ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Natural Sciences Business

COURSE: Phy 2003

Date: 8/28/2013

Credit Hours: 5.0

Prerequisite(s): Grade of C or better in MTH1005 or equivalent courses or registration in MTH 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 in the arts and sciences (not for chemistry, engineering and physics majors). This course includes the basic concepts of force and motion, energy and momentum, properties of matter, heat and thermodynamics, wave motion and sound

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:

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

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

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 to define the terms vector and scalar and 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 force and Newton's laws of motion.*

Competency 2.1 Students will be able to explain Newton's three laws of motion and solve problems utilizing these laws.

Competency 2.2 Students will be able to distinguish between mass and weight of an object. They will be able to apply Newton's laws of motion to linear motion, projectile motion and circular motion problems.

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 define Newton's Law of Universal Gravitation and solve problems utilizing it.

Outcome 3 – Students will be able to demonstrate an understanding of work, energy, momentum and center of mass.

Competency 3.1 Students will be able to explain or define the following terms: work, power, kinetic energy, potential energy, simple machine, linear momentum and Impulse. Also, be able to solve problems applying these concepts.

Competency 3.2 Students will be able to explain the laws of conservation of energy and linear momentum and apply these laws to the solve problems, including elastic and inelastic collision problems.

Competency 3.3 Students will be able to calculate center of mass.

Outcome 4 – Students will be able to demonstrate an understanding of rotational kinematics, rotational dynamics and elasticity

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 explain or define the following terms moment of inertia, torque, rotational kinetic energy, angular momentum, center of gravity of a body or a system of bodies, and solve problems involving these concepts.

Competency 4.3 Students will be able to apply the concept of torque(moment) to solve problems involving static equilibrium and accelerated motion.

Competency 4.4 Define the following terms and solve problems based on them: density, specific gravity, stress, strain, and modulus.

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

Competency 5.1 Be able to solve problems involving fluid statics and fluid dynamics, including problems using the following concepts or laws: pressure, Archimedes's Principle, Viscosity, Poiseuille's Law, Bernoulli's

Equation, Torricelli's Theorem.

Outcome 6 – Students will be able to demonstrate a basic understanding of the Vibrations, waves and sound

Competency 6.1 Students will be able to describe simple harmonic motion, including the defining and/or describing, in words, of terms such as period, frequency, amplitude, and equilibrium position. Student would be able to solve periodic motion problems including problems involving a mass on the end of a vibrating spring and the simple pendulum.

Competency 6.2 Students will be able to describe in words, the motion of waves especially the phenomena of transverse waves, longitudinal waves, waves on a string or spring, and resonance. Student would be able to solve problems involving these concepts.

Competency 6.3 Students will be able to define or describe, in words, and equations, the following terms: intensity and loudness of sound, frequency and pitch of sounds, wave forms associated with sound and tone quality, beats, resonance of sound waves, especially with regard to air columns, and the Doppler effect. Be able to solve problems based on these concepts and phenomena.

Outcome 7-- Students will be able to demonstrate a basic understanding of the Temperature, kinetic theory, heat, and laws of thermodynamics.

Competency 7.1 Students will be able to use the Fahrenheit, Celsius, and Kelvin scales, and convert temperatures from one scale to another, and define the linear and volume coefficients of the thermal expansion and to solve thermal expansion problems.

Competency 7.2 Students will be able to use the ideal gas law to solve problems involving pressures, volumes, and temperatures.

Competency 7.3 Students will be able to define the calorie, BTU, specific heat capacity, heat of fusion, heat of vaporization, and solve calorimetry problems.

Competency 7.4 Students will be able to explain and describe the transfer of heat by conduction, convection, and radiation and solve heat transfer problems.

Competency 7.5 Students will be able to define relative and absolute humidity and solve problems based on these concepts.

Competency 7.6 Students will be able to explain and/or describe the first and second laws of thermodynamics and solve problems based on these, including thermal efficiency problems.

COURSE TOPICS AND CONTENT REQUIREMENTS:

1. Measurement and problem Solving
2. Motion in one dimension
3 Vectors and Motion in two dimensions
4. Forces and Motion
5. Static Equilibrium
6. Work, Energy (Kinetic and potential), and Power
7. Linear momentum and Collisions
8 Gravitation
9. Kinematics and Dynamics of Curvilinear and Rotational Motion
10. Mechanical Properties of Matter
11. Temperature, thermal expansion and kinetic theory
12. Heat and Thermodynamics
13. Vibratory Motion, Wave Motion, and Sound

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:

College Physics, a strategic approach(with mastering physics and student work book), 2nd edition. Knight, Jones and Field

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					D	D
Students will be able to demonstrate an understanding of unit analysis, vector and scalar addition and describe linear motion					X			X	X						x																X	X
Students will be able to demonstrate and apply their knowledge of force and Newton's laws of motion.					X			X	X						x																x	x
Students will be able to demonstrate an understanding of work, energy, momentum and center of mass.					X										X																X	X
Students will be able to demonstrate an understanding of rotational kinematics, rotational dynamics and elasticity					X										X																X	X
Students will be able to demonstrate a basic understanding of the properties and dynamics associated with Fluids.					X										X																X	X
Students will be able to demonstrate a basic understanding of the Vibrations, waves and sound					X										X																X	X

Students will be able to demonstrate a basic understanding of the Temperature, kinetic theory, heat, and laws of thermodynamics.					X																										X	X