ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Natural Sciences Business

COURSE: Phy 2001-General Physics II
(Wave motion, Sound, Thermodynamics and Electricity)-Engineering

Date: 9/26/2013

Credit Hours: 4.0

Prerequisite(s): At leat C in MTH 2001and PHY 1001

Delivery Method:

☒ **Lecture**	**2 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 the concepts of temperature, heat, molecular and thermal properties of matter, thermodynamics, concepts of waves and wave motion, vibrating bodies, electric fields and electric potential, DC current and circuits.

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 periodic motion, mechanical waves, sounds and hearing.*

Competency 1.1 Students will be able to describe various types of periodic motion, including those of masses attached to springs and pendulums and mathematically solve problems involving periodic motion

Competency 1.2 Students will be able to describe traveling waves in words, graphically, and mathematically. this includes being able to define relevant terms such as frequency, velocity, wavelength, etc.

Competency 1.2 Students will be able to solve problems involving wave motion and vibrating bodies, especially problems involving resonance.

Competency 1.3 Students will be able to explain the meaning of sound intensity, loudness, pitch, frequency, waveform, and tone quality, and solve problems involving intensity and beat frequency, and describe and solve problems involving the Doppler effect.

Outcome 2*– Students will be able to demonstrate an understanding of thermodynamics*

Competency 2.1 Students will be able to explain the meaning of the term temperature, and distinguish between temperature and heat, and

convert between the Celsius, kelvin, and Fahrenheit temperature scales.

Competency 2.2 Students will be able to define, explain and solve problems involving thermal expansion, thermal stress, heat capacity and changes of phase. They will also be able explain/describe the three methods by which heat is transferred and solve problems involving these methods of heat transfer.

Competency 2.3 Students will be able to describe/explain the molecular properties of matter, the kinetic theory of gases, apply the ideal gas law to solve problems involving gases.

. Competency 2.4 Students will be able to explain a thermodynamic system and know the first law of thermodynamics, as well as explain and solve problems involving thermodynamic processes using the first law.

Competency 2.5 Students will be able to know and explain the heat engines and second law of thermodynamics and solve problems involving heat engines and the second law.

Outcome 3 *– Students will be able to demonstrate an understanding of electric charge, fields and forces including the sources of the fields.*

Competency 3.1 Students will be able to explain the difference between a conductor and an insulator, and various ways how an object can receive a net charge.

Competency 3.2 Students will be able to explain and use Coulomb's Law to determine both the magnitude and direction of electric force, including using calculus.

Competency 3.3 Students will be able to explain what is meant by an electric fields and determine magnitude and direction for electric fields mathematically, including using calculus.

Outcome 4 *– Students will be able to demonstrate an understanding of electric flux, Gauss's law, electric potential and capacitance and dielectrics..*

Competency 4.1 Students will be able to define electric flux and Gauss's law and use gauss's law to solve electric field problems.

Competency 4.2 Students will be able to define electric potential and electric potential energy and solve problems involving these concepts.

Competency 4.3 Students will be able to explain what is meant by a capacitor and the term capacitance; determine the capacitance of a capacitor; combine capacitors which are in series or in parallel; and determine the energy stored in a charged capacitor.

Competency 4.4 Students will be able to explain what is meant by a dielectric and how a dielectric affects the capacitance of a capacitor and the energy stored in a capacitor.

Outcome 5 *– Students will be able to demonstrate understanding of current, resistance, electromotive force and direct-current circuits design.*

Competency 5.1 Students will be able to define the terms: current, electrical resistance, electromotive force, electric work and power, and solve problems involving these concepts, especially problems involving Ohm's Law.

Competency 5.2 Students will be able to combine resistors in series and in parallel and solve problems involving D.C. circuits by applying Kirchoff's Laws.

Competency 5.3 Students will be able to explain the principles of operation and uses of ammeters, voltmeters, ohmmeters, potentiometers, and solve problems involving these instruments.

Competency 5.4 Students will be able to solve problems involving R-C series circuits and power distribution systems.

COURSE TOPICS AND CONTENT REQUIREMENTS:

1. Oscillatory Motion

2. Wave Motion and Sound Waves

5. Temperature, and Heat

6. Thermal properties of Matter

7. First Law of Thermodynamics

8. Second Law of Thermodynamics

9. Electric Charge and Electric Field

10. Gauss' Law

11. Electric Potential and Potential Energy

12. Capacitance and Dielectrics

13. Current, Resistance, and Electromotive Force

14. Direct Current Circuits and Instruments

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 (including 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								
Students will be able to demonstrate an understanding of periodic motion, mechanical waves, sounds and hearing.					X			X	X																						X	X	
Students will be able to demonstrate an understanding of thermodynamics					X			X	X																						X	X	
Students will be able to demonstrate an understanding of electric charge, fields and forces including the sources of the fields.					X			X	X																						X	X	
Students will be able to demonstrate an understanding of electric flux, Gauss's law, electric potential and capacitance and dielectrics.					X			X	X																						X	X	
Students will be able to demonstrate understanding of current, resistance, electromotive force and direct-current circuits design.					X			X	X																						X	X	