

PHY100/PHY130 Physics (3 hour credits)

Instructor: Yasushi NARA

Office hours: T,R 14:00-15:30

e-mail: nara@aiu.ac.jp

Semesters: Spring, Fall

Office: A36

Phone: 5940

Meeting times: T,R 15:30-16:45

DESCRIPTION: The course presents physics is a cornerstone of the sciences. Knowing the fundamentals of physics permits understanding of many aspects of the nature, not only the surrounding world of everyday experience, but also the mysteries of the universe at the macro-scale and elementary particles at the micro-scale. The ultimate goal of physics is to answer the fundamental questions: How did the universe begin? How and of what is it made? How does it change? What rules govern its behavior? The course will address these questions and provides the outlines of the possible answers. This introductory physics course provides an overview of the fundamental concepts of physics which focuses on concepts of, and critical thinking in physics rather than learning the mathematical formalisms and abstract calculations. The course emphasizes the beauty, symmetry, and simplicity of physics in its actual practice. Students are acquainted with a selection of topics from classical and modern physics together with an introductory account of contemporary issues in physics and technology.

OBJECTIVES: The principal objective of this course is to build a strong conceptual understanding of physical principles ranging from classical mechanics to modern physics which describe the fundamental laws of the world. Students will gain an understanding of how physics develops and what is the current understanding of our world in physics. Upon successful completion of this course students will be well acquainted with the fundamental concepts and laws of physics, which will allow them to understand how science explains and builds models of the natural phenomena.

STUDY MATERIALS: Handout will be provided.

ASSESSMENT: Student achievement of this course objectives will be measured in quizzes (40%), homework assignments (10%), and the final examination (50%)

EXPECTED ACADEMIC BACKGROUND: There are no formal prerequisites for this course. Any advanced mathematics will not be used. No prior physics knowledge is required. However, taking College Algebra course (MAT150) and Statistics (MAT200) would be helpful.

COURSE FORMAT AND ACTIVITIES: This is a lecture course, However, you are expected to contribute to the class by asking questions.

SCHEDULE:

- Week 1:** Introduction and general overview.
Galileo's inclined plane experiment.
- Week 2:** Motion: velocity and acceleration.
Newton's Second law of Motion, Momentum,
- Week 3:** Action-reaction law, Impulse, Conservation of Momentum, Frictional Force.
(Rotational Motion: angular momentum conservation.)
Work and Energy Conservation.
- Week 4:** Inertial force.
Law of Universal Gravitation: Kepler's law of planetary motion.
- Week 5:** Fluid motion.
- Week 6:** Heat and Thermodynamics.
- Week 7:** Electric Forces and Electric Fields, electric potential.
Electric current, Magnetic field.
- Week 8:** Electromagnetic Induction.
- Week 9:** Electromagnetic Waves.
- Week 10:** Special Theory of Relativity
- Week 11:** General Theory of Relativity
- Week 12:** Quantum Physics.
- Week 13:** Atomic and nuclear Physics: radioactivity, fission and fusion.
- Week 14:** Elementary Particles and Fundamental forces. Big-bang Cosmology.
- Week 15:** Final examination.