# TOROS ÜNİVERSİTESİ

Faculty Of Engineering Computer And Software Engineering

#### **Course Information**

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

Prerequisites and co- requisites	None
Language of instruction	English
Туре	Required
Level of Course	Bachelor's
Lecturer	Asst. Prof. Çağdaş ALLAHVERDİ
Mode of Delivery	Face to Face
Suggested Subject	None
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	The topics covered in this course include: • 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; • conservation 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	To be able to understand Newton's Laws
2	To be able to use Newton's Laws for solving physics and engineering problems
3	To be able to use Work, Energy and Momentum conservation laws.
	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

	Methods and Technics
Introduction to Quantitative approach, Physical quantities and Vectors.	Lecturing
Fundamental vector operations. Vector representation in component and unit-vector form. Scalar and vectoral product of vectors.	Lecturing
F	undamental vector operations. Vector representation in component and unit-vector form. Scalar and vectoral product of

3	Mechanical motion and its description; position, speed, and acceleration. Average and instantaneous quantities and their calculations.	Lecturing
4	Fundamental mechanical motions; equations of motion, constant accelerated motion, free fall, projectile motion, circular motion.	Lecturing
5	Causes of mechanical motion. Inertial motion and inertial reference frames. Newton's laws, mechanical forces, momentum, gravity, weight, normal force, and friction. Homestudy: Relativity.	Lecturing
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 forces.	Lecturing
7	Midterm Exam	Exam
8	Solving motion of bodies using forces; free-body diagrams. For example, motion of box on inclined surface, motion of two stacked boxes, etc. Motion of celestial bodies; Newton's law of universal gravitation. Kepler's laws.	Lecturing
9	Force and work, work-energy theorem, kinetic energy. For example, work of friction force etc. Conservative forces. Conservation laws in mechanics; conservation of mechanical energy, conservation of mechanical momentum.	Lecturing
10	Applications of work and energy. For example, metal ball falling onto a spring, two-body collisions in 2D. 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.	Lecturing
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. Kinetic energy of rotation. Angular momentum and conservation of angular momentum.	Lecturing
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 for rolling of a ball. Energy of a rolling object and energy conservation. Linear and rotational energy in rolling.	Lecturing
13	Simple oscillatory motion; amplitude, frequency, period, and phase. Example motion of physical pendulum. Forced oscillations and resonance. Example forced oscillations of a pendulum.	Lecturing
14	Simple wave motion; transversal and longitudinal waves, sinusoidal waves, amplitude, frequency, period, wave-number, wave-length, and phase of sinusoidal waves. 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.	Lecturing
15	Review	Lecturing
16	Final Exam	Exam

## Course Syllabus

#	Material / Resources	Information About Resources	Reference / Recommended Resources
1	H.D. Young, R.A. Freedman and A.L. Ford, Sears and Zemansk's University Physics with Modern Physics Technology Update, 13th Edition, ISBN 10: 0-321-89470-7, 2014		
2	Raymond A. Serway, Physics for Scientists and Engineers, 4th edition, Saunders College Pub, 1996		
3	D. Halliday, R. Resnick, J. Walker, Fundamentals of Physics Extended, 9th Edition, Wiley, 2009 ISBN-10: 0-321-64363-1, 2010.		

#### Method of Assessment

#	Weight	Work Type	Work Title
1	40%	Mid-Term Exam	Mid-Term Exam
2	40%	Final Exam	Final Exam
3	20%	Laboratory	Laboratory

## Relationship between Learning Outcomes of Course and Program Outcomes

#	Learning Outcomes	Program Outcomes	Method of Assessment
1	To be able to understand Newton's Laws	1	1,2

2	To be able to use Newton's Laws for solving physics and engineering problems	1	1,2
3	To be able to use Work, Energy and Momentum conservation laws.	1	1,2,3
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.	1	1,2,3
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.	1	1,2,3
6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.	1	1,2,3

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	4	56
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	13	13
8	Midterm Exam	1	7	7
9	Quiz	0	0	0
10	Homework	3	3	9
11	Midterm Project	3	3	9
12	Midterm Exercise	0	0	0
13	Final Project	1	3	3
14	Final Exercise	0	0	0
15	Preparation for Final Exam	1	20	20
16	Final Exam	1	10	10
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