

# General Education Course Objectives and Learning Outcomes

Course Name: Calculus-Based Physics  
I and Physics I Lab

Course Number: PHYS2114 and PHYS 2000

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**COMMON COURSE OBJECTIVES AND STUDENT LEARNING OUTCOMES THAT ARE OR WILL BE LISTED ON THE SYLLABUS OF EVERY SECTION OF THIS COURSE:**

*Course objectives:* Students will understand classical mechanics at the introductory level and will be able to apply these concepts in future upper-level courses. This course should provide students with a foundation in classical introductory physics topics such as kinematics, force concepts, work/energy, gravitation, heat, and fluids. In addition to providing a conceptual foundation, mathematical ability will be developed to manipulate formulas to derive correct symbolic and numerical solutions. Finally, students should learn/develop problem-solving skills by applying relevant physical models and formulas to physical problems.

- Student learning outcomes:*
- Students Completing PHYS 2114 and PHYS 2000 will be able to
- apply dimensional analysis concepts to perform unit conversions.
  - demonstrate understanding of one and two dimensional motion by applying kinematic equations to physical linear motion problems.
  - summarize and apply Newton’s three laws of motion. Additionally, set up and solve physical problems with a net external force.
  - demonstrate an understanding of kinetic, potential energy, and work by analyzing and solving work-energy problems.
  - apply conservation of momentum concepts to collisions. Additionally, students should be able to distinguish between collisions in which momentum is conserved and when it is not.
  - demonstrate understanding of physical rotational motion situations by applying rotational kinematic equations and angular momentum concepts to rotational motion problems.
  - demonstrate an understanding of waves including harmonic motion, standing waves, and sound waves.
  - Understand and apply laws of static and dynamic fluids
  - Obtain fundamental understanding for thermodynamic phenomena

**ADHE ACTS INFORMATION FOR THIS COURSE (IF APPROPRIATE)**

*ACTS Course number:* PHYS2034 Calculus-Based Physics I (ATU PHYS 2114 + PHYS 2000, taken together meet the acts requirements)

*Copy the ACTS course objectives and learning outcomes:* Calculus-based physics course designed for science and engineering majors. Topics include mechanics in one and two dimensions, fluids, and heat. Lab required. This is a calculus-based course and it is strongly recommended that the student should take Calculus I as a corequisite or have completed Calculus I with a “C” or better.

Expected Student Learning Outcomes: The student will use calculus in order to be able to explain, describe, discuss, recognize, and/or apply knowledge and understanding of the following:

- Measurement and error

- One- and two-dimensional motion
- Vectors • Newton's Laws of Motion
- Work and energy
- Conservation laws
- Linear momentum
- Rotational kinematics and dynamics
- Fluids
- Heat

**WHICH ATU GENERAL EDUCATION GOALS DOES THIS COURSE FULFILL? (NO MORE THAN TWO)**

- Communicate effectively
  - Written communication
  - Oral communication
- Think critically
- Develop ethical perspectives
  - Diversity
  - Empathy
  - Leadership
- Apply scientific and quantitative reasoning** ✓
  - Scientific reasoning
  - Quantitative reasoning
- Apply the value of the arts and humanities
- Practice civic engagement

**DESCRIPTION OF HOW THIS COURSE MEETS THE GENERAL EDUCATION GOALS CHOSEN ABOVE (TO BE INCLUDED ON THE SYLLABUS OF EVERY SECTION OF THIS COURSE)**

In this course (lab and lecture), students are introduced to basic classical mechanics principles that govern the physical world. The students practice applying the principles to situations and using scientific and quantitative reasoning to make predictions or describe the outcomes.