

# INSTITUTE FOR SCIENCE AND MATHEMATICS

Physics: *Matter, Energy, Force and Laws of Motion*

Instructor: Dr. M.E. Donaldson, Ph.D.

## Syllabus

### UNIT 1 (0.25 HS Credits)

#### **Kinematics**

kinematics in one-dimension, vectors: vector components and resultants, kinematics in two-dimensions: projectile motion

#### **Dynamics**

Forces, types, and representation, free-body diagrams, Newton's Laws

### UNIT 3 (0.25 HS Credits)

#### **Simple Harmonic Motion**

basics, simple pendulum, mass-spring systems

#### **Rotational Motion**

torque, center of mass, rotational kinematics, rotational dynamics and rotational inertia, rotational energy, angular momentum, conservation of angular momentum

#### **Mechanical Waves**

wave characteristics, superposition, standing waves

### UNIT 2 (0.25 HS Credits)

#### **Circular Motion And Gravitation**

uniform circular motion, dynamics of uniform circular motion, universal law of gravitation

#### **Energy**

work, power, kinetic energy, potential energy: gravitational and elastic, conservation of energy

#### **Momentum**

impulse, momentum, conservation of momentum, elastic and inelastic collisions

### UNIT 4 (0.25 HS Credits)

#### **Electrostatics**

electric charge and conservation of charge, electric force: coulomb's law

#### **Dc Circuits**

electric resistance, ohm's law, series and parallel connections, Kirchhoff's laws

### **Assignments and grading**

Unit homework and problem sets	30% of overall grade
Lab exercises and assignments	30% of overall grade
Unit quizzes and unit final exams	30% of overall grade

### **Grading scale:**

Letter grade:	A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
Percentage	97-	93-	90-	87-	83-	80-	77-	73-	70-	67-	63-	60-	0-
	100	96	92	89	86	82	79	76	72	69	66	62	59

### **Texts (options):**

Holt Physics Student Edition; Houghton Mifflin Harcourt Physics; ISBN 9780030368165  
High School Physics, CK-12 Foundation, [www.ck-12.org](http://www.ck-12.org)