T.R. ESKİSEHİR OSMANGAZI UNIVERSITY
FACULTY OF ENGINEERING AND ARCHITECTURE
DEPARTMENT OF MECHANICAL ENGINEERING
COURSE INFORMATION FORM

SEMESTER	Fall

COURSE CODE	151813231-151833231	COURSE NAME	DYNAMICS

SEMESTER	WEEKLY COURSE PERIOD			COURSE OF			
	Theory	Practice	Laboratory	Credit	ECTS	TYPE	LANGUAGE
Fall	3	0	0	3	4	COMPULSORY (X) ELECTIVE ( )	Turkish

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

ASSESSMENT CRITERIA			
	Evaluation Type	Quantity	%
MID-TERM	1st Mid-Term	1	40
	2nd Mid-Term	10	10
	Quiz		
	Homework		
	Project		
	Report		
	Others (……)		
FINAL EXAM		1	50

PREREQUIEITE(S)	-
COURSE DESCRIPTION	Dynamics of particles and rigid bodies, applications of free-body diagrams, Newton's second law, the impulse-momentum method and the work-energy principle to solve dynamic problems in mechanical systems.
COURSE OBJECTIVES	The objective of the course is to introduce the physical principles to the analysis of particle and rigid-body motion problems.
ADDITIVE OF COURSE TO APPLY PROFESSIONAL EDUATION	Knowledge acquired and skills developed in this class are used extensively in later engineering courses.
COURSE OUTCOMES	By the end of this course, students will be able to: • solve certain types of differential equation problems involving particle kinematics; • relate the force applied to a particle to the rate of change of the linear momentum of a particle; use that relation to analyze the motion of a particle and the forces acting upon it in one or more directions; • draw the free-body diagram for a particle or for a rigid body in plane motion • relate linear and angular impulse to changes in the linear and angular momentum of a particle; • relate the work done by one or more forces to changes in the kinetic energy of a particle; • implement the concepts of force/acceleration, impulse/momentum, and work/energy to closed systems of particles; • relate the motion of one location on a rigid body to that of another; and • extend the concepts of force/acceleration, impulse/momentum, and work/energy to one or more rigid bodies.
TEXTBOOK	Vector Mechanics for Engineers – Dynamics, F.P. Beer, E.R. Johnston, P.J. Cornwell
OTHER REFERENCES	1) Engineering Mechanics – Dynamics, R.C. Hibbeler 2) Engineering Mechanics – Dynamics, J.L. Meriam, L.G. Kraige
TOOLS AND EQUIPMENTS REQUIRED	-

COURSE SYLLABUS	
WEEK	**TOPICS**
1	Introduction, basic terms
2	Particle kinematics; rectilinear motion (position-velocity-acceleration, relative and dependant motions, uniform rectilinear and uniform accelerated rectilinear motions), curvilinear motion (position-velocity-acceleration, relative motion, recatangular components), derivatives of vector functions
3	Particle kinematics; projectile motion, tangential-normal and radial-transverse components
4	Particle kinetics; Newton's 2nd law of motion: linear momentum, equations of motion, dynamic equilibrium, free-body diagrams, normal-tangential and radial-transverse components (equations of motion), angular momentum
5	Particle kinetics; Newton's 2nd law of motion: conservation of angular momentum, particle trajectory under a central force, radial-transverse components (equations of motion), Newton's law of universal gravitation
6	Particle kinetics; Energy and Momentum Methods: work-energy principle, power and efficiency
7	Particle kinetics; Energy and Momentum Methods: potential energy, conservative forces (motions governed by conservative forces), onservation of energy, impulsive motion, impulse-momentum principle
8	Midterm Exam
9	
10	Particle kinetics; Energy and Momentum Methods: impact, direct-oblique central impacts, problems involving multiple principles
11	Systems of particles: applying Newton's law and momentum principles, motion of the mass center, angular momentum about the mass center, conservation of momentum, kinetic energy, work-energy principle and conservation of energy, impulse-momentum principle, steady stream of particles, mass gaining or losing streams
12	Kinematics of rigid bodies; translation, rotation, general plane motion, absolute and relative velocity-acceleration in plane motion, instant center of rotation, motions relative to a rotating frame (planar and 3-D)
13	Plane motion of rigid bodies: Forces and accelerations
14	Plane motion of rigid bodies: Energy and momentum principles
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 constrains 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: Prof. Dr. Naci Zafer, Assist. Prof. Dr. Sezcan Yılmaz **Date:** 13.11.2017

Signature(s):