

**HIBBING COMMUNITY COLLEGE
COURSE OUTLINE**

COURSE NUMBER & TITLE: PHYS 1010 - Introduction to Physics 1

CREDITS: 4 (3 Lec / 1 Lab)

PREREQUISITES: MATH 1020: Advanced Algebra or Instructor consent

CATALOG DESCRIPTION:

This course addresses that part of physics dealing with motion, rotation, mechanical energy, sound, and waves. Computer simulations and lab investigations are emphasized. Laboratory is included. MNTC goal area: (3)Natural Science.

OUTLINE OF MAJOR CONTENT AREAS:

- I. Units and problem solving
 - A. Why and how we measure
 - B. Units for length, mass, and time
 - C. More about the metric system
 - D. Dimensional analysis
 - E. Unit conversions
 - F. Significant figures
 - G. Problem solving
- II. Kinematics: description of motion
 - A. Change of position: distance and displacement
 - B. Speed and velocity
 - C. Acceleration
 - D. Kinematic equations
 - E. Free fall
- III. Motion in two dimensions
 - A. Components of motion
 - B. Vector addition and subtraction
 - C. Relative velocity
 - D. Projectile motion
- IV. Force and motion
 - A. Force and net force
 - B. Inertia and Newton's First Law of Motion
 - C. Newton's Second Law of Motion
 - D. Applications of Newton's Second Law
 - E. Newton's Third Law of Motion
 - F. Friction
- V. Work and energy
 - A. Work done by a constant force

- B. Work done by a variable force
 - C. Work-energy theorem: kinetic energy
 - D. Potential energy
 - E. The conservation of energy
 - F. Power
- VI. Momentum and collisions
- A. Linear momentum
 - B. Conservation of linear momentum
 - C. Impulse
 - D. Elastic and inelastic collisions
 - E. Center of mass
 - F. Jet propulsion and rockets
- VII. Circular motion and gravitation
- A. Angular measure
 - B. Angular speed and velocity
 - C. Uniform circular motion and centripetal acceleration
 - D. Angular acceleration
 - E. Newton's law of gravitation
 - F. Kepler's law and earth satellites
- VIII. Rotational motion and equilibrium
- A. Rigid bodies, translations, and rotations
 - B. Torque, equilibrium, and stability
 - C. Rotational dynamics
 - D. Rotational work and kinetic energy
 - E. Angular momentum
- IX. Solids and fluids
- A. Solids and elastic moduli
 - B. Fluids: pressure and Pascal's principle
 - C. Buoyancy and Archimedes' principle
 - D. Surface tension and capillary action
 - E. Fluid dynamics and Bernoulli's equation
- XIII. Vibrations and waves
- A. Simple harmonic motion
 - B. Equations of motion
 - C. Wave motion
 - D. Wave phenomena
 - E. Standing waves and resonance
- XIV. Sound
- A. Sound waves
 - B. The speed of sound
 - C. Sound intensity
 - D. Sound phenomena
 - E. The Doppler effect
 - F. Musical instruments and sound characteristics

COURSE GOALS/OBJECTIVES/OUTCOMES:

The student will

1. perform dimensional analysis.
2. perform all vector computations covered.
3. use kinematic equations to solve motion problems.
4. utilize Free Body Diagrams and Mass Accelerations Diagrams to solve dynamics kinetics problems.
5. use conservation of mechanical energy to analyze systems.
6. use the principle of conservation of momentum to analyze impacts and collision.
7. perform rotational mechanics analysis.
8. use the equations of fluid mechanics to analyze static and dynamic fluid systems.
9. perform oscillatory motion analysis.
10. use wave equations to analyze mechanical waves.
11. analyze sound wave phenomenon.
12. perform assigned laboratories in a team environment.
13. communicate all written work in a professional manner utilizing spreadsheets and word processing applications.

MNTC COMPETENCIES MET:

Natural Sciences

HCC COMPETENCIES MET:

Thinking Creatively & Critically

STUDENT CONTRIBUTIONS:

The student will attend class regularly, participate in class discussion, complete assignments, team laboratory or design projects, and take a comprehensive final examination. The student will spend sufficient time to complete all assignments.

METHODS FOR EVALUATING STUDENT LEARNING:

The final grade is determined by grades earned on homework problems, periodic examinations, laboratory reports, and a final exam.

SPECIAL INFORMATION: (SPECIAL FEES, DIRECTIVES ON HAZARDOUS MATERIALS, TEXTBOOK USED, ETC.)

A scientific calculator with exponential and logarithmic capabilities is required for this course.

AASC APPROVAL DATE: November 6, 2007

REVIEW DATE: November 2012
