

**COURSE INFORMATION FORM**

Faculty	Faculty of Engineering		
Program	B.Sc. in Civil Engineering	Elective	
	B.Sc. in Computer Engineering	Elective	
	B.Sc. in Electrical-Electronics Engineering	Elective	
	B.Sc. in Industrial Engineering	Elective	
	B.Sc. in Mechanical Engineering	Required	
Semester	Fall 2016-2017		

Course Code	ME 303			
Course Title in English	Machine Design I			
Course Title in Turkish	Makina Elemanları I			
Language of Instruction	English			
Type of Course	Flipped Classroom/Lecture/Exercise			
Level of Course	Undergraduate			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
	-	-	100	-
Semester Offered	Fall			
Contact Hours per Week	Lecture: 3 hours	Recitation: -	Lab:-	Other:-
Estimated Student Workload	151 hours per semester.			
Number of Credits	6 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	CAD102, STM206			
Expected Prior Knowledge	Prior knowledge in engineering materials and fundamentals of strength of materials is required.			
Co-requisites	None			
Registration Restrictions	Only Undergraduate Students			
Overall Educational Objective	To learn how to use machine elements in a mechanical design.			
Course Description	This course provides mechanical engineering design activity and importance of machine elements knowledge. Topics include: Fundamentals of design and applications of machine elements. Welded, soldered, adhesive bonded, riveted joints. Shaft-hub connections. Bolted joints and power screw mechanisms. Pins, knuckles, springs, shafts and axles, coupling and clutches, lubricants and lubrication theory, sliding and rolling bearings. Fundamentals of speed reduction mechanisms, geometry of gears, spur, helical, bevel, spiral and worm gear mechanisms, belt drive and chain mechanisms.			
Course Description in Turkish	Bu derste konstrüksiyon faaliyeti ve bu faaliyet içinde makina elemanları bilgisinin önemi anlatılmaktadır. Kapsanan konular: Makina elemanlarının hesap, şekillendirme ve kullanım esasları. Kaynak, lehim, yapıştırma, perçin bağlantıları, mil-göbek bağlantıları, cıvata bağlantıları ve vida mekanizmaları, pimler, pernolar, yaylar, miller ve akslar, kavramalar, yağlar ve yağlama teorisi, kaymalı ve rulmanlı yataklar. Hız-moment dönüşüm mekanizmalarının esasları, dişli çark geometrisi. Düz, helisel, konik, spiral dişliler ve sonsuz vida mekanizmaları. Kayış-kasnak ve zincir mekanizmaları.			

Course Learning Outcomes and Competences	Upon successful completion of the course, the learner is expected to: <ol style="list-style-type: none"> 1. Have knowledge on calculation of welded, brazed and adhesive bonded joints and knowledge on shaft-to-hub joints and their standards. Be able to calculate the keys, splined shafts and press fit joints. 2. Have knowledge on bolted joints, power screw mechanisms and screw thread forms and their standards. Be able to calculate the stresses in bolted and screw joints and also the ability to design of a preloaded bolted joint. 3. Have knowledge on springs and their properties, axles, shafts and their calculation principles. Be able to calculate a shaft regarding fatigue failure. To have knowledge on the types, characteristics, and application limits of the couplings and clutches. 4. Have knowledge on lubrication, friction and wear, lubricants and their characteristics, the journal, thrust sliding bearings and rolling bearings. 5. Have knowledge on power transmission mechanisms (speed reduction mechanisms). Be able to make simple calculation of a power transmission system. 	
Relation to Student Outcomes and Competences: N=None S=Supportive H=Highly Related		
Relationship of the Course with the Student Outcomes and Competences	Level	Assessed by
	N/S/H (Related Learning Outcomes)	Exam, Project, HW, Lab, Presentation, etc.
(a) an ability to apply knowledge of mathematics, science, and engineering	H (1,2,3,4,5)	Project, Exams
(b) an ability to design and conduct experiments, as well as to analyze and interpret data		
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	H (1,2,3,4,5)	Project, Exams
(d) an ability to function on multidisciplinary teams		
(e) an ability to identify, formulate, and solve engineering problems		
(f) an understanding of professional and ethical responsibility		
(g) an ability to communicate effectively	S (1,2,3,4,5)	Projects
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context		
(i) a recognition of the need for, and an ability to engage in life-long learning		
(j) a knowledge of contemporary issues		
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	S (1,2,3,4,5)	Project, Exams
Prepared by Asst.Prof.Dr. Vedat Temiz		
Name of Instructors	Asst.Prof.Dr. Vedat Temiz	
Course Contents	Week	Topic
	1.	Introduction to Mechanical Engineering Design, Materials, Load and Stress Analysis
	2.	Static failure theories, Fatigue.
	3.	Permanent joints: Welded, brazed, adhesive and riveted
	4.	Permanent joints: Welded, brazed, adhesive and riveted
	5.	Screws, Fasteners and the design of nonpermanent joints
	6.	Shaft-hub joints

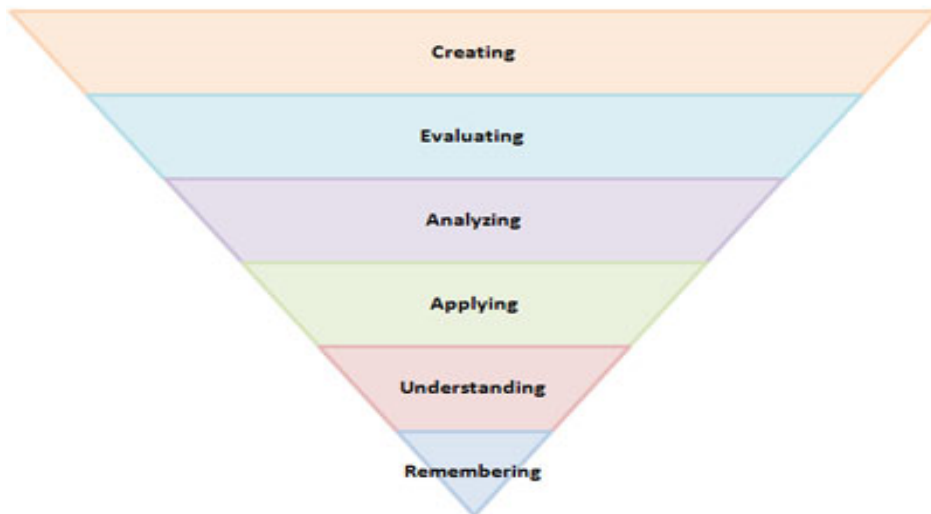
	7.	Mechanical springs																		
	8.	Shaft and axles																		
	9.	Couplings and clutches																		
	10.	Tribology, lubrication theory and journal bearings																		
	11.	Rolling bearings																		
	12.	Power transmission: gearing: spur and helical gears, friction drives																		
	13.	Power transmission: gearing: bevel and worm gears																		
	14.	Belting and chains																		
	15.	Final Examination Period																		
	16.	Final Examination Period																		
Required/Recommended Readings		<ul style="list-style-type: none"> • Khurmi, R.S., Gupta, J.K., A Textbook of Machine Design, Euroasia Pub., 2010. • Course slides supplied by lecturer. 																		
Teaching Methods		Lectures/contact hours using "flipped classroom" as an active learning technique																		
Homework and Projects		-																		
Laboratory Work		-																		
Computer Use		-																		
Other Activities		-																		
Assessment Methods		<p>Types of assessment :</p> <table border="1"> <thead> <tr> <th></th> <th>Number</th> <th>Ratio (%)</th> </tr> </thead> <tbody> <tr> <td>Midterm Exams</td> <td>2</td> <td>30 (each contributing 15%)</td> </tr> <tr> <td>Flipped Classroom Practice</td> <td>14</td> <td>15</td> </tr> <tr> <td>Project</td> <td>1</td> <td>15</td> </tr> <tr> <td>Final Exam</td> <td>1</td> <td>40</td> </tr> <tr> <td>Total</td> <td></td> <td>100</td> </tr> </tbody> </table>		Number	Ratio (%)	Midterm Exams	2	30 (each contributing 15%)	Flipped Classroom Practice	14	15	Project	1	15	Final Exam	1	40	Total		100
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Flipped Classroom Practice	14	15																		
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Final Exam	1	40																		
Total		100																		
Course Administration		<p>Instructor's office and phone number: I.T.U Gumussuyu Campus Office Num:412 office hours: Monday at I.T.U. 14:00-16:00 email address: temizv@itu.edu.tr web: http://web.itu.edu.tr/temizv</p> <p>Rules for attendance: Classroom practice contributes to 20% of the final grade. Missing a quiz: Provided that proper documents of excuse are presented, each missed quiz by the student will be given a grade by taking the average of all of the other quizzes. No make-up will be given. Missing a midterm: Provided that proper documents of excuse are presented, each missed midterm by the student will be given the grade of the final exam. No make-up will be given. Missing a final: Faculty regulations. A reminder of proper classroom behavior, code of student conduct: YÖK Regulations Statement on plagiarism: YÖK Regulations (http://www.mef.edu.tr/icerikler/files/lisans_onlisans_yonetmelik%20(1.pdf))</p>																		

ECTS Student Workload Estimation

Activity	No/Weeks	Hours			Calculation	Explanation
		Preparing for the Activity (B)	Spent in the Activity Itself (C)	Completing the Activity Requirements (D)		
Lecture/Flipped Classroom	14	2	3	2	98	A*(B+C+D)
Quizzes					0	A*(B+C+D)
Midterm(s)	2	12	2		28	A*(B+C+D)
Assignment, Project, Presentation	1	2	7	2	11	A*(B+C+D)
Final Examination	1	12	2		14	A*(B+C+D)
Total Workload					151	
Total Workload/25					6,04	
ECTS					6	

Key verbs for cognitive domain in writing learning outcomes and competences:

Bloom's Taxonomy



Revised edition by Lorin Anderson (a student of Bloom)

Key Verbs:

Remembering: defines, describes, identifies, knows, labels, lists, matches, names, outlines, recalls, recognizes, reproduces, selects, states.

Understanding: comprehends, converts, defends, distinguishes, estimates, explains, extends, generalizes, gives an example, infers, interprets, paraphrases, predicts, rewrites, summarizes, translates.

Applying: applies, changes, computes, constructs, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses.

Analyzing: analyzes, breaks down, compares, contrasts, diagrams, deconstructs, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, relates, selects, separates.

Evaluating: appraises, compares, concludes, contrasts, criticizes, critiques, defends, describes, discriminates, evaluates, explains, interprets, justifies, relates, summarizes, supports.

Creating: categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes.

Key verbs for affective domain in writing learning outcomes and competences:

Receiving Phenomena: asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits, erects, replies, uses.

Responding to Phenomena: answers, assists, aids, complies, conforms, discusses, greets, helps, labels, performs, practices, presents, reads, recites, reports, selects, tells, writes.

Valuing: completes, demonstrates, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works.

Organizing: adheres, alters, arranges, combines, compares, completes, defends, explains, formulates, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes.

Internalizing values: acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, verifies.