

LAST REVIEW: 2010-11 NEXT REVIEW: 2015-16
(i.e. 2003-2004) (i.e. 2008-2009)

STATUS: A
(A, I, D)

COURSE TITLE: General Physics with Calculus I

COMMON COURSE NUMBER: PHY 2048

CREDIT HOURS: 4

CONTACT HOUR BREAKDOWN
(per 16 week term)

CLOCK HOURS:
(Voc. Course ONLY)

Lecture: **64** Lab:
Clinic: Other:

PREREQUISITE(S): MAC 2311 with a minimum grade of C

COREQUISITE(S): MAC 2312 and PHY 2048L

PRE/COREQUISITE(S):

COURSE DESCRIPTION *(750 characters, maximum):*

PHY 2048 is part one of a comprehensive course in physics outlining mechanics, heat, wave motion and sound using analysis in calculus.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s): 4B Area
General Education Requirements – Associate in Science Degree (AS), meets Area(s): 4B Area
General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s): Area

UNIT TITLES

1. Measurement and Vectors and Problem Solving
2. Mechanics
3. Oscillations and Wave Motion
4. Thermodynamics

*** Complete the following only if course is seeking general education status ***

GENERAL EDUCATION Competencies and Skills *:

In the box to the right of the Competency/Skill, enter all specific **student learning outcome** unit numbers, as indicated in the course outline (i.e. 1.1, 2.7, 4.2, 4.0 and 5.12) that apply.

Course must include <u>all</u> of the following:	
1. Read with critical comprehension**	1.2
2. Write clearly and coherently**	1.3
3. Demonstrate literacy as appropriate within a given discipline**	E: 1.1, 1.4, 2.0, 3.0, 4.0 F: 2.0, 3.0, 4.0
4. Apply problem solving skills or methods to make informed decisions in a variety of contexts**	2.0, 3.0, 4.0
Course must include at least <u>one</u> of the following:	
5. Differentiate between ethical and unethical behavior	
6. Demonstrate an understanding of the physical, biological, and social environments and how individual behaviors impact this complex system.	2.5, 2.9, 3.6, 4.2, 5.3
7. Demonstrate an understanding of and appreciation for human diversities and commonalities.	
8. Speak and listen effectively.	

*General Education Competencies and Skills endorsed by 2010-2011 General Education Task Force

****Required Competencies**

1) Read with critical comprehension.

The student will be introduced to the basic texts, concepts, vocabulary, and methods necessary for developing an understanding of the discipline and meeting the required benchmarks as stated in the course outline.

2) Write clearly and coherently.

The student will demonstrate an understanding and mastery of subject matter in a variety of ways, including writing. Writing activities may include both graded and ungraded essays, short answer quizzes, summaries, reactions, journals, and various other reports.

3) Demonstrate and apply literacy across all the disciplines (indicate which ones apply).

- a) **Information literacy** means understanding how to locate needed information, using the appropriate technology for the task, managing and evaluating the extracted information and using it effectively and ethically.
- b) **Technology literacy** is the ability to responsibly and effectively use appropriate technology to access, manage, integrate, or create information, and/or use technology to accomplish a given task.
- c) **Workplace literacy** is having the appropriate knowledge and skills to communicate and work with others effectively and perform job duties, whether it is through the use of computers and/or other technology.
- d) **Cultural literacy** is recognizing, understanding, and appreciating the similarities and differences between one's own culture and the cultures of others through a study of the arts, customs, beliefs, values, and history that define a culture.
- e) **Quantitative literacy** is having the ability to formulate, solve and interpret mathematical/statistical operations and graphical/tabular representations to make informed decisions.
- f) **Scientific literacy** means understanding the methodology and application of the scientific process, the physical and biological worlds, and recognizing that scientific knowledge is continuously updated or revised as new information is discovered.

g) Environmental literacy is creating a context within which environmental issues can be viewed, imparting knowledge to enhance one's ability to analyze the issues, make the connections between humans' decisions and actions and the challenges facing the environment, and instilling the desire to sustain the environment through ethical practices in both one's professional and personal lives.

4. Apply problem-solving skills or methods to make informed decisions in a variety of contexts.

The student will use acquired skills or methods to recognize, analyze, adapt, and apply critical thinking to solve problems and make informed decisions.

EVALUATION:

In the box to the right of the Methods of Assessment, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 4.0, 4.2 and 5.12) that apply.

1. Portfolio	1.1, 1.4, 2.0, 3.0, 4.0
2. Short essays	
3. Research Papers	
4. Group projects	
5. Discussions (In class and online)	
6. Multiple Choice tests	
7. Presentations	
8. Service Learning Projects	
9. Quizzes (pop, announced, etc.)	1.0, 2.0, 3.0, 4.0
10. Take-home tests	1.0, 2.0, 3.0, 4.0
11. Summaries, critiques, and analyses	
12. Reaction papers	
13. Surveys	
14. Performance	
15. Short answer tests	2.5, 2.9, 3.6, 4.2, 5.3
16. Classroom debates and colloquia	
17. Blogs, wikis, web pages	
18. Other (Please explain)	

Common Course Number: PHY 2048

UNITS

Unit 1 Measurement and Vectors and Problem Solving

General Outcome:

- 1.0 The student shall:** be able to analyze measurement systems, dimensional analysis, and vector operations. The student should be able to read and evaluate readings and problems in clearly written compositions.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 1.1 Manage measurement systems and evaluate an answer based on dimensional analysis.
- 1.2 Select the relevant data and equations in scientific readings and problems to evaluate the concepts presented in physics.
- 1.3 Present solutions and evaluations of readings and word problems using the standard formats in physics.
- 1.4 Differentiate between scalar and vector quantities in Cartesian and non-Cartesian coordinates and be able to manipulate them algebraically.

Common Course Number: PHY 2048

Unit 2 Mechanics

General Outcome:

2.0 The student shall: be able to analyze kinematic and static problems.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

Kinematics

- 2.1 Distinguish among the equations of motion to the solution of one- and two-dimensional motion problems using Cartesian and non-Cartesian coordinates.
- 2.2 Relate the description of the motion of a particle with respect to a second (moving) coordinate system, i.e., relative motion.
- 2.3 Formulate and analyze Newton's three laws of motion in solving rotating and non-rotating system problems.
- 2.4 Create force diagrams using the different kinds of forces; gravitational, frictional and mechanical.
- 2.5 Formulate and analyze the law of universal gravitation.

Statics

- 2.6 Assemble the laws of Newton to analyze a rigid body in equilibrium.
- 2.7 Analyze "free body" objects.
- 2.8 Analyze the conservation of torque and angular momentum.
- 2.9 Differentiate among work, energy and power in rotational motion.
- 2.10 Calculate the moment of inertia using the methods of integration.

Common Course Number: PHY 2048

Unit 3 Energy and Conservation Laws

General Outcome:

- 3.0 The student shall:** be able to analyze the conservation laws of work, energy, and power.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

Work, Energy, Power

- 3.1. Analyze the concept of work in solving problems using the work-energy theorem.
- 3.2. Compare and contrast kinetic energy and potential energy.
- 3.3. Analyze the concept of power.

Conservation Laws

- 3.4. Distinguish between conservative and non-conservative forces and systems in measuring potential energy.
- 3.5. Analyze the concept of impulse.
- 3.6. Distinguish between elastic and inelastic collisions using the conservation of energy in linear and angular motion.

Common Course Number: PHY 2048

Unit 4 Oscillations and Wave Motion

General Outcome:

- 4.0 The student shall:** be able to analyze the motion of a particle or system of particles that is periodic.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 4.1. Formulate the equations of motion of a particle to a simple harmonic oscillator.
- 4.2. Construct a simple harmonic oscillator using its angular frequency, amplitude, period, etc.
- 4.3. Compare different wave phenomena as they move through different forms of matter.
- 4.4. Compare different acoustic phenomena such as standing waves, the Doppler effect, etc.
- 4.5. Analyze the concept of sound intensity level.

Common Course Number: PHY 2048

Unit 5 Thermodynamics

General Outcome:

- 5.0 The student shall:** be able to differentiate between heat and temperature and solve basic calorimeter problems, by analyzing the three laws of thermodynamics, the concept of entropy, and the concepts of thermal transport.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 5.1. Analyze thermodynamics such as heat, specific heat, calorimeter, heat capacity, adiabatic, etc. to create a model of temperature.
- 5.2. Differentiate the thermal expansion of solids, liquids and gases, and thermal phenomena associated with change of phase.
- 5.3. Analyze the laws of thermodynamics, thermal transport, and the concept of entropy.