- Course Information -

University:	University of Nebraska at Omaha
College:	Arts and Sciences
Curriculum:	Physics
Number:	1050
Type:	Lecture
Title:	Introduction to Physics
Short title:	Introduction to Physics
Effective term:	Fall 2013
Graduate non-degree students:	Allowed
Can course be taken for credit multiple times?	No

- Credit Hours Information -

Type:	Fixed
Hours:	4

- Cross-listing and/or Dual-listing (UG/G) Information -

Courses:	Not applicable

- Duplication Information (not to be used for cross/dual-listings) - Use in ALL instances where there is potential that a course overlaps in content with another discipline. This feature allows the relevant chair(s)/directors(s) to review and approve early in the review process. Please use if there is potential for perceived duplication.

Curriculum:	Not applicable

- 1.0 Course Description Information -

1.1 Catalog description:

A terminal one-semester course covering major topics in mechanics, heat, sound, electricity, magnetism, light and modern physics. Designed particularly for non-science liberal arts majors or others for whom such a one-semester coverage might be deemed adequate. (Does not count towards physics requirement for chemistry, physics and most engineering majors.)

1.2 Prerequisites of the course:

High school algebra or equivalent.

1.3 Overview of content and purpose of the course:

A terminal one-semester course covering major topics in mechanics, heat, sound, electricity, magnetism, light and modern physics. Designed particularly for non-science liberal arts majors or others for whom such a one-semester coverage might be deemed adequate. Similar in content and difficulty to the PHYS 1110 – 1120 series, though topics are covered in considerably less depth in this one-semester course.

1.4 Unusual circumstances of the course:

None.

- 2.0 Course Justification Information -

2.1 Anticipated audience / demand:

A wide variety of students take this course, any students who need or want to take a physical science course but who don't need two semesters or calculus-based physics. Biology and aviation majors are common.

2.2 Indicate how often this course will be offered and the anticipated enrollment:

Offered every fall and spring semester. Typically 85-90 students take the lecture course.

2.3 If it is a significant change to an existing course please explain why it is needed:

Not a significant change. Gen. Ed. Committee requires an official syllabus be submitted in order to approve course on a steady basis.

- 3.0 Objective Information -

Is this course part of or being proposed for the General Education curriculum?

Yes, General Education area: Natural and Physical Science

3.1 List of performance objectives stated as student learning outcomes:

a. Use significant figures to express the precision to which a given or calculated number is known.

b. Use powers of ten notation and know how to use it to express the number of significant figures in a quantity.

c. Treat units (meters, seconds, kilograms, etc.) mathematically to find the units that a calculated answer should have.

d. Use and explain the rules of optics for spherical mirrors and simple lenses.

e. Add and subtract vectors.

f. Understand Newton's three laws and use them correctly.

g. Solve and explain equations of motion in one and two dimensions, using the relations between time, displacement, velocity, acceleration, force, momentum, and energy, including the concepts of conservation of momentum and mechanical energy.

h. Solve and explain problems involving density, pressure, and buoyancy in both liquid and gas.

i. Calculate and explain the effects of heat, including thermal expansion, heat flow, heat capacity, and the concept of entropy.

j. Use and explain the equations of periodic motion, including simple-harmonic-motion and sound.

k. Use and explain rules and equations governing electromagnetic forces and electric and magnetic fields.

l. Draw and label simple electric circuits. Use and explain the relation between current, voltage, and resistance properly.

m. In all of these, use the language of mathematics to express the concepts and explain how an answer was arrived at.

3.2 General Education Student Learning Outcomes

After completing the course, successful students shall be able to do the following:

3.2.1 Student Learning Outcome
(Describe how the course meets the SLO(s).)

Natural and Physical Sciences : demonstrate a broad understanding of the fundamental laws and principles of science and interrelationships among science and technology disciplines;

In PHYS 1050, students must demonstrate that they understand the basic laws of physics (Newton's laws of motion, etc.) and that they are able to apply them to situations described in homework and exam questions. These questions (and examples worked out in class) include ideas from many fields including, for example, astronomy, biology, nuclear physics, and engineering.

3.2.2 Student Learning Outcome
(Describe how the course meets the SLO(s).)

Natural and Physical Sciences : demonstrate a broad understanding of various natural phenomena that surround and influence our lives;

Demonstrating a broad understanding of various natural phenomena that surround and influence our lives is what physics is about. Students must answer homework and exam questions showing they understand, for example: Why do things fall when you drop them? How hard do you have to pull on something to make it move faster? What keeps planets and moons in orbit? Why does the pressure in my car tires decrease in the winter if I don't add more air? Why does wood float but a rock sinks?

3.2.3 Student Learning Outcome
(Describe how the course meets the SLO(s).)

Natural and Physical Sciences : describe how scientists approach and solve problems including an understanding of the basic components and limitations of the scientific method;

Students must demonstrate that they can solve problems themselves, starting with what they know (what's been measured), applying physical models and formulae to the situations described in questions asked, and recognizing for which situations the models work and for which ones they do not.

3.2.4 Student Learning Outcome
(Describe how the course meets the SLO(s).)

Natural and Physical Sciences : solve problems and draw conclusions based on scientific information and models, using critical thinking and qualitative and quantitative analysis of data and concepts in particular to distinguish reality from speculation.

Homework and exams are used in this course to determine students' ability to apply to real-world situations the physical models and the formulae which describe them. Questions include quantitative testing where a numerical calculation is required (e.g. What force must be applied to a 1 kg mass to make it accelerate at 25 m/s2?) and qualitative testing where understanding of a physical law or model must be demonstrated (e.g., What direction must a force be applied to keep an object moving in a circle at a constant speed?). Students are taught to ask themselves "does this make sense" whenever they finish a problem and get an answer, as a "mental reality check" to help them catch mistakes in their assumptions or calculations

- 4.0 Content and Organization Information -

4.1 List the major topics central to this course:

Measurement and uncertainty, optics, force, Newton's laws of motion, momentum, energy, fluid density and pressure, heat, sound and other oscillations, electricity and magnetism.

- 5.0 Teaching Methodology Information -

5.1 Methods:

Lecture – demonstration is the primary teaching method used. Homework is assigned and graded. In-class clicker "voting" may be used to gauge student understanding during lectures and to emphasize understanding concepts rather than just mathematical problem-solving.

5.2 Student role:

Student is to: attend lectures and discussion sections, ask questions, solve homework problems, participate in classroom "voting" (if applicable), and take the tests.

- 6.0 Evaluation Information -

Students should be provided the actual list of projects, basis for determining the final grade, and grading scale at the beginning of each course.

6.1.1 Describe the typical types of student projects that will be the basis for evaluating student performance:

Instructors may vary the requirements, but currently performance is evaluated using homework assignments (approximately weekly) and exams (3 in-class exams and a final exam).

6.1.2 In submitting this course for the general education curriculum, it is understood that the department will be responsible for providing a regular assessment report of how each of the student learning objectives shown in 3.2.1-3.2.4 are being met. The format for this report will be specified by the UNO Assessment Committee.

6.2 Describe the typical basis for determining the final grade (e.g., weighting of various student projects):

Instructors may vary in how they determine grades. Currently grades are calculated with:

Homework (12 or 13 assignments): 20% of grade

In-class exams (lowest of 3 scores dropped): 50% of grade

Final exam: 25% of grade

Participation (measured primarily by clicker use): 5% of grade

6.3 Grading type:

Letter grades

- 7.0 Resource Material Information -

7.1 Textbook(s) or other required readings used in course:

Introductory Physics: a Problem-solving Approach, 2nd edition, by Wall & Wall, Analog Press, 1997

7.2 Other student suggested reading materials:

7.3 Current bibliography and other resources:

Physics by E. Hecht (Brooks/Cole, 1994)

Basic Physics: A Self-Teaching Guide, 2nd ed., by K.F. Kuhn (John Wiley, 1996)

College Physics, 2nd ed., by P.P. Urone (Brooks-Cole, 2000).

College Physics , 8th ed., by R.A. Serway, J.S. Faughn, and C. Vuille (Brooks Cole; 2008).

Physics, 8th ed., by J.D. Cutnell and K.W. Johnson (John Wiley, 2009).

College Physics: A Strategic Approach with Student Workbooks Volumes 1 and 2., 2nd ed., by R.D.Knight, B. Jones, S.Field (Addison-Wesley, 2009).

College Physics , 7th ed., by J.D. Wilson, A.J.Buffa, and B. Lou (Addison-Wesley, 2009).

Schaum's Outline of College Physics, 11th ed., by E.Hecht and F. Bueche (McGraw-Hill, 2011).

Physics I for Dummies, 2nd ed., by S. Holzner (For Dummies, 2011).

College Physics, **9th ed**., by Hugh D. Young (Pearson/Addison-Wesley, 2012).

College Physics, 4th ed., by A. Giambattista, B. Richardson, and R. Richardson (McGraw-Hill, 2012).

- 8.0 Other Information -

8.1 Accommodations statement:

Appropriate accommodations are provided for students who are registered with the Accessibility Services Center and make their requests sufficiently in advance. For more information, contact Accessibility Services Center (MBSC 126, Phone: 402-554-2872, unodisability@unomaha.edu) or visit unomaha.edu/disability.

8.2 Other:

* 8.3 Author(s):

Vincent Woolf (information entered by Dan Wilkins)