PHYS 3260 Quantum Mechanics II (3,3,0)
Prerequisite: PHYS 3150 Quantum Mechanics I or consent of the instructor
This course studies the principles and applications of quantum mechanics. The topics include: angular momentum and spin, perturbation theory, the variational principle, helium atom, molecules, and scattering.

PHYS 3270 Modern Optics (3,3,0) (E)
Prerequisite: PHYS 2140 Electromagnetism II or consent of the instructor
The first part of this course focuses on understanding the nature of light and its interactions with matter. Though based on classical ideas, modern applications will be emphasized. The second part covers the quantum mechanical treatment of light-matter interactions, including semi-classical model of the laser and topics of current interest.

PHYS 3290 Statistical Physics II (3,3,0)
Prerequisite: PHYS 3120 Statistical Physics I or consent of the instructor
Elementary treatment of statistical mechanics of interacting particles and simple kinetic processes, with applications to condensed systems such as liquids, superfluids or superconductors. Topics covered include cluster expansion for non-ideal gas, simple transport processes, individual and collective diffusion, and collective phenomena.

PHYS 3310 Modern Science Experimental Lab (3,0,3)
Prerequisite: COMP 1170 Introduction to Structured Programming, COMP 1180 Structured Programming or I.T. 1180 Information Management Technology
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. In contrast to other structured programming platforms such as C and BASIC which require a sophisticated programming experience, the graphical programming environment offers a simple platform for beginners to control instruments, automate data acquisition and data presentation.

PHYS 3460 Computational Physics I (3,3,0) (E)
Prerequisite: COMP 1170 Introduction to Structured Programming or COMP 1180 Structured Programming or consent of the instructor
This is an introductory course on doing physics on the computer. By working through selected examples, students will learn basic programming strategies, as well as an appreciation of important concepts in numerical analysis, such as accuracy, stability, and efficiency of various algorithms. They will also encounter examples of modelling and simulation designed to deepen their understanding of physical phenomena such as diffusion, growth, and phase transitions. The course includes a lab component which gives the student hands-on experience in numerical computation.

PHYS 3591-2 Physics Project I & II (3,0,9)
A one-year individual project which usually relates to the interdisciplinary or applied courses in the final year, and requires knowledge and skill acquired in the course. A thesis and an oral presentation are required upon completion of the project. This course is open to Physics majors only.

PHYS 3640 Computational Physics II (3,3,0)
Prerequisite: PHYS 3460 Computational Physics I or consent of the instructor
This course focuses on the Molecular Dynamics (MD) and Monte Carlo (MC) methods applied to particle and spin systems. The basic ideas are first introduced through the simple example of a harmonic oscillator. The MD method is then applied to a many-particle classical system in a box. Some standard algorithms for numerical integration, and for bookkeeping are discussed, along with methods of data analysis. Two versions of the MC method will be applied to the Ising model. The question of relaxation time will be addressed. Finally, a version of the MC method will be introduced to simulate the liquid state of a particle system and compared with the corresponding MD simulation.

PHYS 3910 Topics in Physics I (*,*,*) (E)
PHYS 3920 Topics in Physics II (*,*,*) (E)
PHYS 3930 Topics in Physics III (*,*,*) (E)
Prerequisite: Year III standing or consent of the instructor
This course covers more advanced topics or topics of current interest. A partial list of the topics includes the following: Acoustics, Computer-controlled Instrumentation, Materials Science, Electronic Instrumentation, Lasers and Their Applications, Optoelectronics, Seminconductor Physics, and Spectroscopy. This course can be repeated for credit if the topic is different.

PHYS 4005 Non-Fossil Fuels (3,3,0)
Prerequisite: PHYS 3005 Atomic and Nuclear Physics and PHYS 3015 Structure and Properties of Matter or consent of instructor
This course covers the physics and working principles of important nonfossil fuels, including nuclear, geothermal, and solar energy sources. Environmental impacts of the various technologies are explained. Selected examples of emerging technologies and latest developments are also discussed.

PHYS 4006 Advanced Green Energy Laboratory (Metrology) (3,0,3)
Prerequisite: PHYS 3017 Green Energy with LabView or consent of instructor
This laboratory course uses LabVIEW based software to perform experiments. The teaching mode includes lectures, lab exercises, and project-based experiments related to (1) energy harvesting; (2) energy conversion efficiency; (3) energy conservation; (4) measurements of meteorological parameters and atmospheric constituents; (5) meteorological instrumentation; and (6) characterizations of energy harvesting materials and solar cells.

PHYS 4007 Advances in Displays and Lighting (3,3,0)
Prerequisite: PHYS 4025 Solid State Physics I and PHYS 4017 Semiconductor Physics and Devices, or consent of instructor
This course provides students with an insight on understanding the principles of displays and lighting that are widely used for application in mobile appliance, automotive lighting, traffic signals, signage, LCD backlighting, advanced displays and energy efficient lighting.

PHYS 4015 Introduction to Intellectual Properties (2,2,0)
Prerequisite: Year IV standing
This is an elective course for Year IV students majoring in Green Energy Science but it is open to all senior year students in all majors. The course offers basic knowledge on copyrights, patent filing and patent application.

PHYS 4016 Renewable Energy Materals and Devices (3,3,0)
Prerequisite: PHYS 3015 Structure and Properties of Matter or consent of instructor
This course provides students an insight on understanding the renewable energy materials and devices with emphasis on semiconductor science and photovoltaic technologies for application in energy harvesting. Topics cover the principles of semiconductor physics, basic energy bands, carrier transport, p-n junctions, photovoltaic effect, device structures, applications and recent advances in solar cell technologies.