

Curriculum at a Glance

Physics

Level: 300

Grades 11 and 12

This course is designed as survey of Introductory Physics covering a wide range of topics, including concepts of motion, dynamics, momentum, energy relationships, mechanical waves, sound, electromagnetic waves, geometric optics, electricity, magnetism, and circuits. Students are expected to have a high level of commitment to the completion of all class work and to demonstrate the ability for independent work, They will be asked to apply their conceptual understanding in the solution of mathematical problems via both homework and in-class assessments. Students will also be asked to problem-solve through experimentation.

Unit Name	Essential Content
Linear Motion	<ul style="list-style-type: none">● An introduction to kinematics, including the concepts of Distance, Displacement, Average Speed, Instantaneous Speed, Velocity and Uniform Acceleration.● Solving problems that involve one-way motion, two-way motion, uniformly accelerated motion and freefall.● Produce and analyze graphs involving position vs time, velocity vs time and acceleration vs time.
Vectors	<ul style="list-style-type: none">● An introduction to vectors.● Graphical methods of vector addition.● Numerical methods of vector addition.

<p>Two Dimensional Motion</p>	<ul style="list-style-type: none"> ● An introduction to the concepts of accelerated and non-accelerated motion in two dimensions. ● Solving of non-accelerated relative motion problems. ● Solving of Projectile Motion problems.
<p>Dynamics</p>	<ul style="list-style-type: none"> ● An introduction to the concepts and application of Newton's Laws of Motion, including the Law of Universal Gravity. ● Introduction to Gravitational Force and its relationship to the Gravitational Field. ● An introduction to circular motion at a constant speed, including planetary orbits. ● Solving of problems involving Newton's Second Law, both with and without friction on level surfaces and inclines as well as free fall. ● Solving of uniform circular motion problems, including Kepler's Laws and Planetary Orbits.
<p>Work and Energy</p>	<ul style="list-style-type: none"> ● Introduction to mechanical energy, including both potential and kinetic energy. ● Introduction to Conservation of Energy. ● Application of work and energy conservation to the solving of a variety of problems. ● Relationship between Energy and Power.
<p>Impulse and Momentum</p>	<ul style="list-style-type: none"> ● Introduction to the concepts of momentum and impulse. ● Conservation of Momentum. ● Solving of momentum in both collisions and explosions. ● Application to momentum conservation to the real world.
<p>Electrostatics</p>	<ul style="list-style-type: none"> ● Introduction to the concepts of conductors, insulators, charge, and charge quantization. ● Introduction the charging of conductors and insulators.

	<ul style="list-style-type: none"> ● Use of Coulomb's Law to solve problems. ● Introduction to the Electric Field and its relationship to Electric Force. ● Solving of Electric Field Problems.
Circuits	<ul style="list-style-type: none"> ● Introduction to moving charge and single source electric circuits. ● Introduction to the concepts of resistance, current and voltage. ● Use of Ohm's Law and Electrical Power relationships. ● Analyzing of series, parallel and complex single source electric circuits.
Magnetism	<ul style="list-style-type: none"> ● Introduction to the concepts of magnetic domains and poles. ● Examine the relationship between magnetic and electric fields. ● Interactions of charged particles in a magnetic field. ● Concepts of electric power generation. ● Use of Electrical Transformers. ● Solving of introductory magnetic field problems, including transformers.
Optics	<ul style="list-style-type: none"> ● Introduction to the Electromagnetic Spectrum. ● Introduction to Color Mixing and the use of Filters. ● Concepts of Polarization. ● Ray Diagrams and image formation due to flat mirrors. ● Concepts of Refraction and the use of Snell's Law. ● Formation of rainbows and total internal reflection. ● Image formation by single lens systems by both drawing and calculation.

Mechanical Waves

- Introduction to Simple Harmonic Motion, including the mass on a spring and a simple pendulum.
- Wave properties, including speed, frequency and period.
- The interference of waves, including standing waves on a string and beat frequency.
- Concepts involving the Doppler Effect.