OSTIM TECHNICAL UNIVERSITY
FACULTY OF ENGINEERING
COURSE SYLLABUS FORM
2022-2023
Instructor: Dr. Tolga DURSUN, tolga.dursun@ostimteknik.edu.tr

MEC 303 Theory of Machines							
Course Name	**Course Code**	**Period**	**Hours**	**Application**	**Laboratory**	**Credit**	**ECTS**
Theory of Machines	**MEC 303**	3	3	0	0	3	4

Course Status	Compulsory
Language of Instruction	English
Course Level	Bachelor
Learning and Teaching Techniques of the Course	Lecture, Discussion, Question Answer, Practice

Course Objective

At the end of this course, the student will be able to recognize the types and functions of mechanisms, acquire a clear understanding of mobility of mechanisms in relation to their topological characteristics and perform kinematic enumeration, perform kinematic analysis of planar mechanisms, analyze a gear train, perform force analysis of planar mechanisms. Perform vibration analysis.

Learning Outcomes

1. Ability to determine the types of joints, links, degree-of-freedom of a mechanism.
2. Ability to enumerate different types of mechanisms.
3. Ability to perform position, velocity and acceleration analysis of planar mechanisms.
4. Ability to use MATLAB (or, a similar program) in the full cycle solution of position, velocity and acceleration analysis of planar mechanisms.
5. Ability to identify different types of gear trains and their application areas.
6. Ability to determine the speed ratio of a given gear train.
7. Ability to identify different types of forces that exist in planar mechanisms.
8. Ability to determine the reaction and actuator forces in a planar mechanism that is in static or dynamic equilibrium
9. Ability to use MATLAB (or, a similar program) in the full cycle solution of force analysis of planar mechanisms.
10. Ability to understand basics of vibration analysis.

Course Outline

Introduction to mechanisms: basic concepts, mobility, basic types of mechanisms. Position, velocity and acceleration analysis of linkages. Cam mechanisms. Gear trains. Static and dynamic force analysis of mechanisms. Vibration analysis.

Weekly Topics and Releated Preparation Studies		
Weeks	**Topics**	**Preparation Studies**
1	Introduction to mechanisms	
2	Motion analysis of mechanisms	
3	Motion analysis of mechanisms	
4	Velocity and Acceleration Analysis of Mechanisms	
5	Velocity and Acceleration Analysis of Mechanisms	
6	Gear Trains Simple Gear Trains Planetary Gear Trains Bevel Gears	
7	Review	
8	Midterm exam	
9	Four-link mechanisms	
10	Four-link mechanisms	
11	Static force analysis of machinery	
12	Dynamic force analysis of machinery	
13	Cam mechanisms	
14	Introduction to Vibration analysis	
15	Final Exam	

Textbook(s)/References/Materials:
Course book: Eres Söylemez, Mechanisms, Middle East Technical University
J. Uicker, Gordon R. Pennock, J. E Shigley, Theory of Machines and Mechanisms, Oxford University Press. **(Reference)**
R.L. Norton, Design of Machinery, McGraw Hill. **(Reference)**
Eric Constans and Karl B. Dyer, Introduction to Mechanism Design With Computer Applications. CRC Press, 2019. **(Reference)**
Kevin Russell, Qiong Shen, Raj S. Sodhi, Kinematics and Dynamics of Mechanical Systems Implementation in MATLAB® and Simmechanics®, 2nd edition, CRC Press, 2019. **(Reference)**
A.G. Erdman, G. N. Sandor, S. Kota, Mechanism Design: Analysis and Synthesis, Prentice Hall. **(Reference)**
S.G. Kelly, Fundamentals of Mechanical Vibrations,Mc Graw Hill. **(Reference)**

Assessment		
Studies	**Number**	**Contribution margin (%)**
Attendance	14	10
Lab		
Application		
Field Study		
Course-Specific Internship (if any)		
Quizzes / Studio / Critical	4	20
Homework		
Presentation		
Projects		
Report		
Seminar		
Midterm Exams / Midterm Jury	1	30
General Exam / Final Jury	1	40
	Total	**100**
Success Grade Contribution of Semester Studies		60
Success Grade Contribution of End of Term		40
	Total	**100**

Course Category	
Core Courses	X
Major Area Courses	
Supportive Courses	
Media and Management Skills Courses	
Transferable Skill Course	

Relationship Between Course Learning Outcomes and Program Competencies							
No	**Learning Outcomes**	**Contribution Level**					
		1	**2**	**3**	**4**	**5**
1	An ability to apply knowledge of science, mathematics, and engineering.					X
2	An ability to design static systems, components, or processes to meet industrial needs.					X
3	An ability to identify, formulate, and solve engineering problems				X	
4	Take responsibility to solve unpredictable and complex problems encountered in applications as an individual and as a member of a team			X		
5	Plan and manage activities in teamwork		X			
6	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.		X			
7	Can do research on interdisciplinary fields.			X		

ECTS / Workload Table			
Activities	**Number**	**Duration (hours)**	**Total Workload**
Course hours (Including the exam week: 14 x total course hours)	14	3	42
Laboratory			
Application			
Course-Specific Internship			
Field Study			
Study Time Out of Class	14	3	42
Presentation / Seminar Preparation			
Projects			
Reports			
Homeworks			

Quizzes / Studio Review	4	2	8
Preparation Time for Midterm Exams / Midterm Jury	1	20	20
Preparation Period for the Final Exam / General Jury	1	20	20
Total Workload			**132**