PHYS 1640 Energy, Environment and Sustainability (3,3,0)

Climate change and the depletion of energy resources are issues of major international concern in the contemporary world. The focus of this course is on the multiple and intricate relationships between energy, environment and sustainability issues. It allows students to fully understand the subject matter from both the natural science and social science perspectives. Through appropriate real-life examples, the course aims to guide students, in an exploration of viable alternative energy sources and to enable them to embark on a way of life that promotes a clean and sustainable use of energy resources. In addition to classroom learning, the teaching will be supplemented by field visits, demonstrations, group projects and debates.

PHYS 1650 Nano-Living: Impact of Nanoscience and Nanotechnology (3,3,0)

This course will popularize basic knowledge of nanoscience and nanotechnology, introduce an increasing range of pragmatic applications in daily life, establish critical consciousness of their social consequences (in environment, safety and human health), and prevent misleading.

PHYS 2005 Heat and Motion (3,3,0) (E)

Prerequisite: PHYS 1005 Introduction to Physics and MATH 1005 Calculus or consent of instructor

This course covers classical mechanics and thermodynamics pertaining to energy science applications. The concepts and theory of Newtonian mechanics will be introduced followed by applications to rigid body motions, wave propagation, and fluid dynamics. After presenting the laws of thermodynamics, the energy flow and energy conversion mechanisms in various thermodynamic processes will be examined.

PHYS 2006 Electricity and Magnetism (3,3,0) (E)

Prerequisite: PHYS 1005 Introduction to Physics and MATH 1005 Calculus or consent of instructor

This course introduces the basic concepts of electricity and magnetism as applied to energy technology fields. Topics include electrostatics, circuits, induction, motors, generators, alternating currents, transformers, electromagnetic waves and optics.

PHYS 2007 Mathematical Methods for Physical Sciences (4,4,0) (E)

Prerequisite: MATH 1005 Calculus or consent of instructor

This course provides students with the necessary mathematical knowledge in preparation for studying further courses in physical sciences. It illustrates the use of mathematics in physical sciences context so that students can apply their math skills in a practical situation.

PHYS 2008 Green Energy Laboratory I (1,1,0)

Co-requisite: PHYS 2005 Heat and Motion or consent of instructor

By way of lectures and a series of experiments related to principles and application of energy science, this practical course introduces Year 2 students to the basic concepts and methodologies behind experimentation and energy science.

PHYS 2009 Green Energy Laboratory II (1,1,0)

Prerequisite: PHYS 2005 Heat and Motion or consent of instructor

Co-requisite: PHYS 2006 Electricity and Magnetism or consent of instructor

By way of a series of Green Energy experiments, this practical course introduces Year II students to the basic concepts and methodologies behind Green Energy.

PHYS 2115 Electronics (3,3,0) (E)

Prerequisite: PHYS 1005 Introduction to Physics or consent of instructor

This course provides students with basic concepts of electronic circuits. Foundation concepts in both dc and ac circuit analysis will be introduced. Next, the behaviours and applications of solid state electronic devices, including diodes and transistors will be examined. The last part covers power electronics and techniques to control the flow of electrical energy between the source and the load. This course builds a foundation upon which further work in electronics and instrumentation are based. The course includes a lab-based tutorial component which gives students hand-on experience.

PHYS 2130 Electromagnetism I (3,3,0)

Prerequisite: PHYS 1122 General Physics II or consent of the instructor

Review of vector field theory, Coulomb's law, electric field, Gauss's law, electric potential, Poisson's equation, Laplace's equation, electric energy, boundary value problems, multiple expansion, electric fields in matter, magnetic field, Lorentz force, Ampére's law, and Biot Savart law.

PHYS 2140 Electromagnetism II (3,3,0)

Prerequisite: PHYS 2130 Electromagnetism I or consent of the instructor

Magnetic fields in matter, Maxwell's equations, vector potential, gauge transformation, electromagnetic energy and momentum, Poynting's theorem, electromagnetic waves, polarization, reflection and refraction, electromagnetics waves in conducting media, dispersion, wave guides, electromagnetic radiation, retarded potential and Liénard-Wiechert potential, and relativistic electrodynamics.

PHYS 2260 Modern Physics (3,3,0)

Prerequisite: PHYS 1121-2 General Physics I & II, or consent of the instructor

This course introduces the key concepts of 20th-century physics: special relativity, light quantization, wave-particle duality, and quantum physics.

PHYS 2330 Mechanics (4,4,0)

Prerequisite: PHYS 1121 General Physics I or consent of the instructor

Lagrangian and Hamiltonian Mechanics, central force motion, harmonic oscillations, coupled oscillations and waves. Teaching will be illustrated with applications.

PHYS 2340 Experimental Physics II (2,0,3)

Prerequisite: Year II standing or consent of the instructor

This course consists of a series of laboratory experiments complementing the following courses: PHYS 1121-2 General Physics I & II.

PHYS 2350 Atoms, Molecules, and Solids (3,3,0)

Prerequisite: PHYS 2260 Modern Physics, or consent of instructor

By using the framework of quantum physics, this course explains the rich and diverse properties of matter ranging from atoms to solids.

PHYS 2360 Experimental Physics III (2,0,3)

Prerequisite: Year II standing or consent of the instructor

This course consists of a series of laboratory experiments complementing the courses PHYS 2260 Modern Physics, PHYS 2130 Electromagnetism I, PHYS 3120 Statistical Physics I and PHYS 2140 Electromagnetism II.

PHYS 3005 Atomic and Nuclear Physics (4,4,0) (E)

Prerequisite: PHYS 2005 Heat and Motion or consent of instructor

This course begins by introducing the key concepts of quantum physics including the wave-particle duality, the Heisenberg uncertainty principle and the Schrödinger equation. Using the language of quantum physics, students will then explore the structure and properties of atoms and nuclei. This course also introduces the basic concepts of radioactivity and nuclear reactions and lays a foundation for understanding the working principles of nuclear power generation.