

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
Lab hours per week: 2
3. Prerequisites: PHYS 1121 (C or better) and MATH 1510 (C or better)
4. Corequisites: None
5. MnTC Goals: Goal #3 - Natural Sciences

In this second semester of a two-semester sequence covering calculus-based introductory physics, students explore electricity and magnetism and its many applications, as well as mechanical waves, electromagnetic waves and optics. Students explore a wide variety of physical phenomena that underlie many of today's technologies. This material will be useful in any science-related career, and its content is fundamental to an understanding of the physical world.

B. Date last reviewed/updated: February 2025**C. Outline of Major Content Areas:**

1. Wave phenomena
2. Electricity
3. Magnetism
4. An introduction to Maxwell's equations
5. Electromagnetic waves
6. Optics

D. Course Learning Outcomes:

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

1. Predict the motion of an electric charge subject to an electric and magnetic field. (Goal 3a, 2c)
2. Calculate the electric field and potential due to a discrete and continuous set of point charges. (Goal 3a, 2a)
3. Apply conservation of energy to analyze charged systems. (Goal 3a, 2a)
4. Analyze circuits containing resistors, inductors, capacitors and emf devices. (Goal 3a, 2c)
5. Calculate the magnetic field generated by a current in different configurations (e.g., single wire, solenoid, coil). (Goal 3a, 2a)
6. Use Faraday's Law to calculate the induced emf generated by a changing magnetic flux. (Goal 3a, 2a)
7. Calculate properties of mechanical and electromagnetic waves. (Goal 3a, 2a)
8. Apply properties of optics to the behavior of visible light. (Goal 3a, 2a)
9. Test formulated hypotheses by performing laboratory experiments. (Goal 3b, 2c)

10. Communicate lab results with reasoned arguments, supported by experimental evidence, both orally and in writing. (Goal 3c)

E. Methods for Assessing Student Learning:

Methods for assessment may include, but are not limited to, the following:

1. Written and/or oral reports
2. Homework
3. Projects
4. Quizzes
5. Exams
6. Final Exam

F. Special Information:

None