



T.C. ESKİŞEHİR OSMANGAZİ UNIVERSITY
ARCHITECTURE AND ENGINEERING FACULTY
MECHANICAL ENGINEERING DEPARTMENT

COURSE INFORMATION FORM

SEMESTER	Spring
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COURSE CODE	151816336 - 151816336	COURSE NAME	MACHINE DYNAMICS
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SEMESTER	WEEKLY COURSE PERIOD			COURSE OF			
	Theory	Practice	Laboratory	Credit	ECTS	TYPE	LANGUAGE
6	3	0	0	3	7	COMPULSORY (x) ELECTIVE ()	Turkish

COURSE CATAGORY

Basic Science	Basic Engineering	Mechanical Engineering [if it contains considerable design, mark with (√)]	Social Science
	√		

ASSESSMENT CRITERIA

MID-TERM	Evaluation Type	Quantity	%
	Mid-Term		1
	Quiz		
	Homework		
	Project		
	Report		
	Others (.....)		
FINAL EXAM		1	50

PREREQUIEITE(S)

COURSE DESCRIPTION

Dynamics forces-equations, mass center-moment of inertia and forces, rotor dynamics, flywheel design, static-dynamic balancing, force and moment isolation/balancing of machines.

COURSE OBJECTIVES

To teach students methods in dynamical analysis and design of mechanisms and machines.

ADDITIVE OF COURSE TO APPLY PROFESSIONAL EDUATION

To provide students the skill to design and analyze machines that perform better

COURSE OUTCOMES

By the end of this module students will be able to:

- 1) Calculate work, power and energy of various mechanisms,
- 2) Solve problems using momentum and conservation of energy,
- 3) Effectively draw free body diagrams of each link of a machine to arrive at the force analysis,
- 4) Use energy relations to come up with the equations of motion (Lagrange method),
- 5) Calculate the driving torque and forces for a specified motion of the mechanism,
- 6) Identify and explain the transmission of forces in a machine,
- 7) Calculate the shaking force and shaking moment,
- 8) Analyze the effects of a flywheel, design of flywheels,
- 9) Perform static and dynamic balancing of machinery.

TEXTBOOK

Design of Machinery: an Introduction to Synthesis and Analysis of Mechanisms and Machines, Robert L Norton, McGraw-Hill

OTHER REFERENCES

Lecture Notes; Mechanism Design: Analysis and Synthesis, Arthur G. Erdman, George N. Sandor

TOOLS AND EQUIPMENTS REQUIRED

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COURSE SYLLABUS	
WEEK	TOPICS
1	Introduction: Reminders from Dynamics
2	Force Analyses (Newton-Euler Equations)
3	The effect of forces that generate resistance to movement
4	Power Equation
5	Virtual Work
6	Generalized Coordinates-forces, Lagrange Method
7	Mass Center and Moment Of Inertia
8	Mid-Term Examination
9	Mid-Term Examination
10	Equations Of Motion In A Rotated Coordinate System
11	Motors- Flywheel Design
12	Dynamic Equivalent Mass
13	Static-Dynamic Balancing
14	Problem Solutions
15,16	Final Exam

NO	PROGRAM OUTCOMES	3	2	1
1	Sufficient knowledge of engineering subjects related with mathematics, science and Mechanical Engineering; an ability to apply theoretical and practical knowledge on solving and modeling of Mechanical Engineering problems.		X	
2	Ability to determine, define, formulate and solve complex Mechanical Engineering problems; for that purpose an ability to select and use convenient analytical and experimental methods.	X		
3	Ability to design a complex system, a component and/or an engineering process under real life constraints or conditions, defined by environmental, economic and political problems; for that purpose an ability to apply modern design methods.	X		
4	Ability to develop, select and use modern methods and tools required for Mechanical Engineering applications; ability to effective use of information technologies.			X
5	In order to investigate Mechanical Engineering problems; ability to set up and conduct experiments and ability to analyze and interpretation of experimental results.		X	
6	Ability to work effectively in inner or multi-disciplinary teams; proficiency of interdependence.			X
7	Ability to communicate in written and oral forms in Turkish/English; proficiency at least one foreign language.			X
8	Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement.		X	
9	Understanding of professional and ethical issues and taking responsibility		X	
10	Awareness of project, risk and change management; awareness of entrepreneurship, innovativeness and sustainable development.		X	
11	Knowledge of actual problems and effects of engineering applications on health, environment and security in global and social scale; an awareness of juridical results of engineering solutions.			X
1: None. 2: Partial contribution. 3: Complete contribution.				

Prepared by: Assist. Prof. Dr. Sezcan Yilmaz

Date: 13.11.2017

Signature(s):