

Class meets live online on Mondays and Thursdays, 1030 – noon (central time).
Students do labs on their own, at home, with common household items.

Physics I and Physics I Lab Topics (PHYS1111, PHYS1113) Fall Semester

- 1) Translational Mechanics
 - a) Kinematics
 - i) 1D kinematics
 - ii) Vectors
 - iii) 2D kinematics (parabolic motion)
 - b) Kinetics
 - i) Newton's laws of motion
 - ii) Statics
 - iii) Trusses
 - iv) Dynamics
 - v) Uniform Circular Motion
 - vi) Gravity
 - vii) Work-Energy (including conservation of energy)
 - viii) Impulse-momentum (including conservation of momentum)
- 2) Rotational Mechanics
 - a) Rotational Kinematics
 - i) Angular position, distance, displacement, velocity, acceleration
 - ii) Angular kinematic equations
 - iii) gears
 - b) Rotational Kinetics
 - i) Newton's 2nd law – rotational form
 - ii) Torques (including tipping moment)
 - iii) Rotational Statics
 - iv) Rotational Dynamics
 - v) Rotational Energy (including torsional springs and roll without slip)
 - vi) Angular momentum (including conservation of momentum)
- 3) Fluids
 - a) Statics – buoyancy
 - b) Dynamics – Bernoulli
- 4) Thermodynamics
 - a) Temperature
 - b) Heat Transfer
 - c) Thermodynamic cycles

Physics II and Physics II Lab Topics (PHYS1121, PHYS1123) Spring Semester

- 1) Periodic Motion
 - a) Springs; Hooke's Law
 - b) SHM
 - i) Spring-mass
 - ii) Simple pendulums
 - c) Spring-mass-damper systems
- 2) Waves
 - a) Types of waves: transverse, longitudinal, surface
 - b) Sound: speed in air, doppler, harmonics, beats, music, intensity
 - c) Light
- 3) Optics (geometric and physical; mirror and magnification equations)
 - a) Reflection and mirrors
 - b) Refraction and lenses
 - c) Ray tracing
 - d) Snell's law
 - e) Optical instruments
- 4) Electricity
 - a) Electric charge
 - b) Electric (coulombic) force
 - c) Resistance
 - d) Ohm's law
 - e) DC circuits resistors
 - f) Power
 - g) Electric field and potential
 - h) Capacitors
 - i) DC Instruments
 - j) DC circuits with resistors and capacitors
- 5) Magnetism
 - a) Magnetic forces
 - b) Sources of magnetism
 - c) Theories of the Earth's magnetic field
 - d) Relationship to electricity
 - e) Inductance: motors, generators, transformers
- 6) Other topics
 - a) Atomic physics
 - b) Nuclear physics
 - c) Special relativity
 - d) Astrophysics