PHYS 4016 Renewable Energy Materals and Devices (3, 3, 0) (E)

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.

PHYS 4017 Semiconductor Physics and Devices (3,3,0) (E)

Prerequisite: PHYS 3015 Structure and Properties of Matter or consent of instructor

This course introduces the basic physics of semiconductor materials and the physical principles of key semiconductor devices. Both electronic and optical properties of semiconductors are covered. Selected applications of the semiconductor devices, e.g. in light-emitting diodes, solar cells and photo-detectors, will be presented.

PHYS 4025 Solid State Physics I (3,3,0) (E)

Prerequisite: PHYS 3015 Structure and Properties of Matter of consent of 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 4026 Surface Analysis and Characterization (3,3,0) (E)

Prerequisite: CHEM 3027 Materials Testing and Characterization or consent of instructor

This course provides students an insight on understanding the principles of most commonly used techniques for materials characterization with emphasis on surface analysis, typical instrumentation, and analytical methods that are widely used for application in characterizing surface properties of chemicals, polymers, ceramics, semiconductors, alloys, metals and composites.

PHYS 4898-9 Final Year Project I & II (3,0,9) (E)

Prerequisite: Year IV standing or consent of instructor

All final year students majoring in Green Energy Science have to complete a project. The project may be taken as a semester-project or a year-project. It is one of the key elements in the programme to train students to explore energy science in a research setting. The range of projects is diverse and each student will work independently under faculty supervision. Upon completion, the student will gain valuable hands-on experience in problem solving. He will be required to communicate his results via written texts and oral presentation.

PHYS 7310 Introduction to Environmental Science (3,3,0)

After completion of this course, students will develop knowledge of (1) Ecosystem and (2) how the Ecosystem responses to environmental change due to population growth. Students should also comprehend the concepts of (3) physical and energy resources.

PHYS 7320 Principles and Technologies of Renewable Energy I (3,3,0)

This course introduce the principles and technologies of renewable energy. After completion of this course, students will learn (1) the origin of renewable energy flow; (2) blackbody radiation, solar spectrum and radiation; (3) the Earth's energy budget; (4) working principles of inorganic and organic photovoltaic cells; (5) device fabrication and architecture; (6) materials science and characterization methodology of photovoltaic cells; and (7) solar cell systems and installation.

PHYS 7330 Principles and Technologies of Renewable Energy II (3,3,0)

Prerequisite: PHYS 7320 Principles and Technologies of Renewable Energy I

After completion of this course, students will learn (1) the origin of renewable energy flow; (2) individual renewable energy sources, including solar radiation, wind, ocean waves, water flows and tides, heat flows and stored heat, biomass; (3) large scale energy conversion processes; and (4) power transmission and energy storage technologies.

PHYS 7340 Energy Harvesting and Energy Conservation (3,3,0)

Prerequisite: PHYS 7320 Principles and Technologies of Renewable Energy II

After completion of this course, students will learn the following: (1) renewable energy system analysis; (2) harvesting parasitic energy in daily life; (3) harvesting chemical energy; and (4) energy conservation.

PHYS 7350 GIS and Remote Sensing (3,3,0)

This course introduces the knowledge of atmospheric science and radiation, meteorological instrumentation, data inversion and retrieval algorithm for environmental monitoring. After completion of this course, students will learn (1) atmospheric physics; (2) radiation transfer, absorption and scattering of solar radiation in Earth's atmosphere; (3) sensors and measurement instrumentation for atmospheric parameters and constituents; (4) working principles of GPS and its data format, and GIS data representation; (5) satellite platform, airborne, and ground-based remote sensing methodology and instrumentation; and (6) data inversion methodology and algorithm.

PHYS 7360 Green Laboratory (3,0,3)

This laboratory course includes lectures, lab exercises, and project-based experiments. The laboratory provides a set of practical experiments, which 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 7371-2 Project in Green Technology (6,0,3)

The objective of the course is to enable students to develop mastery of green technology related concepts, including energy harvesting, energy conservation, and pollution monitoring. Students are expected to perform a highly independent work. After completion of this course, they will be able to demonstrate their mastery of course materials and apply what they have learnt in implementing practical problems. Students may propose a topic or select a project from a list of topics provided by the Department.

PHYS 7380 Advanced Topics in Physics I (3,3,0)
PHYS 7390 Advanced Topics in Physics II (3,3,0)
PHYS 7400 Advanced Topics in Physics III (3,3,0)

Prerequisite: Postgraduate standing or consent of instructor

This course are advanced courses reflecting the research interests of the time and of the faculty. Fundamental physics concepts and skills acquired from upper level undergraduate courses will be applied in these courses. Topics offered include Materials Science, Scientific Instrumentation, Modern Optics, Optoelectronics, Semiconductor Physics, Biophysics, Nonlinear Dynamic and Spectroscopy. These courses can be repeated for credit if the topics are different.

PHYS 7410 Physics for Green Technology (3,3,0)

This course covers the physics for green technology and environmental science, including classical and fluid mechanics, thermodynamics, electrostatics and electricity, electromagnetic waves, optics, and modern physics.