Date Board Approved:
(Prior to Fall 2003)

Date Prepared/Revised: 08/24/05

This is an important document. Keep it! In the future, it could save you TIME AND MONEY!

Iowa Central Community College
Science Department

Iowa Central Community College

Course Syllabus

Course Name: College Physics I (General Physics 1)
Course Number: PHY-162 (PHY-157)

Class Location and Time:
Room: SC-302 Day: MTWRF Time: 8:00 am-9:00am
Room: Day: Time:

Course Start Date: 9/1/2010 Course End Date: 12/15/2010

Instructor: Carl Gross	Office Location: SC-301A
E-mail Address: gross_c@iowacentral.edu	Office Hours:
Phone: (515) 574-1227, x or 800 362-2793, x 1227	Days: MWF Times: 9:10 am-10:10 am Days: TR Times: 12:10 pm – 1:10 pm Days: Times:

Final Exam: Day: Wednesday Date: 12/15/2008 Time: 8:00-9:30 am

Departmental Assistance: For help with course selection, class registration, transfer information, and other academic assistance, please contact the department associate, Jenny Williamson, in Science 110H, at (515) 576-7201, ext. 2503 or 1-800-362-2793, ext. 2507, or by e-mail: williamson@triton.iccc.cc.ia.us

1. Total Semester Hour Credit: 4

2. Total Contact Hours per Semester: Lecture: 54 Lab: 36 Clinical:

3. Catalog Description:
   This course provides a general background for those who do not plan advanced study in physics or engineering. Topics covered include elementary mechanics, including kinematics and dynamics of particles; work and energy; linear and angular momentum; rotational motion; oscillations; waves and gravitation. This course satisfies a general education requirement in the Math/Science area.
   Prerequisite: MAT-130 Trigonometry or equivalent

4. Prerequisites and/or Co-requisites:
   MAT-130 Trigonometry or equivalent

5. Textbook Required:
   - Knight, Jones, Field. *College Physics*, 2nd edition. Prentice-Hall, 2007. ISBN 9780321595492

6. Supplemental Materials Required:
   - Calculator with trigonometric functions – minimum
     - Programmable graphing calculator (Ti-86 or higher) – recommended
   - Laboratory notebook – any notebook with non-removable pages
   - USB flash drive

7. College Procedures:

- **Children in the Classroom:**
  - Students are not allowed to bring children into the classrooms, labs, shops, or hallways during class times.
- **Electronic Devices in the Classroom:**
  - Cell phones, pagers, timers and similar devices are not to be operational during classroom, lab, and clinical times.
- **Inclement Weather Statement:**
  - The final decision to attend college classes can only be made by the individual based on their specific extenuating circumstances that may make it hazardous for them to travel.

8. Additional Course Information:

- Attendance
  - Attendance is required for success. Please be sure to attend class regularly. Refer to your student handbook for college attendance policy.
- Late Work
  - Is ***NOT*** accepted unless arrangements are made with the instructor **prior to the due date**.
- Make-up Work
  - Arrangements must be made with the instructor **prior to due date** if possible.
    - At minimum a phone call, e-mail, or Facebook message must be received by the end of the day to be eligible for make-up work.
  - When available, make-up work will likely be different from in-class versions.
  - Make-up work will be evaluated on a case-by-case basis.
  - Missed presentations can't be made up unless arrangements are made **at the time the presentation is assigned**.

9.*Grading Policy*:

Letter Grade Minimum Percent	
A	>90
B	>80
C	>70
D	>60
F	<60

Grade Weighting	
Homework	30
Quiz	20
Lab Work	20
Midterm	15
Final	15

10. Course (Student) Outcomes:
    - The student will have a basic understanding of important physics principles outlined below.

11. Unit (Competencies) Outcomes:

Outcome 1: Understand the SI system of measurement, error analysis and the use of vectors.

- Task 1: Determine whether or not an equation is dimensionally correct, convert from one SI unit to another unit for the same quantity and apply appropriate SI prefixes that indicate multiples of base units.
- Task 2: Apply the rules of significant figures and represent an answer with the correct number of significant figures.
- Task 3: Define a vector quantity and a scalar quantity, give examples for each, and solve vector problems using geometric constructions and arithmetically by either plane trigonometry or component addition.
- Task 4: Quantify and minimize sources of random uncertainty so that the precision of measurements can be enhanced, and compensate for systematic error in measurements so that accuracy can be improved.

Outcome 2: Understand and apply the laws of motion in one, two, and three dimensions.

- Task 1: Define, give formulas and solve problems involving time, displacement, average velocity, and average acceleration in both one, two, and three dimensions.
- Task 2: Apply one of the general kinematic equations for uniformly accelerated motion to solve for one of the five parameters: initial velocity, final velocity, acceleration, time, and displacement.
- Task 3: Plot graphs of displacement vs. time, velocity vs. time, and acceleration vs. time. Use any graph to determine the shape of the other two graphs and be able to determine instantaneous velocity, average velocity, instantaneous acceleration, average acceleration, and displacement from graphs. Recognize how graphs can be used to describe changes in position, velocity, and acceleration of an object moving along a straight line.
- Task 4: Solve acceleration problems involving free-falling bodies in a gravitational field.
- Task 5: Determine the position, velocity, range, maximum height, and time of flight of a projectile when its initial velocity, position and of projection are given.
- Task 6: Determine the velocity, acceleration, and period of revolution of a particle moving in a circle.

Outcome 3: Understand the relationship between the forces applied to an object and the motion that results.

- Task 1: Identify the force pairs acting in a system.
- Task 2: Describe the properties of friction and explain why the coefficient of static friction is greater than the coefficient of kinetic friction.
- Task 3: Draw a free-body diagram for objects in motion with constant acceleration, and solve friction and frictionless problems for any of the

following: force (or force component forces), mass, acceleration, tension, coefficients of friction, or inclined plane angles.

Outcome 4: Understand the concepts of work and energy, energy conservation and energy and work relationship.

- Task 1: Calculate the work done by constant and variable forces. Graph force vs. displacement, and determine amount of work and the force constant from the graph.
- Task 2: Solve problems involving the concept of kinetic energy and its relationship to the *net* work done on a point mass as embodied in the *work-energy theorem*.
- Task 3: Discuss and solve problems concerning the principle of conservation of mechanical energy and the relationship between the performance of work and the corresponding change in kinetic energy.
- Task 4: Determine the power of a system and understand its relationship to time, force, distance, and velocity.
- Task 5: Relate conservation and non-conservative forces to the net work done by a force when an object moves in a closed loop.

Outcome 5: Understand the concepts related to systems of particles and collisions. The concepts will include center of mass, impulse, linear momentum, and elastic and inelastic collisions.

- Task 1: Find the Center of Mass of a system of particles and of a continuous object.
- Task 2: State the impulse-momentum theorem. Determine impulse, average constant force, time of contact by the force and final speed of an object given the appropriate conditions.
- Task 3: Evaluate the linear momentum of a system of particles. In a system involving two objects where linear momentum is conserved, calculate the velocity or mass of either object if pertinent masses and velocities are given. Consider both elastic and inelastic collisions; and when only one body is initially moving or when both bodies are initially moving.
- Task 4: State the law of conservation of momentum and apply it to the solution of physical problems.

Outcome 6: Understand and apply the laws of motion relating to circular and rotational motion.

- Task 1: Solve problems requiring the knowledge of centripetal force including banking angles, the conical pendulum, and motion in a vertical circle.
- Task 2: Define angular displacement, angular velocity, and angular acceleration, and apply these concepts to the solution of physical problems.
- Task 3: Draw analogies relating rotational-motion parameters (ϑ, ω, α) to linear-motion parameters (d, v, a), and solve angular acceleration problems.
- Task 4: Define the moment of inertia of a body and describe how this quantity and the angular speed can be used to calculate rotational kinetic energy.
- Task 5: Apply the concepts of Newton's second law, rotational work, rotational power, and angular momentum to the solution of physical problems.

Task 6: Compute the torque produced by a given force and the angular momentum about any center of a particle or system of particles.

Task 7: Solve problems using the Law of Conservation of Angular Momentum.

Outcome 7: Understand the concepts related to oscillations and simple harmonic motion.

Task 1: Provided a graph or verbal description of simple harmonic motion, determine the frequency, period and amplitude.

Task 2: Compute the frequency, angular frequency, displacement, phase difference, or period in simple harmonic motion when given the appropriate conditions.

Task 3: Write and apply a relationship between the frequency of motion and the mass of a vibrating object when the spring constant is known.