

# Survey of Physics Syllabus: 10-806-139

**Class Meeting Structure:** Weekly 2 hour lecture  
Weekly 3 hour lab/problem-solving session

**Course Description:** Introduction to physics concepts common to mechanical, electrical, thermal, fluid, and optical systems. A brief overview of modern physics is included.

**Required Textbook:** *Inquiry into Physics* by Ostdiek and Bord

**Homework:** There will be weekly graded homework assignments, consisting of a mix of conceptual questions and mathematical word problems..

**Exams:** There will be three mid-term exams and a final consisting of conceptual questions and mathematical word problems

**Labs:** The lab grade may come from a variety of sources; lab assignments to be turned in, lab quizzes, or written lab reports

**Grades:** Exam, homework and laboratory percentages will be calculated separately. Then grades will be weighted on the following distribution:

**Exams 50%**  
**Homework 25%**  
**Laboratory 25%**

## Summary of Course Topics and Suggested Lab Activities:

**Math Review:** Metric system and scientific notation, Unit conversion using dimensional analysis

**Chapter 1 – The Study of Motion:** Velocity, linear acceleration, acceleration due to gravity, centripetal acceleration.

*Suggested Labs:* Graphical interpretation of velocity and acceleration, measuring  $g$ ,

**Chapter 2 – Newton's Laws:** Newton's Laws of Motion, mass vs. weight, friction, centripetal force, law of universal gravitation.

*Suggested Labs:* Newton's 2<sup>nd</sup> Law, calculating coefficients of friction, adding force vectors graphically

**Chapter 3 – Energy and Conservation Laws:** Conservation of momentum, conservation of energy, work, power, conservation of angular momentum.  
*Suggested Labs:* Conservation of energy with a projectile launcher, calculating your own horsepower, ballistic pendulum

**Chapter 4 – Physics of Matter:** Pressure, density, Pascal’s principle, Archimedes’ principle, Bernoulli’s Principle.  
*Suggested Labs:* Hydraulic jack lab, Archimedes’ Principle

**Chapter 5 – Temperature and Heat:** Temperature scales, thermal expansion, heat, specific heat, heat engines, heat transfer.  
*Suggested Labs:* Calorimetry, Mechanical Equivalent of heat

**Chapter 6 – Waves and Sound:** Transverse and Longitudinal waves, speed of waves on a string, frequency, velocity and wavelength, interference, sound waves.  
*Suggested Labs:* Speed of waves on a string, sound wave interference

**Chapter 7 - Electricity:** Properties of electric charge, coulomb’s law, electric fields, current, resistance, Ohm’s Law, series and parallel circuits, electric power, AC and DC.  
*Suggested Labs:* Ohm’s Law, Mapping electric fields

**Chapter 8 – Magnetism and EM Waves:** Properties of magnets, relationships between electricity and magnetism, solenoids, electric motors, electromagnetic induction, transformers, the electromagnetic spectrum.  
*Suggested Labs:* Solenoid Balance Lab, Force on a Current-Carrying Wire

**Chapter 9 – Optics:** Reflection, refraction, diffraction, interference, polarization, total internal reflection and fiber optics, forming images and thin lens formula, the human eye  
*Suggested Labs:* Reflection, refraction and total internal reflection, Human eye lab

**Chapter 10 – Atomic Physics:** Bohr’s Model of the atom and atomic spectra, deBroglie waves, lasers

**Chapter 11 – Nuclear Physics:** Three types of radiation, half-life and radioactive dating, fission and fusion

*If Time Allows:*

**Chapter 12 – Special Relativity:** Postulates and predications of special relativity