In the Physics course, students investigate the natural and built world around them in a wide and interesting range of contexts. They discover how we exploit radioactivity in industrial testing and in the treatment of diseases, why we use different materials in heating and cooling systems, how we use electric and magnetic fields in machines, and how our understanding of light and sound waves helps us to communicate.

Physics 2AB

This is a single physics course for students to develop an understanding of physics in the world around them. Students understand areas such as motion, nuclear physics, heating and cooling, and electricity investigating real life problems. 35% of this course involves experiments and investigations. This Physics course provides suitable preparation for students who aim to undertake tertiary studies in fields that do not require the completion of high level Physics units.

Recommended Background

To be successful in this course, students should have obtained an overall B grade, or better, in Year 10 Science.

Commitment

Students will be required to complete a minimum of 3 hours of study per week for this course.

Course Content

Motion and Forces

∞ Add and subtract vectors;
∞ Apply concepts of motion such as speed and acceleration;
∞ Apply calculations in motion such as displacement, velocity and acceleration;
∞ Explain Newton’s Three Laws of motion including appropriate calculations;
∞ State, explain and apply the laws of conservation of momentum;
∞ State, explain and apply the principles of conservation of energy; and
∞ Explain the relationship between energy, work and power.

Nuclear Physics

∞ Explain and apply the concepts of atomic number, mass number, isotope, atomic mass unit and nuclide;
∞ Describe alpha, beta and gamma radiation;
∞ Write nuclear equations;
∞ Explain and apply the concepts of half-life, activity, dose and dose equivalent;
∞ Explain and apply the concepts of mass defect and binding energy of an atom;
∞ Describe neutron-induced fission, chain reactions and critical mass; and
∞ Describe and explain both advantages and disadvantages of nuclear power stations and other applications of nuclear technology.

Heating and cooling

∞ Explain matter and models of the atom;
∞ Explain heat and temperature in terms of the kinetic theory;
∞ Explain and give examples of thermal expansion and contraction;
∞ Describe and perform calculations in specific heat capacity;
∞ Describe and perform calculations in latent heat; and
∞ Explain energy degradation and its relationship to conservation of energy.

Electrical fundamentals:

∞ Describe how charge is gained;
∞ Explain and calculate electrical current;
∞ Explain and calculate the connection between electrical work, charge and potential difference;
∞ Draw and interpret circuit diagrams using standard symbols;
∞ Predict, measure and calculate current, resistance and potential difference in series and parallel circuits; and
∞ Describe and explain electrical hazards and principles behind the operation of various safety devices.

Physics 3AB

This is a single physics course for students to develop an understanding of physics in the world around them. This Physics course provides suitable preparation for students who aim to undertake tertiary studies.

Recommended Background

To be successful in this course, it is recommended that students should have completed Physics 2AB.
Physics

Commitment

Students will be required to complete a minimum of 3 hours of study per week for this course.

Course Content

Motion and forces in a gravitational field
- Investigate energy;
- Resolve vectors;
- Apply motion concepts such as displacement, velocity and acceleration within projectile motion;
- Explain centripetal acceleration and centripetal force;
- Explain Newton's Law of Universal Gravitation and apply to satellites;
- Describe the impact of satellite technology on everyday life;
- Apply concepts of moments about a point;
- Explain and apply the concept of a rigid body in equilibrium; and
- Carry out calculations involving projectiles, circular motion, satellite motion, moments and equilibrium.

Electricity and magnetism
- Investigate effects and forces of magnets;
- Draw fields around magnets;
- Explain how moving charges have magnetic fields;
- Apply concepts relating to Ohm's Law and series and parallel circuits;
- Investigate forces on current carrying conductors in magnetic fields;
- Explain the motor principle;
- Describe the production of an induced emf including calculations;
- Explain magnetic flux and magnetic induction;
- Interpret and explain AC generators and Lenz's Law;
- Explain, and perform calculations, involving transformers; and
- Explain why electrical energy is transmitted as AC and at high voltages.

Particles, waves and quanta
- Explain and apply concepts of waves and sound such as reflection, diffraction and resonance;
- Describe and explain the nature of electromagnetic waves and spectra;
- Explain how astronomical observations help us gather more information about celestial bodies;
- Explain fluorescence and the generation of X-rays;
- Investigate subatomic particles such as neutrinos and quarks;
- Describe basic aspects of the special theory of relativity such as reference frames;
- Describe and explain the expansion of the Universe and Hubble's law;
- Describe and explain fundamental cosmological concepts such as red shift, the Big Bang Theory and the history and future of the Universe; and
- Describe and explain the importance of particles, waves and quanta in everyday life.

Motion and forces in electric and magnetic fields
- Explain that point charges create radial electric fields;
- Describe, using diagrams, electric field distributions around simple combinations of charged points, spheres and plates;
- Describe, explain and use electric fields between parallel plates and within uniform conductors, to explain the forces on charged particles and applying appropriate equations;
- Apply the concept of force on a charged particle moving through a magnetic field;
- Describe the factors which affect the magnitude and direction of the force on a charged particle moving through a magnetic field; and
- Explain and apply the concepts of electric and magnetic field in sequence or in combination including appropriate equations.