Course syllabus

Engineering Mechanics - Dynamics

Aboelnour Abdalla Faculty of Science, Sohag University
Egypt

COURSE DETAILS		
Type of study programme	Undergraduate professional study programme- 180 ECTS	
Study programme	MECHANICAL ENGINEERING	
Course title	Engineering Mechanics - Dynamics	
Course code	SKS010	
ECTS (Number of credits allocated)	7	
Course status	Core	
Year of study	First	
Course Web site	https://moodle.oss.unist.hr/course/category.php?id=21	
Total lesson hours per semester	Lectures	45
	Auditory exercises	45
Prerequisite(s)	None	
Lecturer(s)	Department of Mechanical Engineering: Ado Matoković, Ph.D., college professor,	

COURSE DESCRIPTION	
Course Objectives:	• Understanding basic laws and principles of plane kinematics and kinetics of particle and rigid body.
Learning outcomes ***On successful completion of this course, student should be able to:***	1. define basic kinematic quantities of rectilinear and curvilinear motion of particle such as: position, displacement, velocity and acceleration, 2. describe and understand plane kinematics of rigid bodies, 3. explain basic terms in kinetics of particles: Newton's second law, work and kinetic energy, impulse and momentum, gravitational and elastic potential energy 4. discuss direct and oblique central impact 5. determine moments and products of inertia of a mass, 6. explain plane kinetics of rigid bodies, 7. analyse and comprehend free undamped and damped vibrations
Course content	Introduction into Engineering Mechanics-Dynamics. Basic quantities and units. Newton's laws of motion and law of gravitation. Kinematics of particle. Rectilinear motion and basic kinematic quantities: position, displacement, velocity and acceleration. Special cases of rectilinear motion of particle: motion with constant velocity and motion with constant acceleration. Dependent rectilinear motions. Curvilinear motion of particle: position vector, velocity and acceleration. Free flight of a projectile. Tangential and normal components of acceleration. Radial and transvers components of velocity and acceleration. , Kinetics of particles: force and acceleration. Newton's second law. D'Alembert's principle - dynamic equilibrium. Definition of work, kinetic energy and power. Work of a gravitational force. Work of a spring force. Principle of work and energy. Potential energy: gravitational and elastic. Impulse and momentum. Principle of impulse and momentum. Angular impulse and angular momentum. Impact: direct central impact; oblique central impact. Plane kinematics of rigid bodies. Types of plane motion of rigid bodies: translation, rotation, general plane motion. Velocity and acceleration centre. Accelerations in different reference frames. Interpretations for Coriolis acceleration. Plane kinetics of rigid bodies. Mass moments of inertia, parallel-axis theorem, calculation mass moments of inertia for composite bodies. Work and energy. Kinetic energy of a rigid body in plane motion. Principle of work and energy. Conservation of energy. Impulse and momentum. Principle of impulse and momentum. Vibrations. Undamped free vibrations. Damped free vibrations.

CONSTRUCTIVE ALIGNMENT – Learning outcomes, teaching and assessment methods

Alignment of students activities with learning outcomes		
Activity	**Student workload ECTS credits**	**Learning outcomes**
Lectures	45 hours / 1,5 ECTS	1,2,3,4,5,6,7
Auditory exercises	45 hours / 1,5 ECTS	2,3,4,7
Homework	12 hours / 0,4 ECTS	2,3,4,7
Short tests	12 hours / 0,4 ECTS	2,3,4,7
Self-study	96 hours / 3,2 ECTS	1,2,3,4,5,6,7,8
TOTAL:	**210 hours / 7 ECTS**	**1,2,3,4,5,6,7,8**

CONTINUOUS ASSESSMENT		
Continuous testing indicators	**Performance A_i (%)**	**Grade ratio k_i (%)**
Class attendance and participation	70 - 100	10
Seminars	100	10
Homework	0-100	10
Short tests	0-100	10
First mid-term exam	50-100	30
Second mid-term exam	50-100	30

FINAL ASSESSMENT		
Testing indicators – final exam (first and second exam term)	**Performance A_i (%)**	**Grade ratio k_i (%)**
Written exam	50 - 100	45
Oral exam	50 - 100	45
Seminars	100	10
Testing indicators – makeup exam (third and fourth exam term)	**Performance A_i (%)**	**Grade ratio k_i (%)**
Written exam	50 - 100	45
Oral exam	50 - 100	45
Seminars	100	10

PERFORMANCE AND GRADE		
Percentage	**Criteria**	**Grade**
50% - 61%	*basic criteria met*	sufficient (2)
62% - 74%	*average performance with some errors*	good (3)
75% - 87%	*above average performance with minor errors*	very good (4)
88% - 100%	*outstanding performance*	outstanding (5)

ADDITIONAL INFORMATION

Teaching materials for students (scripts, exercise collections, examples of solved exercises), teaching record, detailed course syllabus, application of e-learning, current information and all other data are available by MOODLE system to all students.