

Identification	Subject	ME 361 - Machine Elements I, 6 ECTS	
	Department	Mechanical Engineering	
	Program	Undergraduate	
	Term	Fall 2024	
	Instructor	Khalig Mammadov	
	E-mail:	khaliq.mammadov@khazar.org	
	Phone:		
	Classroom/hours		
	Office hours		
Prerequisites	Strength of Materials, Materials Science		
Language	English		
Compulsory/Elective	Compulsory		
Required textbooks and course materials	<i>Shigley`s Mechanical Engineering Design 10th edition- R.G. Budynas, J.K. Nisbett, 2015</i>		
Course outline	<p>Mechanical engineers are integral to the creation and production of machine components. Mechanical engineering design is a cornerstone of the field, aimed at providing students with a solid understanding of design principles. This foundation enables them to develop the necessary skills to carry out detailed and accurate calculations for machine elements. The course on machine elements is divided into two parts. The first part covers a wide range of topics, including general stress analysis, failure criteria, and the design of shafts, screws, welded joints, springs, as well as permanent and non-permanent joints. The second part focuses on more specific areas such as rolling contact and journal bearings, gears, clutches, flywheels, flexible machine elements, and the application of various analytical tools to address these components in depth.</p>		
Course objectives	<p>The main goal of this course is to equip mechanical engineering students with a solid foundation in design principles and the critical skills needed to perform thorough, concise, and accurate calculations for machine elements. The first part of the course covers key topics such as general stress analysis, failure conditions, and the design of components like shafts and springs. By the end of the course, students will be able to evaluate and analyze stresses and strains in machine elements, including both permanent and non-permanent joints. They will also gain a deep understanding of static and fatigue design criteria.</p>		
Learning outcomes	<p>Upon successful completion of this course, students will be able to:</p> <ol style="list-style-type: none"> 1. Conduct stress analysis and apply Mohr's circle theory to formulate and evaluate stresses and strains. 2. Apply multi-dimensional static failure and fatigue criteria in the analysis 3. Analyze screw connections, welds, and design both non-permanent and permanent joints. 4. Analyze and design power transmission shafts. 5. Analyze and design 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		10
	Project		20
	Final Exam		40
	Total		100

Policy	<ul style="list-style-type: none"> ▪ Ethics Copy of other students' work is highly discouraged. All assignments must be handled by the student himself. This is a university policy and violators will be reprimanded accordingly. ▪ Preparation for class The structure of this course demands your individual effort outside the classroom for extra practice of many problems within the textbook. After each session, every student needs to put sufficient time to practice and finish the assignments by the predetermined date. Homework assignments will be an integral part of this course to reinforce learning and practice key concepts. Assignments will be assigned regularly and are due on specified dates. Late submissions will be accepted with a penalty of 10% per day. It is essential to complete and submit your homework on time, as it contributes to your understanding of the material. Detailed instructions and grading criteria for each homework assignment will be provided. Collaboration with fellow students is encouraged for understanding but not for copying. • Withdrawal (pass/fail) This course strictly follows grading policy of the School of Engineering. Thus, a student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be required to repeat the course the following term or year. ▪ Cheating/plagiarism Cheating or other plagiarism in handling the assignments, Mid-term and Final Examinations will lead to course failure. In this case, the student will automatically get zero (0), without any considerations. ▪ Professional behavior guidelines The students shall behave in the way to create favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly discouraged.
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Tentative Schedule

Week	Date/Day (tentative)	Topics	Textbook/Assignments
1	21/09/2024	Introduction to Mechanical Engineering Design	Chap 1
2	28/09/2024	A review on Materials	Chap 2
3,4	05/10/2024 12/10/2024	A review on Strength of Materials	Chap 3 & 4
5	19/10/2024	Failure Prevention	Chap 5
6	26/10/2024	Failures Resulting from Static Loading	Chap 5
7,8	02/11/2024 09/11/2024	Fatigue Failure Resulting from Variable Loading	Chap 6
9	16/11/2024	Fatigue Failure Resulting from Variable Loading, Midterms Exam	Chap 6

10, 11	23/11/2024 30/11/2024	Shafts and Shaft Components	Chap 7
12, 13	07/12/2024 14/12/2024	Screws, Fasteners, and the Design of Nonpermanent Joints	Chap 8
14, 15	21/12/2024 28/12/2024	Welding, Bonding, and the Design of Permanent Joints	Chap 9
16		Final Exam	