

Standard Institutionally Developed College: N/A

EDGE Compatible: No

Pre-requisites

ENGL 1101 - Composition and Rhetoric (201003)
MATH 1112 - College Trigonometry (201003)
MATH 1113 - Precalculus (201003)

Co-requisites

PHYS 1111L - Introductory Physics Lab I (201203)
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Course Description

The first course of two algebra and trigonometry based courses in the physics sequence. Topics include material from mechanics (kinematics, dynamics, work and energy, momentum and collisions, rotational motion, static equilibrium, elasticity theory, and simple harmonic motion), mechanical waves, theory of heat and heat transfer, and thermodynamics.

Course Length

	Minutes	Contact Unit
Lecture:	2250	
Lab 2:	0	
Lab 3:	0	
Practicum/Internship:	0	
Clinical:	0	
Total:	2250	3
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Semester Credit Hours:		3

Competencies

Order	Description	Lecture	Lab2	Lab3	Practicum/Internship	Clinical	Total Minutes	Semester Credit Hrs
1	Measurements and Systems of Units	150	0	0	0	0	150	0
2	Newton's Laws	200	0	0	0	0	200	0
3	Work, Energy, and Power	200	0	0	0	0	200	0
4	Momentum and Collisions	150	0	0	0	0	150	0
5	One- and Two-Dimensional Motion	250	0	0	0	0	250	0
6	Circular Motion and Law of Gravity	150	0	0	0	0	150	0

Order	Description	Lecture	Lab2	Lab3	Practicum/ Internship	Clinical	Total Minutes	Semester Credit Hrs
7	Rotational Dynamics and Static Equilibrium	250	0	0	0	0	250	0
8	Elasticity Theory	100	0	0	0	0	100	0
9	Harmonic Motion	150	0	0	0	0	150	0
10	Theory of Heat and Heat Transfer	200	0	0	0	0	200	0
11	Thermodynamics	150	0	0	0	0	150	0
12	Wave Motion	150	0	0	0	0	150	0
13	Sound	150	0	0	0	0	150	0
Totals for Course PHYS 1111 - Introductory Physics I (version 201003):		2250	0	0	0	0	2250	3

Learning Outcomes

Measurements and Systems of Units

Order	Description	Learning Domain	Level of Learning
1	Express and manipulate numbers in scientific notation.	Cognitive	Synthesis
2	Explain the various unit systems and conversion of units.	Cognitive	Comprehension
3	Explain dimensional analysis.	Cognitive	Comprehension
4	Explain significant figures and uncertainties.	Cognitive	Comprehension
5	Explain the difference between vector and scalar quantities, and the properties of vectors.	Cognitive	Comprehension
6	Perform vector addition and subtraction.	Cognitive	Synthesis
7	Understand and use coordinate systems.	Cognitive	Comprehension
8	Understand and apply basic trigonometry.	Cognitive	Comprehension

Newton's Laws

Order	Description	Learning Domain	Level of Learning
1	State Newton's laws of motion.	Cognitive	Knowledge
2	Calculate the gravitational attraction between two bodies.	Cognitive	Application
3	Distinguish between force and mass and define the units of each.	Cognitive	Analysis
4	Define static and kinetic frictional forces.	Cognitive	Knowledge
5	Solve dynamics problems involving constant forces.	Cognitive	Application

Work, Energy, and Power

Order	Description	Learning Domain	Level of Learning
1	Define work, potential energy, kinetic energy and power, and identify the units of each.	Cognitive	Knowledge

Order	Description	Learning Domain	Level of Learning
2	State and apply the law of conservation of energy.	Cognitive	Knowledge
3	Compute the work done by both constant and varying forces.	Cognitive	Application
4	Use the work-energy theorem in solving problems.	Cognitive	Application
5	Compute the translational kinetic energy of a body.	Cognitive	Application
6	Compute the elastic potential energy stored in a spring.	Cognitive	Application
7	Compute the gravitational potential energy of an object.	Cognitive	Application
8	Compute the power given appropriate parameters.	Cognitive	Application

Momentum and Collisions

Order	Description	Learning Domain	Level of Learning
1	Define momentum and identify its units.	Cognitive	Knowledge
2	Define impulse and identify its units.	Cognitive	Knowledge
3	State the law of conservation of momentum.	Cognitive	Knowledge
4	Solve elastic and inelastic collision problems.	Cognitive	Application

One- and Two-Dimensional Motion

Order	Description	Learning Domain	Level of Learning
1	Define displacement and identify its units.	Cognitive	Knowledge
2	Define both velocity and speed, and identify their respective units.	Cognitive	Knowledge
3	Define acceleration, and identify its units.	Cognitive	Knowledge
4	Solve problems involving uniformly accelerated motion and free falling objects.	Cognitive	Application

Circular Motion and Law of Gravity

Order	Description	Learning Domain	Level of Learning
1	Define angular displacement, angular velocity, and angular acceleration, and identify their respective units.	Cognitive	Knowledge
2	Solve problems involving circular motion.	Cognitive	Application
3	Define and calculate centripetal force and centripetal acceleration.	Cognitive	Knowledge
4	Understand and calculate the gravitational attraction between two bodies.	Cognitive	Comprehension

Rotational Dynamics and Static Equilibrium

Order	Description	Learning Domain	Level of Learning
1	Define torque and identify its units.	Cognitive	Knowledge
2	Compute the torque generated by a force about an axis.	Cognitive	Application
3	Determine the moment of inertia of a rigid body about a given axis.	Cognitive	Application
4	State the conditions of mechanical equilibrium.	Cognitive	Knowledge

Order	Description	Learning Domain	Level of Learning
5	Solve problems involving systems in the state of mechanical equilibrium.	Cognitive	Application
6	State the law of conservation of angular momentum.	Cognitive	Knowledge
7	Solve problems with conservation of angular momentum.	Cognitive	Application

Elasticity Theory

No Learning Outcomes entered for this Course Competency.

Harmonic Motion

Order	Description	Learning Domain	Level of Learning
1	Define stress and identify its units.	Cognitive	Knowledge
2	Calculate stress.	Cognitive	Application
3	Define strain and identify its units.	Cognitive	Knowledge
4	Calculate the moduli of elasticity.	Cognitive	Application
5	Solve problems involving simple harmonic motion.	Cognitive	Application

Theory of Heat and Heat Transfer

Order	Description	Learning Domain	Level of Learning
1	Explain the difference between the terms heat energy and internal energy.	Cognitive	Comprehension
2	Identify the units of heat energy.	Cognitive	Knowledge
3	Explain Explain the concepts of specific heat capacity, heat of fusion, and heat of vaporization.	Cognitive	Comprehension
4	Solve calorimetry problems.	Cognitive	Application
5	Solve problems on thermal expansion with the expansion coefficients.	Cognitive	Application
6	Explain the three basic avenues of heat transfer.	Cognitive	Comprehension

Thermodynamics

Order	Description	Learning Domain	Level of Learning
1	Explain the concept of a state variable.	Cognitive	Comprehension
2	Solve problems using the first law of thermodynamics.	Cognitive	Application
3	Explain the four basic thermodynamic processes and the concept of a cyclic thermodynamic process.	Cognitive	Comprehension
4	Demonstrate the use of P-V diagrams.	Cognitive	Application
5	Understand the operation of heat engines and the definition of thermal efficiency.	Cognitive	Comprehension
6	Determine the efficiency of a heat engine.	Cognitive	Application
7	Explain the second law of thermodynamics.	Cognitive	Comprehension

Wave Motion

Order	Description	Learning Domain	Level of Learning
1	Define the terms used to describe the properties of waves.	Cognitive	Knowledge
2	Explain wave reflection and the principle of superposition.	Cognitive	Comprehension
3	Explain standing waves.	Cognitive	Comprehension
4	Compute wavelength, frequency, and speed of various types of waves.	Cognitive	Application
5	Explain the difference between transverse and longitudinal waves.	Cognitive	Comprehension
6	Explain the relationship between amplitude, energy, intensity, and power associated with a mechanical wave.	Cognitive	Comprehension

Sound

Order	Description	Learning Domain	Level of Learning
1	Explain the nature of sound as a compressional wave.	Cognitive	Comprehension
2	Compute the speed of sound given appropriate data.	Cognitive	Application
3	Explain the concepts of intensity and intensity level.	Cognitive	Comprehension
4	Explain the phenomenon of beats and beat frequency.	Cognitive	Comprehension
5	Compute the resonant frequency of a system given appropriate data.	Cognitive	Application
6	Explain the Doppler effect and compute frequency shift given appropriate data.	Cognitive	Comprehension

References

Order	Reference Type	Description
1	Book with Author(s) Listed	Giambattista, A., & et al.. (2010). College physics with an integrated approach to forces and kinematics. (3rd). New York, NY: McGraw Hill.
2	Book with Author(s) Listed	Christian, W. & Belloni, M.. (2004). Physlet physics-interactive illustrations, explorations, and problems for introductory physics.. (1st). Upper Saddle River, NJ: Pearson / Prentice Hall.
3	Book with Author(s) Listed	Cutnell, J. & Johnson, K.. (2006). Physics. (7th). New York, NY: John Wiley & Sons.
4	Book with Author(s) Listed	Giancoli, D.. (2004). Physics, principles and applications. (6th). Upper Saddle River, NJ: Pearson Prentice Hall.
5	Book with Author(s) Listed	O'Kuma, T. & et al.. (2004). Ranking task exercises in physics. (Student Edition). Upper Saddle River, NJ: Pearson / Prentice Hall.
6	Book with Author(s) Listed	Serway, R. & Faughn, J. & Vuille, C.. (2009). College physics. (8th). Belmont, CA: Brooks / Cole.
7	Book with Author(s) Listed	Wilson, J. & et al.. (2009). College physics with mastering physics. (7th). ? : Pearson / Addison Wesley.
8	Professional Web Site	

Order	Reference Type	Description
		North Carolina State University: Advanced Instructional Systems, Inc.. (1997-on going). WebAssign: A web-based assessment system providing homework and test delivery, collection, grading, and recording services. Retrieved ?, from http://webassign.net