Dynamics

Course Code:

ME 244

Course Period:

Spring

Course Type:

Core

Credits:

3

Theoric:

2

Practice:

2

Laboratory Hour:

0

ECTS:

6

Prerequisite Courses:

Statics [1]
Course Language:

English

Courses given by:

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Course Objectives:

• To teach the two fundamental subjects of dynamics, namely; kinematics (relations between position/velocity/acceleration and time) and kinetics (relations between force, mass, acceleration and time) of dynamic bodies with engineering examples. • To teach students the notion of inertia, at the university level, and its importance in engineering systems in motion. • To give them the ability to analyze forces and motion.

Course Content:

Dynamics of particles: Rectilinear and curvilinear motion. Newton’s laws, momentum and angular momentum methods. Work and energy. System of particles. Dynamics of rigid bodies in plane motion; kinematics and kinetics. Work and energy method and the momentum principles for rigid bodies.

Course Methodology:

1: Lecture, 3: Homework

Course Evaluation Methods:

A: Midterm and final exam, B: Quiz, C: Homework

Learning Outcomes	Program Outcomes	Teaching Methods	Assessment Methods
1. An ability to analyze motion of particles and rigid bodies, with examples from engineering.	1, 2	1, 3	A, B, C
1. An ability to analyze forces/moments and their relations with motion.	1, 2	1, 3	A, B, C
1. Concepts of power, energy, linear and angular momentum as applied to engineering systems in motion.	1, 2	1, 3	A, B, C

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Kinematics of particles	Textbook
2	Kinematics of particles	Textbook
3	Kinematics of particles	Textbook
4	Kinetics of particles: force and acceleration	Textbook
5	Kinetics of particles: force and acceleration	Textbook

6	Kinetics of particles: work and energy	Textbook
7	Kinetics of particles: work and energy	Textbook
8	Kinetics of particles: impulse and momentum	Textbook
9	Planar kinematics of a rigid body	Textbook
10	Planar kinematics of a rigid body	Textbook
11	Planar kinetics of a rigid body: force and acceleration	Textbook
12	Planar kinetics of a rigid body: force and acceleration	Textbook
13	Planar kinetics of a rigid body: work and energy	Textbook
14	Planar kinetics of a rigid body: impulse and momentum	Textbook

RECOMMENDED SOURCES	
Textbook	R.C. Hibbeler, Engineering Mechanics: Dynamics, 12th ed. In SI units, Prentice Hall, 2010.
Additional Resources	

MATERIAL SHARING	
Documents	Syllabus, Attendance, Grading
Assignments	Homework assignments
Exams	None

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Midterms	2	20
Homeworks and quizzes	8-10	20
Total		**60**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE'S CONTRIBUTION TO PROGRAM								
No	Program Learning Outcomes		Contribution					
		NA	1	2	3	4	5	
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems.						**X**	
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.	**X**						
3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.	**X**						
4	Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively.	**X**						
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions.	**X**						
6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.	**X**						
7	Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions.	**X**						
8	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.	**X**						
9	Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice.	**X**						

10	Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development.	**X**						
11	Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions.	**X**						
12	Ability to work professionally in both thermal and mechanical systems areas, including design and realization.	**X**						
13	Ability to verify and validate numerical solutions to engineering problems.	**X**						

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Including the exam week: 16x Total course hours)	16	4	64
Hours for off-the-classroom study (Pre-study, practice)	16	4	64
Mid-terms	2	4	8
Final examination	1	8	8
Total Work Load			144
Total Work Load / 25 (h)			5.76
ECTS Credit of the Course			6