ILLINOIS VALLEY COMMUNITY COLLEGE

Course Outline

DIVISION: Natural Sciences Business

Course: PHY 1001 - General Physics I
(Mechanics-Engineering)

Date: 8/30/2013

Semester Hours: 5.0

Prerequisite(s): Grade of C or better in Math 2001

Delivery Method:

☒	**Lecture**	**3 Contact Hours (1 contact = 1 credit hour)**
☒	**Seminar**	**1 Contact Hours (1 contact = 1 credit hour)**
☒	**Lab**	**2 Contact Hours (2 contact = 1 credit hour)**
☐	**Clinical**	**0 Contact Hours (3 contact = 1 credit hour)**
☐	**Online**	
☐	**Blended**	

Offered: ☐ **Fall** ☒ **Spring** ☐ **Summer**

IAI Equivalent –***Only for Transfer Courses***-go to *http://www.itransfer.org*:

CATALOG DESCRIPTION:
This course is for students majoring in chemistry, engineering, physics and mathematics. This course includes motion, forces, work and energy, circular and Fluid mechanics

GENERAL EDUCATION GOALS ADDRESSED

Upon completion of the course, the student will be able:

☒ To apply analytical and problem solving skills to personal, social and professional issues and situations.
☐ To communicate orally and in writing, socially and interpersonally.
☐ To develop an awareness of the contributions made to civilization by the diverse cultures of the world.
☒ To understand and use contemporary technology effectively and to understand its impact on the individual and society.
☒ To work and study effectively both individually and in collaboration with others.
☐ To understand what it means to act ethically and responsibly as an individual in one's career and as a member of society.
☐ To develop and maintain a healthy lifestyle physically, mentally, and spiritually.
☐ To appreciate the ongoing values of learning, self-improvement, and career planning.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

Outcome 1 *– Students will be able to demonstrate an understanding of unit analysis, vector and scalar addition.*

Competency 1.1 Students will be able to know the basic units of length, mass and time used in the SI, CGS, and English system of units, as well as the derived units based on these which are commonly used in the description of mechanics.

Competency 1.2 Students will be able to know and apply all of the common prefixes used in the SI system and their appropriate symbols.

Competency 1.3 Students will be able to define displacement, velocity and acceleration and solve problems involving uniformly accelerated motion, including problems involving free fall motion and motion in a plane.

Competency 1.4 Students will be able derive kinematic equations using calculus

Competency 1.5 Students will be able to define the terms vector and scalar and give examples of each.

Competency 1.6 Students will be able to resolve vectors into components as well as add, subtract, and multiply vector quantities

Outcome 2 *– Students will be able to demonstrate and apply their knowledge of Newton's laws of motion.*

Competency 2.1 Students will know Newton's laws of motion and apply them to problems involving the equilibrium of particles and rigid bodies.

Competency 2.2 Students will be able to apply Newton's laws of motion to problems including the motion of particles and rigid bodies.

Competency 2.3 Students will be able to describe and determine frictional forces and solve problems involving frictional forces.

Competency 2.4 Students will be able to distinguish between mass and weight, and correctly use each while solving static and dynamic problems.

Outcome 3 – Students will be able to demonstrate a basic understanding of the conservation laws related to mechanics and dynamics.

Competency 3.1 Students will be able to define the concepts of work, kinetic energy, potential energy, mechanical energy, and power to solve problems involving these concepts

Competency 3.2 Students will be able to define the concepts of linear and angular momentum and impulse and solve problems based on these concepts especially collision problems.

Competency 3.3 Students will be able to know and apply the conservation laws of momentum and energy to the solution of problems related to these topics.

Outcome 4 – Students will be able to demonstrate a basic understanding of rotational dynamics, periodic motion and the universal law of gravitation.

Competency 4.1 Students will be able to define angular displacement, angular velocity, and angular acceleration and solve angular motion problems.

Competency 4.2 Students will be able to define and determine the center of gravity of a body or a system of bodies.

Competency 4.3 Students will be able to define torque and apply the concept of torques to the solution of problems involving equilibrium and accelerated motion.

Competency 4.4 Students will be able to describe Newton's universal law of gravitation and solve problems based on energy, force, torque and momentum related to gravitation.

Outcome 5 – Students will be able to demonstrate a basic understanding of the properties and dynamics associated with liquid and solid materials.

Competency 5.1 Students will be able to define the concepts of stresses, strains, and modulus and solve problems based on these concepts, especially problems involving Young's modulus.

Competency 5.2 Students will be able to solve problems involving fluid statics, including problems using the following concepts: pressure, density, buoyancy, and displacement.

Competency 5.3 Students will be able to describe and solve problems involving fluid dynamics using Bernoulli's principles.

COURSE TOPICS AND CONTENT REQUIREMENTS:

1 .Physics and Measurement

2. Motion in one dimension

3. Vectors

4. Motion in a plane

5. Newton's laws of motion and its Applications

6. Circular Motion

7. Work, Kinetic Energy, and Power

8. Potential Energy and Conservation of Energy

9. Linear momentum , Impulse and collisions

10. Rotational kinematics and dynamics

11. Angular Momentum

12. Static Equilibrium and Elasticity

13. Universal Gravitation

14. Fluid Mechanics

INSTRUCTIONAL METHODS:

1. Lectures and interactive lecture demonstration (ILDs), Activity-based physics and other audio-visual aids and technologies.

2. Homework assignments and related class discussion sessions.

3. Micro – computer based laboratory exercises.

4. Modeling and guided practice of a variety of physics problems.

INSTRUCTIONAL MATERIALS:

Physics for scientist and engineers, a strategic approach, with modern physics (and student work book, with masteringphysics), 3rd edition. Randall D. Knight

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

Reading of textbook, note taking, and participation in classroom discussions as well as performing laboratory experiments are required of the students. Students are assigned approximately 15 homework problems per Chapter. Solutions of graded problems are discussed after grading if and when necessary.
Evaluation of the students will include written problem class tests and one problem-orientated comprehensive final exam, written reports of laboratory experiments, quizzes and homework assignments

OTHER REFERENCES

University Physics with Modern Physics with Mastering Physics, 13/E
Hugh D. Young, Roger A. Freedman,

Classical Dynamics of particles and systems, Thornton and Marion, 2004, Brooks/Cole

The Mechanical Universe and Beyond the Mechanical Universe

Physics Demonstration series, by Physics Curriculum and Instruction, 2001

Course Competency/Assessment Methods Matrix

Course Prefix, Number and Name	Assessment Options																																				
For each competency/outcome place an "X" below the method of assessment to be used.	**Assessment of Student Learning**	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations	Pre-Post Tests	Quizzes	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Assignment
Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.	**Direct/ Indirect**	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D	I	D	I	I	I	I	I	I	I	I	I
Outcome 1					X			X	X			X	X		X													X				X					
Outcome 2					X			X	X			X	X		X													X				X					
Outcome 3					X			X	X			X	X		X													X				X					
Outcome 4					X			X	X			X	X		X													X				X					
Outcome 5					X			X	X			X	X		X													X				X					