

Syllabus Spring 2016

Introduction to Physics

Course description. In this first-year introduction to physics, our focus is on key concepts in classical mechanics. In the first half, we study dimensions and units; Newton's law of motion and gravitation, linear and circular particle trajectories, elements of vectors in Euclidean space; and Newton's law of conservation of momentum; energy, linear and angular momentum, moment of inertia. In the second half, we study elements of fluids and fluid dynamics, the pendulum, scaling and dimensional analysis; waves in ropes (transverse) and gas (longitudinal sound waves); temperature and entropy. We conclude with elements of thermodynamics.

Professor: Maurice H.P.M. van Putten

Coordinates: 8B02, MO and WE 10:30-12:00 hr

References: College Physics – Volume 1, A. Giambattista, B. Richardson and C. Richardson, 2012, (McGraw-Hill); College Physics – Brief Edition (Korean), A. Giambattista, B. Richardson and C. Richardson, 2005, (McGraw-Hill; available in the Sejong University Bookstore), **Ch. 1-16**; Feynman Lectures of Physics, Volume 1, online available at www.feynmanlectures.caltech.edu, **Ch. 4-6, 8-11, 18-23, 39-46, 50-51.**

Contents

- I. Introduction to dimensions and units (length, time, mass etc.)**
- II. Static forces, Newton's law of action and re-action forces**
- III. Gravitational forces: the weight of mass**
- IV. Particle motions and the inertia of mass: particle trajectories and vector calculus**
- V. Newton's law of conservation of momentum**
- VI. Energy, linear and angular momentum, moment of inertia**
- VII. Fluid dynamics**
- VIII. Pendulum and oscillations**
- IX. Scaling relations from dimensional analysis**
- X. Waves in ropes and gas (transverse and longitudinal oscillations)**
- XI. Temperature and entropy**
- XII. Ideal gas law, adiabaticity, first law of thermodynamics**
- XIII. Conductive and convective heat transport: random walks versus linear motion**
- XIV. Elements of thermodynamics**

Homework. Provided in class

Grading. Based on class attendance, homework, mid-term, final.