TOROS ÜNİVERSİTESİ

Faculty Of Engıneerıng
Electrıcal And Electronıcs Engıneerıng (Englısh)

Course Information

PHYSICS I					
Code	**Semester**	**Theoretical**	**Practice**	**National Credit**	**ECTS Credit**
		Hour / Week			
PHY101	Fall	3	2	4	7

Prerequisites and co-requisites	
Language of instruction	English
Type	Required
Level of Course	Bachelor's
Lecturer	Asst. Prof. Ali Kemal HAVARE
Mode of Delivery	Face to Face
Suggested Subject	
Professional practise (internship)	None
Objectives of the Course	The course’s objective is to introduce students to the fundamental concepts of physics and their practical applications, and to provide students with a foundation to build upon in their future studies. The course introduces to non-major students physical quantities and measurements, mechanical motion, force, work and energy, and oscillations and waves.
Contents of the Course	Quantitative approach, measurements, quantities, and units; Vectors and manipulations with vectors; Kinematics of mechanical motion and simplest motions; Dynamics of mechanical motion, Newton’s laws, forces, momentum, solving motion using forces; Rotational motion, torque and angular momentum, rotational and rolling motion of solid bodies;• nservation of energy, linear, and angular momentum, significance and application of conservation laws in physics; Simple harmonic oscillations, forced oscillations and resonance, simple wave motion, basic properties of waves.

Learning Outcomes of Course

#	Learning Outcomes
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems.
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.
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. (Realistic constraints and conditions may include factors such as economic and environmental issues, sustainability, manufacturability, ethics, health, safety issues, and social and political issues, according to the nature of the design.)
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.
6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.

Course Syllabus

#	Subjects	Teaching Methods and Technics

1	Introduction. Quantitative approach. Physical quantities. Introduction to the idea of a vector.	Lecture
2	Introduction to the basics of vector calculus. Fundamental vector operations. Vector representation in component and unit-vector form. Scalar product of vectors.	Lecture
3	Mechanical motion and its description; position, speed, and acceleration. Average and instantaneous quantities. Speed as a time-derivative of position. Homestudy/handout: calculating derivatives and derivatives of vectors.	Lecture
4	Simplest mechanical motions; equations of motion, uniform, uniformly accelerated, free fall, ballistic motion, circular motion.	Lecture
5	Causes of mechanical motion. Inertial motion and inertial reference frames. Newton's three laws, mechanical forces. Momentum of motion. Some simple examples of forces: gravity, weight, normal force, and friction. Homestudy/handout: relativity of motion, relativity and 1st Newton's law.	Lecture
6	Properties of the force of friction; static, kinetic, and rolling friction. Properties of elastic deformation forces; tension, longitudinal, transversal, and shear deformations, elastic modules. Properties of non-inertial forces; linear, centrifugal, and Coriolis force.	Lecture
7	Solving motion of bodies using forces; free-body diagrams. Example motion of box on inclined surface. Example motion of two stacked boxes. Motion of celestial bodies; the law of universal gravitation of Newton. Kepler laws. Homestudy/handout: Inferring force from motion, 3rd Kepler's law and Newton's gravitation law.	Lecture
8	Midterm Exam	Exam
9	Force and work, work-energy theorem, kinetic energy. Example work of gravity force. Example work of friction force. Example using work to calculate kinetic energy. Conservative forces. Conservation laws in mechanics; conservation of mechanical energy, conservation of mechanical momentum. Homestudy/handout: Conservation laws and symmetries of nature; Noether's theorem.	Lecture
10	Use of work and energy. Example metal ball falling onto a spring. Example two-body collisions in 2D. Description of rotational motion; axis of rotation, angular position, radian measure, angular speed, and angular acceleration. Relation between linear and angular quantities; tangential and normal speed, tangential and normal acceleration.	Lecture
11	Reasons for change of rotational motion, forces and torque. 2nd Newton's law for rotation, moment of inertia of a body. Example rotating disk under torque. Parallel axis theorem for off-central rotations. Example of-center rotation of a disk. Example rolling of car in sharp turn. Kinetic energy of rotation. Angular momentum and conservation of angular momentum.	Lecture
12	Rolling motion; rolling with slipping and without slipping, role of the friction force in rolling. Example rolling of a ball down inclined plane. Method of fixed axis; example rolling of a ball using the method of fixed axis. Example rolling of a ball using energy conservation; partition between linear and rotational energy in rolling.	Lecture
13	Simple oscillatory motion; amplitude, frequency, period, and phase. Example motion of mathematical and physical pendulum. Forced oscillations and resonance. Example forced oscillations of a pendulum.	Lecture
14	Simple wave motion; transversal and longitudinal waves, sinusoidal waves, amplitude, frequency, period, wave-number, wave-length, and phase of sinusoidal wave. Wave-front and wave-front propagation, speed of wave. Superposition principle and interference of waves; constructive and destructive interference. Interference from two spherical sources and interference pattern.	Lecture
15		
16	Final Exam	Exam

Course Syllabus

#	Material / Resources	Information About Resources	Reference / Recommended Resources
1	"D. Halliday, R. Resnick, J. Walker, Fundamentals of Physics Extended, 9th Edition, Wiley, 2009 ISBN-10: 0-321-64363-1, 2010. "		
2	Raymond A. Serway, Physics for Scientists and Engineers, 4th edition, Saunders College Pub, 1996		

Method of Assessment

#	Weight	Work Type	Work Title
1	40%	Mid-Term Exam	Mid-Term Exam
2	60%	Final Exam	Final Exam

Relationship between Learning Outcomes of Course and Program Outcomes

#	Learning Outcomes	Program Outcomes	Method of Assessment
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems.	1	1,2
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.	1,3	1,2
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. (Realistic constraints and conditions may include factors such as economic and environmental issues, sustainability, manufacturability, ethics, health, safety issues, and social and political issues, according to the nature of the design.)	1,2	1,2
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.	1,2	1,2
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.	2,5	1,2
6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.	4,5,6,7	1,2

PS. The numbers, which are shown in the column Method of Assessment, presents the methods shown in the previous table, titled as Method of Assessment.

Work Load Details

#	Type of Work	Quantity	Time (Hour)	Work Load
1	Course Duration	14	5	70
2	Course Duration Except Class (Preliminary Study, Enhancement)	14	2	28
3	Presentation and Seminar Preparation	0	0	0
4	Web Research, Library and Archival Work	0	0	0
5	Document/Information Listing	0	0	0
6	Workshop	0	0	0
7	Preparation for Midterm Exam	1	10	10
8	Midterm Exam	1	2	2
9	Quiz	0	0	0
10	Homework	7	3	21
11	Midterm Project	0	0	0
12	Midterm Exercise	0	0	0
13	Final Project	0	0	0
14	Final Exercise	0	0	0
15	Preparation for Final Exam	1	20	20
16	Final Exam	1	2	2
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