Identification	**Subject**	ME 361 - Machine Elements I, 6 ECTS	
	Department	Mechanical Engineering	
	Program	Undergraduate	
	Term	Fall 2025	
	Instructor	Khalig Mammadov	
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	Phone:		
	Classroom/hours		
	Office hours		
Prerequisites	Strength of Materials, Materials Science		
Language	English		
Compulsory/Elective	Compulsory		
Required textbooks and course materials	Budynas RG, Nisbett JK. Shigley's mechanical engineering design. New York: McGraw-Hill; 2011.		
Course outline	Mechanical engineers play a vital role in the development and production of machine components. At the core of the discipline lies mechanical engineering design, which equips students with a strong grasp of fundamental design principles. This foundation enables them to perform precise and thorough calculations for various machine elements. The course on machine elements is structured in two parts. The first part addresses broad topics such as stress analysis, failure criteria, and the design of shafts, screws, welded joints, springs, as well as permanent and detachable joints. The second part delves into more specialized areas, including rolling contact and journal bearings, gears, clutches, flywheels, and flexible machine elements, while also emphasizing the use of analytical tools to study these components in detail.		
Course objectives	The primary objective of this course is to provide mechanical engineering students with a strong foundation in design principles, along with the essential skills to carry out precise, clear, and reliable calculations for machine elements. The initial part of the course addresses fundamental topics such as stress analysis, failure criteria, and the design of components like shafts and springs. By the conclusion of the course, students will be able to assess and interpret stresses and strains in various machine elements, including both permanent and detachable joints, while also developing a comprehensive understanding of static and fatigue design principles.		
Learning outcomes	By the end of this course, students will be able to: 1. Perform stress analysis and use Mohr's circle to determine and evaluate stresses and strains. 2. Apply multi-dimensional static failure and fatigue criteria in engineering analysis. 3. Evaluate screw connections, welded joints, and design both permanent and non-permanent joints. 4. Design and analyze shafts for power transmission. 5. Design and analyze mechanical springs.		
Teaching methods	**Lecture**		x
	Group discussion		x
	Experiential exercise		--
	Case analysis and assignments		x
	Course paper		--
Evaluation	**Methods**	**Date/deadlines**	**Percentage (%)**
	Midterm Exam		25
	Class Participation		5
	Homework		15
	Project		15
	Final Exam		40
	Total		100

Policy	▪ **Ethics** Copying another student's work is strictly prohibited. All assignments must be completed individually by each student. This is a university policy, and any violations will result in disciplinary action. ▪ **Preparation for class** This course requires consistent individual effort outside the classroom, particularly through extensive practice of problems from the textbook. After each session, students are expected to dedicate sufficient time to completing assignments by the specified deadlines. Homework plays a crucial role in reinforcing learning and strengthening understanding of key concepts. Assignments will be given regularly and must be submitted on time. Late submissions will be accepted with a deduction of 10% per day. Completing and submitting assignments on schedule is essential for mastering the material. Clear instructions and grading criteria will be provided for each assignment. While collaboration with classmates is encouraged for discussion and better understanding, copying is not permitted. • **Withdrawal (pass/fail)** This course adheres strictly to the grading policy of the School of Engineering. To successfully pass, students are generally required to achieve a minimum score of 60%. Those who do not meet this requirement will need to retake the course in the following term or academic year. ▪ **Cheating/plagiarism** Any form of cheating or plagiarism in assignments, mid-term, or final examinations will result in automatic course failure. In such cases, the student will receive a grade of zero (0) without exception. ▪ **Professional behavior guidelines** Students are expected to conduct themselves in a manner that fosters a positive academic and professional environment during class hours. Unauthorized conversations and inappropriate behavior are strictly prohibited. ▪ **Homework** There will be a homework assignment for every chapter composed of exercises and problems. ▪ **Attendance** Students who attend the whole classes will get 5 marks. for three absence student loses 1 mark. ▪ **Project** The project in the Machine Elements 1 course is worth 15% of the total grade. In this project, students are required to analyze and design a mechanical component. The project consists of two main parts: the final presentation, which should be 10-15 minutes long and include an introduction to the problem, the design or analysis methods used, results, and proposed improvements; and the written report, which should detail the design process, analysis, results, and references used. The project will be evaluated based on the quality of the analysis, accuracy of the design, innovation, clarity of the report, and presentation skills.
Tentative Schedule	

Week	Date/Day (tentative)	Topics	Textbook/Assignments
1		Introduction to Mechanical Engineering Design	Chap 1
2		A review on Materials	Chap 2
3,4		A review on Strength of Materials	Chap 3 & 4
5		Failure Prevention	Chap 5
6		Failures Resulting from Static Loading	Chap 5
7		Fatigue Failure Resulting from Variable Loading	Chap 6
8		Review **Midterms Exam**	
9, 10		Shafts and Shaft Components	Chap 7
11, 12		Screws, Fasteners, and the Design of Nonpermanent Joints	Chap 8
13,14		Welding, Bonding, and the Design of Permanent Joints	Chap 9
15		Solve problems and conclusion	
16		**Final Exam**	