

PHYSICS 211

PHY 211 - Introduction to Physics I is the first course in the non-calculus based PHY 211/212 sequence. It provides an introduction to mechanics, heat, and sound. It is designed as a terminal sequence for non-physical science majors. There are three 1-hour lectures, one 1-hour tutorial and one 3-hour lab each week. Prerequisite: MAT 142.

The syllabus below is a general guide and will vary from semester to semester.

Week 1

Units, Uncertainty and Significant Figures, Vectors, and Vectors Products, Displacement, Average and Instantaneous Velocity and Acceleration, Constant Acceleration motion, Freely Falling Bodies

Week 2

Position, Velocity and Acceleration Vectors, Projectile Motion, Motion in a Circle, and Relative Velocity, Newton's Laws of Motion, Mass and Weight, Free-Body Diagrams

Week 3

Applying Newton's Laws - Particles in Equilibrium and Dynamics of Particles
Frictional Forces, Dynamics of Circular Motion

Week 4

Work, Kinetic Energy and the Work-Energy Theorem, Power

Week 5

Gravitational Potential Energy, Elastic Potential Energy, Conservative and Nonconservative Forces, Force and Potential Energy

Week 8

Momentum and Impulse, Conservation of Momentum, Momentum Conservation and Collisions, Elastic Collisions, Center of Mass

Week 7

Angular Velocity and Acceleration, Constant Angular Acceleration, Linear and Angular Kinematics, Energy in Rotational Motion, Parallel-Axis Theorem, Moment-of-Inertia, Dynamics of Rotational Motion, Torque and Angular Acceleration for a Rigid Bodies, Work and Power in Rotational Motion, Angular Momentum, Conservation of Angular Momentum

Week 9

Conditions for Equilibrium, Rigid-Body Equilibrium Problems, Stress, Strain, and Elastic Moduli, Newton's Law of Gravitation, Weight, Gravitational Potential Energy, Motion of Satellites

Week 10

Oscillations, Simple Harmonic Motion, Energy in Simple Harmonic Motion, The Simple and Physical Pendulums, Damped Oscillations, Forced Oscillations and Resonance

Week 11

Density, Pressure in a Fluid, Buoyancy, Fluid Flow, Bernoulli's Equation

Week 12

Mechanical Waves, Periodic Waves, Energy in Wave Motion, Wave Interference and Superposition, Standing Waves and Normal Modes on a String, Sound Waves

Week 13

Sound Intensity, Sound Waves and Normal Modes, Resonance and Sound, Interference and Beats, The Doppler Effect

Week 14

Temperature and Heat, Thermal Equilibrium, Thermometers and Temperature Scales, Thermal Expansion, Quantity of Heat, Calorimetry and Phase Changes, Mechanisms of Heat Transfer, Kinetic-Molecular Model of an Ideal Gas, Heat Capacities

Week 15

Thermodynamic Systems, Work, Internal Energy and the First Law of Thermodynamics, Thermodynamic Processes, Internal Energy, Heat Capacities, and Adiabatic Processes of an Ideal Gas, Second Law of Thermodynamics, Heat Engines, Refrigerators, Second Law of Thermodynamics and the Carnot Cycle, Entropy