Postgraduate Programmes

Honours modules in Physics

SPHA081: Quantum Mechanics	**Credits: 20**	**Co-requisite / Prerequisite: SPHB081**
Content: Postulate and Concepts of Quantum Mechanics: Vectors and Operators in Hilbert space and their representatives; observable, measurement and uncertainties; Angular momentum: Commutator Relations, Ladder Operators, Spin, angular momentum eigenstates and eigenvalues, addition of angular momentum, spin correlation; Approximation methods: Time independent perturbation theory, Time-dependent perturbation theory, Variational Principle, WKB approximation, Identical particle: Two particle system, boson and fermions, exchange forces, atoms, Quantum statistical mechanics		

SPHB081:Statistical Mechanics	**Credits: 20**	**Co-requisite / Prerequisite: SBPA081**
Content: Boltzman's velocity distribution law. The Gamma space. The micro canonical ensemble. The canonical ensemble. Quantum Statistics. Bose–Einstein and Fermi-Dirac Statistics. Gas degeneration with example of strongly and weakly degenerate Fermi-Dirac and Bose Einstein gases. Einstein and Debye expression for heat capacity. Plank's radiation formula applications.		

SPHA082:Electrodynamics	**Credits: 20**	**Co-requisite / Prerequisite: SPHB082**
Content: **Maxwell's equations**. **Conservation Laws**: Charge and Energy.		

Electromagnetic Waves: Waves in One Dimension; Electromagnetic Waves in Vacuum; Electromagnetic Waves in Matter; Absorption and Dispersion; Guided Waves. **Potentials and Fields**: The Potential Formulation; Continuous Distributions; Point Charges. **Radiation**: Dipole Radiation; Point Charges.

SPHB082: Solid State Physics	**Credits: 20**	**Co-requisite / Prerequisite: SPHA082**
Content: Core Topics: Defects Solid State: classifications of imperfections, point defects and ordering, diffusion and alloying, dislocations, defect and dislocation energies, elasticity and elastic properties, entropy and energy relation in crystals, voids and crystal lattice relations, semiconductors and impurities, interactions and dislocation vectors, Burger's vectors and energy of alloys. Miscellaneous Topics: Electron Microscopy: interaction of electrons with matter, scattering factor and amplitude, crystal potentials, kinematical and dynamical theory, intensity distribution and contrasts. Electron diffraction patterns and indexing. Kikuchi lines and secondary diffraction.		

SPHS080: Research Project	**Credits: 40**	**Co-requisite / Prerequisite: SPHA081, SPHB081, SPHA082, SPHB082**
Content: Student will be introduced to many of the skills required to carry out independent research. The exact skills taught will depend on the type of research project to be undertaken. However, the skills will include laboratory techniques, word processing, literature and oral presentation.		

Master of Science in Physics:

SPHA090: Dissertation	**Credits: 180**	**Prerequisite:** A relevant Master degree
Content: An MSc degree in Physics comprises a dissertation based on the results of an approved supervised research project presented in a form suitable for publication. There is no coursework component. Depending on the field of research, an external supervisor(s) may be required to supply effective supervision of the project.		

Doctor of Philosophy in Physics

SPHA100: Thesis	**Credits: 360**	**Prerequisite:** A relevant Master degree
Content: A PhD degree in Physics comprises a thesis based on the results of an approved supervised research project presented in a form suitable for publication. There is no coursework component. Depending on the field of research, an external supervisor(s) may be required to supply effective supervision of the project.		