



School District of Marshfield **Course Syllabus**

Course Name: Honors Physics

Length of Course: Year

Credits: 1

PREREQUISITES: Honors Algebra (206) or Algebra (205) with instructor approval, Honors Course Application. Concurrent enrollment in Honors Geometry (212) or Honors Algebra II (208) strongly encouraged.

Course Description:

Discover the physical laws of nature, including motion, dynamics, energy, heat, waves and sound, light and optics, electricity and magnetism, thermodynamics and modern physics. Also study interactions among science, technology and society.

REQUIREMENTS: Recommended for college bound students and provides preparation for those intending to take AP Physics.

Learning Targets:

- Understand the scientific method and apply it to laboratory investigations and problems.
- Develop problem solving skills.
- Analyze and interpret graphs to understand the significance of slope, area under the curve, and relationship between variables.
- Learn of misconceptions developed over time in the real world and understand the true meaning
- Understand mechanics and fluid mechanics.
- Understand waves, including sound and light.
- Understand optics and diffraction.

First Quarter

1. Motion Graphs, Velocity, and Acceleration – 5 weeks
 - A. Distance-Time and Velocity-Time
 - B. Kinematic and motion equations
 - C. SI units and dimension analysis

- D. Graphical analysis
- 2. Newton's Laws of Motion and Forces – 6 weeks (concludes in Quarter 2)
 - A. Newton's 3 laws of motion and application
 - B. Friction
 - C. Net force equations and free body diagrams
 - D. Force resolution
 - E. Hanging objects
 - F. Connected objects

Second Quarter

- 3. Vectors and 2-Dimensional Motion – 5 weeks
 - A. Vector resolution and addition
 - B. Projectile motion
 - C. Circular and satellite motion
 - D. Pendulum motion
- 4. Review and Semester Final – 1 week
- 5. Work, Energy, and Momentum – 5 weeks (concludes in Quarter 3)
 - A. Work and work-energy theorem
 - B. Kinetic, elastic potential, and gravitational potential energy
 - C. Law of conservation of energy
 - D. Simple machines, power, and efficiency
 - E. Law of conservation of momentum
 - F. Collisions and impulse

Third Quarter

- 6. Fluids – 3 weeks
 - A. Density and pressure
 - B. Fluid dynamics: Bernoulli's principle, hydrostatic pressure, Pascal's principle, Archimedes's principle
- 7. Waves and Sound – 4 weeks
 - A. Longitudinal and transverse waves, structure and motion
 - B. Sound waves: velocity, intensity, frequency, and beats
 - C. Resonance, interference, and harmonics
 - D. Bow waves and sonic booms

Fourth Quarter

- 8. Light and Electromagnetic Radiation – 3 weeks
 - A. Electromagnetic radiation: types and properties
 - B. Reflection and refraction (Snell's Law)
 - C. Total internal reflection, fiber optics
- 9. Lenses and Mirrors – 3 weeks
 - A. Ray diagrams
 - B. Concave and convex lenses
 - C. Plane and curved mirrors

10. Wave Optics – 3 weeks

- A. Single slit interference
- B. Double slit interference
- C. Diffraction
- D. Phase changes with reflection
- E. Constructive and destructive interference

Required Core Resources:

- Textbook: College Physics; Serway and Faughn 6th Ed.
- Laboratories: Vernier's Physics with Computers
- Interactive Physics Simulations; Addison-Wesley