PHYS 2330 Mechanics (4,4,0) (E)
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) (E)
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) (E)
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) (E)
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 2006 Electricity and Magnetism 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.

PHYS 3006 Renewable Energy Sources (3,3,0) (E)
Prerequisite: PHYS 2005 Heat and Motion, PHYS 2006 Electricity and Magnetism, or consent of instructor
This course covers the physics and working principles of renewable energy sources such as wind, water, biomass, and geothermal energy. Environmental impacts of the various technologies are explained. Selected examples of emerging technologies and latest developments are also discussed.

PHYS 3007 Energy Storage, Distribution and Conservation (3,3,0) (E)
Prerequisite: PHYS 3005 Atomic and Nuclear Physics or consent of instructor
Co-requisite: PHYS 3015 Structure and Properties of Matter
This course explores the current practice and emerging technologies in energy storage, distribution and efficient energy usage. Selected topics on novel technologies such as high power density rechargeable batteries, nonhydrogen based fuel cells, and smart energy management etc. will also be discussed.

PHYS 3015 Structure and Properties of Matter (3,3,0) (E)
Prerequisite: PHYS 3005 Atomic and Nuclear Physics or consent of instructor
By using the framework of quantum physics, this course examines the structural, chemical, and electronic properties of matter, which form the basis for energy device applications.

PHYS 3016 Energy Management (3,3,0) (E)
Prerequisite: PHYS 2005 Heat and Motion or consent of instructor
This course explores the basic energy management strategy to streamline energy flow and maximize energy usage efficiency in daliy life. In addition to new supply-side management topics not covered in PHYS 3007 Energy Storage, Distribution and Conservation, the course will emphasize demand-side management including economics models, energy audit procedure, user-based source planning and implementation methods.

PHYS 3017 Green Energy Lab with LabView (3, 0, 3) (E)
This course provides an introductory level to graphical programming for data acquisition and instrument control encountered by science students, using LabVIEW™ as the programming platform. This course has experiments in the area of energy generation and device characterization such that the measurements are carried out with the use of LabView for data acquisition, data conversion, information presentation and file storage and retrieval.

PHYS 3025 Physics and Technology of Energy Conversion (3,3,0) (E)
Prerequisite: PHYS 2005 Heat and Motion and PHYS 2006 Electricity and Magnetism or consent of instructor
This course provides a solid foundation of energy conversion technology which is the key to renewable energy science. The processes include the conversion of Thermal, Mechanical and Chemical energy into electricity.

PHYS 3026 Instrumentation and Data Acquisition Laboratory (3,*,*) (E)
Prerequisite: COMP 1005 Essence of Computing
This course introduces graphical programming for data acquisition and instrument control encountered by science students, using LabVIEW™ as the programming platform. This course provides a basic concept of hardware interface and sampling theory, and to equip students with practical skills to data acquisition, analysis and instrument control.

PHYS 3120 Statistical Physics I (4,4,0) (E)
Co-requisite: Year III standing or consent of the instructor
Foundation course on thermal and statistical physics. After a discussion of thermodynamic systems and processes, the basic postulates and framework of the statistical mechanics will be laid out, and connections to the classical thermodynamic laws will be made. The formalism will then be applied to simple classical and quantum systems such as the ideal gas, paramagnetic solid, free electron gas and phonons in solids, etc. The quantum statistics of Bosons and Fermions will be introduced.

PHYS 3140 Solid State Physics I (3,3,0) (E)
Prerequisite: PHYS 3120 Statistical Physics I or consent of the instructor
This course studies applications of statistical physics and quantum mechancis to the solid state of matter. Aspects included are crystal structures, X-ray diffraction, lattice dynamics, thermal properties, and band theory of solids.

PHYS 3150 Quantum Mechanics I (4,4,0) (E)
Prerequisite: PHYS 2260 Modern Physics
The course begins with a revision of the elementary wave mechanics for a particle in one dimension. The basic formalism of quantum mechanics is then introduced after equipping students with tools from linear algebra. The theory is then applied to the treatment of the hydrogen atom and classification of angular momentum eigenstates. The wave functions for many-electron systems and their applications will be introducted.

PHYS 3170 Solid State Physics II (3,3,0) (E)
Prerequisite: PHYS 3140 Solid Physics I or consent of the instructor
This course is a continuation of PHYS 3140 Solid State Physics I. A wide range of properties of solids, which include charge transport phenomena, optical properties, dielectric properties, and selected new materials of current interest will be treated in detail.