

**Common Course Outline for: PHYS 1122 Physics 2 for Scientists and Engineers****A. Course Description**

1. Number of credits: 5
2. Lecture hours per week: 4
3. Lab hours per week: 2
4. Prerequisites: PHYS 1121 (C or higher) and MATH 1520 (C or higher). Recommended: Math 2510 (C or higher) or concurrent enrollment (preferred), or Math 2520 (C or higher) or concurrent enrollment.
5. Co-requisites: None
6. MnTC Goals: 3 Natural Science

This course is a continuation of Physics 1121. This course uses calculus. Topics include wave phenomena, electricity, magnetism, an introduction to Maxwell's equations, electromagnetic waves, and optics. This course meets requirements for students majoring in engineering, mathematics, computer science, or the sciences.

**B. Date last revised:** April 2017**C. Outline of Major Content Areas:**

Wave phenomena, electricity, magnetism, an introduction to Maxwell's equations, electromagnetic waves and optics

**D. Course Learning Outcomes**

Upon completion of this course, students should be able to:

1. Demonstrate an understanding of scientific theories and principles by: (2abc, 3a)
  - a. Stating and applying the fundamental laws and concepts relating to the course topics.
  - b. Identifying which physical laws and principles are appropriate for the solution of physics problems relating to human applications.
  - c. Using the appropriate physical laws and principles and differential and integral calculus concepts and techniques to develop the mathematical expressions required to solve physics problems; solving those mathematical expressions.
  - d. Using the terminology of physics correctly.
2. Formulate and test hypotheses by: (2abc, 3b)
  - a. Performing laboratory, simulation, or field experiments.
  - b. Collecting data and analyzing it statistically and graphically.
  - c. Identifying sources of error and uncertainty.
  - d. Estimating the magnitude of error and uncertainty in data.
  - e. Using appropriate software to perform experiments and analyze data.
3. Communicate experimental findings, analysis, and interpretations by: (2abc, 3c)
  - a. Presenting laboratory results orally.
  - b. Orally explaining analysis and interpretations of laboratory results and relating the results to physics concepts and theories.

- c. Presenting written reports that interpret laboratory results and relate them to physics concepts and theories.

**E. Methods for Assessing Student Learning**

Assessment methods are at the discretion of the instructor and may include written and/or oral reports, homework, other projects, quizzes, exams, and a final exam.

**Special Information:** This course is required for all physics, astronomy, and pre-engineering majors, many math and chemistry majors, and some biology and pre-medicine majors. Biology and pre-meds transferring to the University of Minnesota can take PHYS 1201/1202 Physics with Biomedical Applications; for other transfer institutions, check with their transfer specialist.