concepts, models and theories of public and interpersonal communication; to be able to apply public and interpersonal communication concepts and theories to analyse their own, interpersonal, and group behaviors; to enhance their team building and leadership skills; to improve their written and oral communication skills relevant to sport and recreation.

PERM 4015 Marketing in Leisure Services (3,2,1)
Prerequisite: PERM 2006 Organization and Administration in Physical Education and Recreation
The course covers the fundamental marketing knowledge of sport and recreation and its applications in the Western and Chinese sport industry. Upon completion of the course, students should be able to (1) understand the differences between services and physical product; (2) identify the role of marketing in leisure and sport services; and (3) apply the marketing knowledge in leisure and sport services.

PERM 4016 Outdoor Recreation (3,3,0)
Prerequisite: PERM 1317 Outdoor Pursuits
This course is to introduce fundamental knowledge and issues in outdoor recreation as well as in leading recreation activities. Upon completion of the course, students should be able to (1) comprehend the fundamentals of outdoor recreation; (2) understand the nature and outdoor resources for recreation; and (3) acquire essential skills to be leaders in outdoor recreational activities.

PERM 4017 Principles and Practice of Exercise and Weight Management (3,3,0)
This course introduces students to the scientific principles underlying the design of weight management programmes. It also provides students with an understanding of the obesity issues. It enables students to: (1) understand the health risks and the etiology of obesity; (2) introduce exercise prescription and intervention to combat obesity; and (3) understand the issue of obesity and weight control in physiological, sociological, and psychological context.

PERM 4895 Honours Project (3,*,*)
Prerequisite: PERM 3006 Research Methods
This course is a required project for all BA (Hons) in Physical Education and Recreation Management students. Students will pursue in-depth research on a specific topic of interest to the student under the guidance of appointed lecturers from the Department offering the course. Students are to consult with their advisers regarding the necessary field study, experimentation, library or archival research required, and how best to integrate this into their Honours Project.
This course enables students to initiate, conduct and write-up a research project in the physical education and reaction management field; to integrate the professional skills which have been taught in the preceding two years with specific application to a topic to produce a well-argued and documented report.

PHYS 1005 Introduction to Physics and Energy Science (3,3,0)
This course introduces some basic concepts of physics with emphasis on real-life examples, in particular applications in energy science. It explores the fundamental physical principles in the workings of everyday objects and natural phenomena, everyday objects and the processes of energy conversion and usage.

PHYS 2005 Heat and Motion (3,3,0)
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)
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)
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 2015 Guided Study in Physics and Energy Science I (3,0,0)
This course is part of an elite undergraduate study program supervised by a faculty member in the Physics Department. The goal is to prepare the student for advanced studies and research in physics and energy science. Examples of topics include electrodynamics, statistical physics, materials science, electronic instrumentation, spectroscopy, and nuclear physics and technology. The student should accomplish one of the following. (1) Research on a non-textbook problem, (2) acquire a research skill, (3) learn how to use a research tool, or (4) study an advanced subject in depth. The student must submit a written report at the end of the semester.

PHYS 2115 Electronics (3,3,0)
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 3005 Atomic and Nuclear Physics (4,4,0)
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.

PHYS 3006 Renewable Energy Sources (3,3,0)
Prerequisite: PHYS 2005 Heat and Motion 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)
Prerequisite: PHYS 2005 Heat and Motion or consent of instructor
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)
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)
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)
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)
Prerequisite: PHYS 2005 Heat and Motion 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,*,*)
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 3027 Intermediate Electromagnetism (3,3,0)
Prerequisite: PHYS 2006 Electricity and Magnetism or consent of instructor
This course studies electomagnetism up to Maxwell's equations at an intermediate level. It uses the tools of vector calculus for solving special problems in electrostatics and magnetostatics including the presence of dielectric and magnetic materials.

PHYS 3035 Energy and Thermodynamics (3,3,0)
Prerequisite: PHYS 2005 Heat and Motion or consent of instructor
This course introduces the relation between free energy and kinematics by demonstrating the statistical formalism of thermodynamics. Different kinds of free energy for different ensembles will be discussed, followed by applications of the statistical formalism to simple thermodynamic systems.

PHYS 3036 Mechanics (3,3,0)
Prerequisite: PHYS 2005 Heat and Motion or consent of instructor
This course deals with the basic theory of Lagrangian and Hamiltonian mechanics, coupled oscillations, and central force motion. It extends the basic discussions on mechanical motion in the lower level course, Heat and Motion, to a more general mathematical and theoretical framework, and provides a broader foundation for understanding and employing classical mechanics in energy science applications.

PHYS 3037 Guided Study in Physics and Energy Science II (3,0,0)
This course is part of an elite undergraduate study program supervised by a faculty membter in the Physics Department. The goal is to prepare the student for advanced studies and research in physics and energy science. Examples of topics include electrodynamics, statistical physics, materials science, electronic instrumentation, spectroscopy, and nuclear physics and technology. The student should accomplish one of the following. (1) Research on a non-textbook problem, (2) qcquire a research skill, (3) learn how to use a research tool, or (4) study an advanced subject in depth. The student must submit a written report at the end of the semester.

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.

PHYS 4017 Semiconductor Physics and Devices (3,3,0)
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)
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)
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 4027 Computational Physics (3,3,0)
Prerequisite: Year IV standing or consent of instructor
This is an introductory course on computer simulation. By working through selected examples, including green energy related topics such as the OLED emission, students will learn basic programming strategies, as well as an appreciation of important concepts in numerical analysis, such as accuracy, stability, and deficiency of various algorithms. The course includes a lab component which gives the student hands-on experience on computer simulation. An introduction to higher level languages or subroutines may also be included.

PHYS 4035 Topics in Energy Science I (3,3,0)
PHYS 4036 Topics in Energy Science II (3,3,0)
PHYS 4037 Topics in Energy Science III (3,3,0)
Prerequisite: Year IV standing or consent of instructor
These courses are specialized courses reflecting the development of the time and the research interests of the faculty. Examples of topics include Materials Science, Electronic Instrumentation, Optoelectronics, Spectroscopy, and Nuclear Physics and Technology. These courses can be repeated for credit if the topics are different.

PHYS 4045 Electromagnetic Waves and Optics (3,3,0)
Prerequisite: PHYS 3027 Intermediate Electromagnetism or consent of instructor
The first part of this course introduces the classical theory of electromagnetic waves and their interactions with matter. The second part treats interference and diffraction. The third part covers laser basics and Gaussian beams. Current topics will also be discussed.

PHYS 4046 Quantum Mechanics (4,4,0)
Prerequisite: PHYS 3005 Atomic and Nuclear Physics or consent of instructor
To learn the basic theory of quantum mechanics: from the wave mechanics of a particle in one dimension, through formalistic Hilbert space and matrix mechanics, to many particle systems.

PHYS 4898-9 Final Year Project I & II (3,0,9)
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 7040 Advanced Topics in Physics I (3,3,0)
PHYS 7050 Advanced Topics in Physics II (3,3,0)
PHYS 7060 Advanced Topics in Physics III (3,3,0)
Prerequisite: Postgraduate standing or consent of instructor
These courses cover advanced topics of physics at the postgraduate level. The topics include: (1) Materials Science (Semiconductor Physics, Structural and Device Materials, Characterization Techniques); (2) Optics and Lasers (Optoelectronic Devices and Systems, Laser Physics and Applications, Spectroscopy); (3) Instrumentation (Data Capture, Noise Reduction and Signal Recovery); (4) Acoustics; (5) Advanced Quantum Mechanics; (6) Advanced Statistical Physics; (7) Advanced Condensed Matter Physics; (8) Advanced Computational Physics; (9) Nonlinear Dynamic and Chaos; (10) Phase Transitions and Critical Phenomena

PHYS 7320 Renewable Energy Technologies 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 Renewable Energy Technologies II (3,3,0)
Prerequisite: PHYS 7320 Renewable Energy Technologies 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 Renewable Energy Technologies III (3,3,0)
Prerequisite: PHYS 7330 Renewable Energy Technologies 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 Geographic Information System and Remote Sensing (3,3,0)
In this course, students will learn the following: (1) atmospheric physics; (2) principles of radiation and energy transfer in the

atmosphere; (3) measurement techniques of atmospheric parameters and constituents; (4) satellite and remote sensing instrumentation; and (5) 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 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.

PHYS 7420 Energy Usage, the Environment and Sustainability (3,3,0)
This course allows students to comprehend the significance of energy sources, their capacity, security, costs and their effects on the environment. The energy production and economic distinction between non-renewable (e.g. coal, gas, oil and nuclear fuel) and renewable sources (e.g. wood, biomass, hydro, solar, wind, geothermal and ocean) upon amongst different countries will be explored. In addition, an examination on the role of nuclear energy and its concerns in radiation, spent fuel waste disposal and safety issue are addressed.

PHYS 7430 Introduction to Modern Materials (3,3,0)
This course aims to provide a broad base on properties of modern materials and their applications. Topics cover structure, properties and functionality of materials including metals, ceramics, polymers and semiconductors.

PHYS 7440 Principles of Optoelectronics (3,3,0)
This course aims to provide a broad base on optoelectronic properties of semiconductors and device applications. Topics cover surface and interface of semiconductors, optical properties of semiconductors, light generation in semiconductors and recent advances in organic electronics.

PHYS 7450 Principles of Photonic Physics (3,3,0)
This is an introduction into advanced topics in propagation of electromagnetic waves in a medium and interaction of electromagnetic waves with matter. Topics covered include derivation of optical constants such as susceptibility and dielectric constants, absorption, scattering and refraction.

PHYS 7460 Advances in Displays and Lighting (3,3,0)
This course provides students 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 7470 Energy Audit and Management (3,3,0)
This is a professional training course leading to the certified energy manager (CEM) requirement under the Association of Energy Engineers (AEE), USA. The course covers the latest energy cost reduction techniques in commercial building and the manufacturing industries of which CEM is an internationally recognized professional certification in energy management. The training focuses on the technology, the economics, the policies and the regulations for effective energy management.

PHYS 7480 Organic Electronics (3,3,0)
This interdisciplinary course describes the fundamentals of organic semiconductor materials, molecular design, synthesis, material processes, discusses the operation principle of organic semiconductor devices, enables students to become familiar with relevant terminology and be aware of the latest progresses in the emerging field of organic electronics, including functional organic semiconductors for applications in solar cells, transistors, sensors, advanced flat panel displays, and generation solid state lighting etc.

POLS 1005 Foundations of Political Science (3,2,1)
This is a course which introduces students to a comprehensive review of the field of political science. Basic concepts, political theories and methodologies, political institutions, political parties are all examined. The Subfields of comparative politics and international relations are also integral parts of the course so as to lay down the foundation for further studies. Political developments in Europe and China are frequently employed as examples and related to the introduction of political ideas.

POLS 1110 Introduction to Research Methods (3,2,1)
This course is designed to enhance students' ability to perceive, evaluate and understand political phenomena through a systematic introduction to a wide range of approaches, methods and theories of political science. Basic research procedures and academic writing are the other foci of the course. Students are encouraged to analyse and explain the current political development of Europe, mainland China or Hong Kong with the help of particular perspectives and research methods. This course is open to GIS and European Studies majors only.

POLS 1120 Introduction to Political Economy (3,2,1)
Political economy, with its roots in the European 17th and 18th centuries, was the forefather of what developed in the 20th century into the two separate disciplines of political science and economics. However, it has remained as that discipline which examines the relationship of the individual to society, the economy, and the state. It is the study of relations and choices, of structures and institutions, of scales from the personal and local to the national, international, and global. Its originators include Locke, Hobbes, Adam Smith, Karl Marx, and Max Weber. Including choice theory and market theory, system theory, development theory and public policy theory, political economy examines the historic and human behavioural linkages among values/morals, politics, economic reality and economic reasoning. This course is open to GIS majors and GIS minors only.

POLS 1140 Political Movements: Chinese and European (3,2,1)
Prerequisite: *For GIS major*: POLS 1510 Foundations of Political Science or POLS 1520 Government and Politics of China
For ES major: EURO 1111 Europe: Unity and Diversity
The course examines three major political movements—nationalism, liberalism, and socialism—within a comparative context. By "movement" is meant not solely an ideology, but an ideology in relation to concrete political developments and popular mobilization. European experience of the three movements will be compared and contrasted with Chinese experience. This course is open to GIS and European Studies majors only.