Total	100%

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 copy your work on exams, assignments, or reports is cheating.
- Cutting and pasting text, figures and tables from 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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