Science 1 (Physics)

Basic Course Information

Course Number	03005019	**Subject Category**	Compulsory(G)
Class Format	Lecture	**Credit Type and Number of Credits**	1.5
Department	Electrical and Electronics	**Student Category**	Year 1
Period of Study	Semester 1	**Classes per Week**	3
Required Materials	KOSEN Textbook Series Physics volume 1, Mechanics and Waves, H. Ushio et al., Morikita Publishing Co., Ltd. ISBN978-4-627-15511-4		
Instructor	Naruemon Rueangkham	Suwun Suwunnarat	Natsuda Klongvessa

Course Objective

There are various types of engineering problems that require a good knowledge and application of physics. This course provides students with a basic knowledge of physics in mechanics. This includes mathematics, the motion of an object, velocity and acceleration, Newton's laws of motion, force, and the equation of motion of an object. The course also covers mechanical energy. The exercises and homework are designed to help the students develop knowledge, problem-solving skills, and understanding.

Evaluation(Rubric)	Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
Have the mathematical knowledge necessary to solve physics solution, i.e., significant figures, vectors, trigonometric functions, effective/ineffective solutions	Submit assignments by the deadline, and able to solve not only basic problems but also applied problems on midterm and/or final exams correctly.	Have the mathematical knowledge necessary to solve physics solution, i.e., significant figures, vectors, trigonometric functions, effective/ineffective solutions	Do not have the mathematical knowledge necessary to solve physics solution, i.e., significant figures, vectors, trigonometric functions, effective/ineffective solutions
Have mathematical and graphical expression skills	Submit assignments by the deadline, and able to solve not only basic problems but also applied problems on midterm and/or final exams correctly.	Have mathematical and graphical expression skills	Do not have mathematical and graphical expression skills
Can describe and derive the motion of an object in mathematical formulas	Submit assignments by the deadline, and able to solve not only basic problems but also applied problems on midterm and/or final exams correctly.	Can describe and derive the motion of an object in mathematical formulas	Can not describe and derive the motion of an object in mathematical formulas
Can describe and derive the falling motion of an object in mathematical formulas	Submit assignments by the deadline, and able to solve not only basic problems but also applied problems on midterm and/or final exams correctly.	Can describe and derive the falling motion of an object in mathematical formulas	Can not describe and derive the falling motion of an object in mathematical formulas
Describe various forces acting on an object in mathematical formulas	Submit assignments by the deadline, and able to solve not only basic problems but also applied problems on midterm and/or final exams correctly.	Describe various forces acting on an object in mathematical formulas	Can not describe various forces acting on an object in mathematical formulas
Can explain Newton's laws of motion and describe the motion of an object given initial conditions using Newton's laws of motion	Submit assignments by the deadline, and able to solve not only basic problems but also applied problems on midterm and/or final exams correctly.	Can explain Newton's laws of motion and describe the motion of an object given initial conditions using Newton's laws of	Can not explain Newton's laws of motion. Can not describe the motion of an object given initial conditions using Newton's laws of motion
Explain static and dynamic frictional forces and able to use both in different situations	Submit assignments by the deadline, and able to solve not only basic problems but also applied problems on midterm and/or final exams correctly.	Explain static and dynamic frictional forces and able to use both in different situations	Can not explain static and dynamic frictional forces, and can not use both in different situations
Able to derive mechanical energy in various situations and derive the motion of an object using the law of conservation of mechanical energy	Submit assignments by the deadline, and able to solve not only basic problems but also applied problems on midterm and/or final exams correctly.	Able to derive mechanical energy in various situations and derive the motion of an object using the law of conservation of mechanical energy	Can not derive mechanical energy in various situations and can not derive the motion of an object using the law of conservation of mechanical energy.

Relationship with Learning Outcomes
G(1) Wide knowledge on Science and Engineering and practical ability to apply them to solve problems in the society.
Please change
Please change

Teaching Method

Outline:	Students will study basic concepts and principles of mechanics in physics. Students are expected to develop an appreciation of the fundamental laws and principles and their applications to solve typical problems. The followings are covered: significant figures, vectors, scalars, trigonometric functions, effective/ineffective solutions, kinematics, forces, Newton's laws of motion, friction, kinetic energy, potential energy, and conservation law.
Class Format:	Lecture and exercise
Please Note :	All materials will be posted on the Google classroom. The student is requested to keep photo copies or files of all submitted material to ensure further study by oneself.

Course Plan

Semester 1	Contents and Method of Course	Goals	Related MCC
1st week	Guidance: Knowledge of mathematics to be acquired in order to study physics	Have the mathematical knowledge necessary to solve physics solution, i.e., significant figures, scalar and vectors, trigonometric functions used in physics, SI units.	
2nd week	Motions of the objects: position, velocity and acceleration in one and two dimentional systems	Explain the concepts of velocity and acceleration. Calculate average velocity, average acceleration, the relative velocity between two objects and resultant velocity in linear and planar motions. Calculate the position and velocity of object in relation to time using the formulae of linear motion with constant acceleration. Understand and interpret the motion of point masses on a plane surface as a change of position vector.	Ⅱ-A 1 1 Ⅱ-A 1 2 Ⅱ-A 1 3 Ⅱ-A 1 4 Ⅱ-A 1 5
3rd week	Motion of a falling object	Calculate the position and velocity of an object at a given time in free fall,vertical projectile motion, horizontal and oblique projectile motions.	Ⅱ-A 1 7 Ⅱ-A 1 8 Ⅱ-B 1 1 Ⅱ-B 1 3 Ⅱ-B 1 4 Ⅱ-B 1 5
4th week	Various types of forces: gravitational force, drag force, tension and frictional forces.	Show forces acting on objects using diagrams, free-body diagrams. Calculate and interpret the composition and decomposition of forces. Solve problems relating to equilibrium of forces acting on point masses. Explain gravitational force, drag force, tension and frictional forces. Calculate elastic force using Hooke's law.	Ⅱ-A 1 9 Ⅱ-A 1 10 Ⅱ-A 1 11 Ⅱ-A 1 12 Ⅱ-A 1 13
5th week	Newton's laws of motion	Explain three Newton's laws of motion, i.e., the law of inertia, the law of motion and the law of action and reaction forces. Can show example applications of these laws. Perform calculations using Newton's equation of motion.	Ⅱ-A 1 14 Ⅱ-A 1 15 Ⅱ-A 1 16 Ⅱ-A 1 17
6th week	Frictional forces: static frictional force and kinetic frictional force	Explain the equilibrium of forces when static frictional forces are present. Perform calculations relating to maximum frictional forces and kinetic frictional forces.	Ⅱ-A 1 19 Ⅱ-A 1 20 Ⅱ-A 1 21
7th week	Perform calculations using Newton's equation of motion	Mock examination	
8th week	Wrap-up of 1st half of semester (Review)	Review and summarize learning	
9th week	Midterm examination	For week 1-8	
10th week	Return midterm exam papers and give feedback	Return midterm exam papers and give feedback	
11th week	Work and power	Perform calculations relating to work and power	Ⅱ-A 1 22
12th week	Kinetic energy	Perform calculations relating to kinetic energy of objects	Ⅱ-A 1 23
13th week	Potential energy	Perform calculations relating to gravitation potential energy and elastic potential energy	Ⅱ-A 1 24 Ⅱ-A 1 25
14th week	Mechanical energy and law of mechanical energy conservation	Use the law of conservation of mechanical energy for the calculation of various physical quantities	Ⅱ-A 1 26
15th week	Work by conservative force and non-conservative force	Change in mechanical energy with non-conservative forces	
16th week	Physics experiments	Experiments of the field related to mechanics	
17th week	Perform calculations using law of mechanical energy conservation.	Mock examination	
18th week	Wrap-up of 2nd half of semester (Review)	Review and summarize learning	
19th week	Final examination	For week 11-18	
20th week	Return exam papers and feedback	Return exam papers and feedback	

Do not

	Examination	Presentation	Mutual Evaluations between students	Behavior
Basic Ability	60	0	0	0
Technical Ability	0	0	0	0
Interdisciplinary Ability	0	0	0	0