BSc (Hons) Physics with Computing - SC342 (Under Review)

1. Objectives

One of the most important concepts in physics is that, behind the apparent complexity of the world around us, nature has an underlying simplicity and unity which can be expressed in terms of all-embracing fundamental principles and laws. As well as being concerned with such fundamental questions, physics is a widely applicable subject and forms the basis of much of modern and, more importantly, future technologies.

The Physics with Computing programme provides a solid grounding in physics, mathematics, and computing. The programme combines the study of a fundamental and widely applicable subject with the opportunity to acquire high-level skills in experimental, theoretical and computational methods of problem solving. It also includes state of the art topics like bioinformatics and data mining. As such, the programme provides a secure foundation for a very wide range of careers including teaching, computing and finance, as well as in the more obvious technical areas of research and development in industry, government laboratories and universities. The analytical and problem solving competences of physicists are also appreciated worldwide in less obvious areas like management and law.

IN ADDITION, OUR PROGRAMME OFFERS THE APPROPRIATE BACKGROUND FOR SPECIALISATION THROUGH FURTHER STUDIES, OR RESEARCH AT POSTGRADUATE LEVEL, BOTH LOCALLY AND OVERSEAS.

2. General Entry Requirements

As per General Entry Requirements for admission to the University for undergraduate degrees.

3. Programme Requirement

Passes at GCE 'A' Level in Mathematics and Physics.

4. Programme Duration

	Normal	**Maximum**
Degree:	6 Semesters *(i.e. 3 years)*	10 Semesters *(i.e. 5 years)*

5. Credits per Semester

Minimum: 9 credits; Maximum (including retake modules): 27 credits

6. Minimum Credits Required for Award of Undergraduate Degree: 101

Breakdown as follows:

	Credits from		
Degree	**Core Taught Modules**	**Project/Dissertation**	**Electives[a]**
BSc (Hons) Physics with Computing	75	8	18

[a] 18 credits from electives: A minimum of 15 credits from departmental electives out of which at least 6 credits should be from electives with a PHYCO code.

7. Assessment

Each module can either be taught in semester 1 only or in semester 2 only or throughout the two semesters.

Modules wholly taught in one semester are termed semester modules whereas modules taught throughout two semesters are termed yearly modules.

Each module will be assessed over 100 marks with details as follows (unless otherwise specified).

Assessment will be based on a written examination of a paper of 2 to 3-hour duration (normally a paper of 2 hour duration for modules carrying 3 credits or less, 2½ hour paper for modules carrying 3.5-4.5 credits and 3 hour paper for modules carrying 5 to 6 credits) and on continuous assessment done during the semester or year.

Written examinations for semester modules will be held in the semester they are taught in. Yearly modules will be examined at the end of the year.

The continuous assessment will count for 20-30% of the overall percentage mark for the module(s) unless specified otherwise. Continuous assessment may be based on laboratory work, seminars and/or assignments and should include at least two (2) assignments/tests per year per module.

An overall total of 40% for combined continuous assessment and written examination components would be required to pass the module, without minimum thresholds within the individual continuous assessment and written examination..

In case of yearly modules, special examinations (e.g. class tests) will be arranged at the end of semester 1 or semester 2 for exchange students who have registered only for one semester; credits will be assigned on a pro-rata basis.

The following module will be assessed over 50% continuous assessment and 50% written exam:

PHYCO 3001(5) - Signal and Image Processing

The following modules will carry 100 marks each and will be assessed solely by continuous assessment:

PHYSI 1006Y(3) - Physics Lab I
PHYCO 1201(1) - Numerical and Scientific Computing I
PHYCO 1100(1) - Operating Systems and Softwares

Modules will carry the weightings of 1, 3 or 5 depending on their status (Introductory, Intermediate or Advanced). Weighting for a particular module is indicated within parentheses in the module code.

Projects/Dissertations will carry 8 credits for degree award. They will be carried out normally in the area of specialisation.

8. List of Modules

A. Physics Core Modules (75 + 8 credits)

Code	Module Name	HRS /WK L+P	Credits
PHYCO 1100(1)	Operating Systems and Scientific Softwares	2+2	3
PHYCO 1201(1)	Numerical & Scientific Computing I	2+2	3
PHYCO 2001(3)	Numerical & Scientific Computing II	2+2	3
PHYCO 2002(3)	Computer Simulation Methods	2+2	3
PHYCO 3001(5)	Signal & Image Processing	2+2	3
PHYSI 1101(1)	Mathematical Techniques for Physicists I	3+0	3
PHYSI 1201(1)	Mathematical Techniques for Physicists II	3+0	3
PHYSI 1102(1)	Mechanics I	3+0	3
PHYSI 1203(1)	Physics of Matter	3+0	3
PHYSI 1104(1)	Waves & Optics I	3+0	3
PHYSI 1204(1)	Electromagnetism I	3+0	3
PHYSI 1105(1)	Electric Circuits & Electronics	3+0	3
PHYSI 1006Y(3)	Physics Lab I	0+3	3
PHYSI 1107(1)	Thermal Physics	3+0	3
PHYSI 1208(1)	Quantum Physics	3+0	3
PHYSI 1009(1)	Introduction to Astronomy	3+0	3
PHYSI 2101(3)	Maths for Physicists I	3+0	3
PHYSI 2201(3)	Maths for Physicists II	3+0	3
PHYSI 2002(3)	Mechanics II	3+0	3
PHYSI 2203(3)	Optics II	3+0	3
PHYSI 2104(3)	Electromagnetism II	3+0	3
PHYSI 2005(3)	Quantum Mechanics I	3+0	3
PHYSI 3000Y(5)	Project/Dissertation	–	8
PHYSI 3001(5)	Nuclear Physics	3+0	3
PHYSI 3104(5)	Statistical Physics	3+0	3
PHYSI 3006(5)	Solid State Physics I	3+0	3

B. Physics With Computing Electives (Not all electives may be on offer)

PHYCO 2003(3)	Bioinformatics	2+2	3
PHYCO 2004(3)	Computing Case Study Module	1+4	3
PHYCO 2010(3)	High Performance Computing in Physics I	2+2	3
PHYCO 3002(5)	Databases & Data Mining	2+2	3
PHYCO 3003(5)	Microprocessor & Microcontroller Systems	2+2	3
PHYCO 3010(5)	High Performance Computing in Physics II	2+2	3
PHYAS 2008(3)	Astrophysics I	2.5+1	3
PHYAS 2011(3)	Astronomical Techniques I	2.5+1	3
PHYEL 2007(3)	Electronics & Communications	2+2	3
PHYEL 3005(5)	Classical Mechanics	3+0	3
PHYEL 3007(5)	Medical Physics	3+0	3
PHYEL 3009(5)	Electromagnetic Theory	3+0	3
PHYSI 3003(5)	Elementary Particle Physics	3+0	3
PHYSI 3102(5)	Atomic & Molecular Physics	3+0	3

C. Other Electives

And/or modules approved by the department

9. Programme Plan - BSc (Hons) Physics with Computing

YEAR 1

Code	Module Name	HRS/WK L+P	Credits
CORE			
PHYCO 1100(1)	Operating Systems and Scientific Softwares	2+2	3
PHYCO 1201(1)	Numerical & Scientific Computing I	2+2	3
PHYSI 1101(1)	Mathematical Techniques for Physicists I	3+0	3
PHYSI 1201(1)	Mathematical Techniques for Physicists II	3+0	3
PHYSI 1102(1)	Mechanics I	3+0	3
PHYSI 1203(1)	Physics of Matter	3+0	3
PHYSI 1104(1)	Waves & Optics I	3+0	3
PHYSI 1204(1)	Electromagnetism I	3+0	3
PHYSI 1105(1)	Electric Circuits & Electronics	3+0	3
PHYSI 1006Y(3)	Physics Lab I	0+3	3
PHYSI 1107(1)	Thermal Physics	3+0	3
PHYSI 1208(1)	Quantum Physics	3+0	3
PHYSI 1009(1)	Introduction to Astronomy	3+0	3

YEAR 2

Code	Module Name	HRS/WK L+P	Credits
CORE			
PHYCO 2001(3)	Numerical & Scientific Computing II	2+2	3
PHYCO 2002(3)	Computer Simulation Methods	2+2	3
PHYSI 2101(3)	Maths for Physicists I	3+0	3
PHYSI 2201(3)	Maths for Physicists II	3+0	3
PHYSI 2002(3)	Mechanics II	3+0	3
PHYSI 2203(3)	Optics II	3+0	3
PHYSI 2104(3)	Electromagnetism II	3+0	3
PHYSI 2005(3)	Quantum Mechanics I	3+0	3
ELECTIVES			
PHYCO 2003(3)	Bioinformatics	2+2	3
PHYCO 2004(3)	Computing Case Study Module	1+4	3
PHYCO 2010(3)	High Performance Computing in Physics I	2+2	3
PHYEL 2007(3)	Electronics & Communications	2+2	3
PHYAS 2008(3)	Astrophysics I	2.5+1	3
PHYAS 2011(3)	Astronomical Techniques I	2.5+1	3

And/or modules approved by the department.

YEAR 3

Code	Module Name	HRS/WK L+P	Credits
CORE			
PHYCO 3001(5)	Signal & Image Processing	2+2	3
PHYSI 3000Y(5)	Project/Dissertation	–	8
PHYSI 3001(5)	Nuclear Physics	3+0	3
PHYSI 3104(5)	Statistical Physics	3+0	3
PHYSI 3006(5)	Solid State Physics I	3+0	3
ELECTIVES			
PHYCO 3002(5)	Databases & Data Mining	2+2	3
PHYCO 3003(5)	Microprocessor & Microcontroller Systems	2+2	3
PHYCO 3010(5)	High Performance Computing in Physics II	2+2	3
PHYSI 3003(5)	Elementary Particle Physics	3+0	3
PHYSI 3102(5)	Atomic & Molecular Physics	3+0	3
PHYEL 3005(5)	Classical Mechanics	3+0	3
PHYEL 3007(5)	Medical Physics	3+0	3
PHYEL 3009(5)	Electromagnetic Theory	3+0	3

and/or modules approved by the department.

Note: Not all electives may be on offer.

IMPORTANT NOTE: The student will be allowed to opt for the BSc (Hons) Physics, BSc (Hons) Physics with Computing, or any other future Physics undergraduate programme, offered by the department after the common first year, subject to the programme being offered by the department.

10. Outline Syllabus

This outline syllabus is not prescriptive and is intended to serve as a guide only.

PQ: Prerequirement *(must have followed module & sat for exams)*
PR: Prerequisite *(must have attained a minimum of grade D)*
RQ: Must register for the module, or must have followed the module & sat for exams
MR: Minimum Requirement *(Must have the required number of credits)*

CORE MODULES

PHYSI 1101(1) - MATHEMATICAL TECHNIQUES FOR PHYSICISTS I (PR: A-Level Physics & Maths)
Vector algebra: vector addition, scalar and vector products, triple products. Vector equation: differentiation and integration of vectors. Polar coordinates. Introduction to complex numbers. Calculus of several variables: partial derivatives, scalar and vector fields. Coordinate systems: cylindrical, spherical. Vector Analysis: gradient, divergence and curl. Line and multiple integrals. Green's theorem in the plane, Divergence theorem and Stokes' theorem. Ordinary differential equations: methods of solution for first order differential equations.

PHYSI 1102(1) - MECHANICS I (PR: A-Level Physics & Maths)
Vectors, Statics, Frames of reference, Kinematics, Dynamics & Forces, Newton's laws of motion, Momentum, Conservation laws, Newton's law of gravitation, Oscillatory motion, Resonance.

PHYSI 1104(1) - WAVES & OPTICS I (PR: A-Level Physics & Maths)
Vibrations and Waves; Fundamentals of geometrical optics; Fermat's principle; Corpuscular theory versus Wave theory; Reflection and refraction at plane/curved surfaces; Aberrations; Matrix Method in Optics; Optical instruments.

PHYSI 1105(1) - ELECTRIC CIRCUITS & ELECTRONICS (PR: A-Level Physics & Maths)
Ohm's law and Kirchoff's laws. Basic electrical components. Steady state DC. Linear circuit analysis and Network theorems. Single phase a.c. Circuits. Three-phase AC systems. Semiconductor diodes and circuits. Introduction to BJ Transistors. Boolean algebra. Karnaugh table. Logic gates. Transients.

PHYSI 1006Y(3) - PHYSICS LAB I (PR: A-Level Physics)
Lectures on measurement systems and methods, characteristics and uses of instruments, data analysis and presentation, report writing. Practical training sessions will consist of a variety of experiments closely related to level/year 1 core Physics modules and will cover topics like heat, optics, sound, electricity, mechanics and properties of matter.

PHYSI 1107(1) - THERMAL PHYSICS (PR: A-Level Physics & Maths)
State variables, equilibrium states, PVT surface temperature, Zeroth law of thermodynamics, Thermometers, temperature scales. Thermal expansion, thermal conductivity in solids, Specific heat, phase changes. Laws of thermodynamics. Entropy and the second law. Heat engines and reversible processes. Kinetic theory of gases. Specific heats of gases, Law of equipartition of energy, atomicity. Adiabatic processes, speed of sound in gases. Free energies and Maxwell's relations. Black-body radiation.

PHYSI 1201(1) - MATHEMATICAL TECHNIQUES FOR PHYSICISTS II (PQ: PHYSI 1101(1))
Further differential equations. Further complex numbers. Hyperbolic functions. Limits. Curve sketching. Infinite series: comparison test and ratio test for non-negative series. Introduction to Fourier Series. Matrix Algebra: Matrices, determinants, inverses; solutions of linear systems of equations. Eigenvalues and eigenvectors.

PHYSI 1203(1) - PHYSICS OF MATTER (PR: A-Level Physics & Maths)
States of matter, Interatomic and intermolecular forces, X-ray diffraction and the crystal lattice, Cohesive & Elastic properties, Thermal motion & Boltzmann principle, Thermal properties of crystalline solids and gases, Transport properties. Polarisation in dielectrics, permittivity and dielectric susceptibility. Magnetism in matter: Magnetisation, magnetic susceptibility and permeability. Elements of fluid mechanics. Concepts of fluid flow.

PHYSI 1204(1) - ELECTROMAGNETISM I (PR: A-Level Physics & Maths)
Electrostatics: Coulomb's Law and the electric field; Electric flux and Gauss's Law. Electric potential, and the relationship between field and potential. Capacitors and electrical energy storage. Calculations of the electric field, electric potential and capacitance in simple cases. Magnetostatics: Magnetic fields and forces generated by a conductor; Biot-Savart and Ampere's Laws and applications to calculation of magnetic fields; Forces between currents, torque on a current loop. The magnetic dipole, torque and P.E. in a magnetic field.

PHYSI 1208(1) - QUANTUM PHYSICS (PR: A-Level Physics & Maths)
Some problems of classical physics: black body radiation, photoelectric effect and stability of atoms. Energy quantisation. Particle nature of radiation. Compton effect. Rutherford model of the atom. Bohr model of the hydrogen atom. Wave-particle dualism. The Uncertainty Principle. Introduction to the Schrödinger equation.

PHYSI 1009(1) - INTRODUCTION TO ASTRONOMY
Historical development of Astronomy. Our Solar System: the Sun, Planets, Comets, Asteroids and meteor showers. About stars: brief notion of their nature and life history. Extrasolar planets. The interstellar medium. Nebulous objects. Our Galaxy, its contents and its structure. Other galaxies. The Universe and its expansion. Recent Discoveries in Astronomy.

Practical component: Use of Sky Charts. Naked eye identifications of some constellations, some stars and planets in the night sky. Use of a small optical telescope to view fainter nebulous objects and to observe planets like Jupiter and Saturn in more detail.

PHYSI 2002(3) - MECHANICS II (PQ: PHYSI 1102(1) & PHYSI 1201(1))
Angular momentum. Rigid body mechanics. Inertial and non-inertial frames of reference. Special Relativity.

PHYSI 2005(3) - QUANTUM MECHANICS I (PQ: PHYSI 1208(1))
Development of the Schrödinger wave equation (SWE), Wave functions, Eigenfunctions and eigenvalues, 1-D potentials, Angular momentum, 3-D SWE, Operator methods in quantum mechanics, General structure of wave.

PHYSI 2101(3) - MATHS FOR PHYSICISTS I (PQ: PHYSI 1201(1))
Theory of linear vector spaces: basis vectors, linear operators, matrix representation of linear operators. Inner product spaces. Fourier series, Some equations of mathematical physics, Series solution and some special functions. Applications.

PHYSI 2104(3) - ELECTROMAGNETISM II (PR: A-Level Physics & Maths; PQ: PHYSI 1204(1))
Time varying fields: Magnetic Induction, Faraday's Law and Lenz's Law; generators and alternators. Inductance and energy storage in inductors. Self and mutual inductance. Dielectric permittivity, Magnetic susceptibility, and permeability. Maxwell's equations. The electromagnetic wave equation in lossless or lossy media: Plane waves, effects of boundaries. Energy and momentum of electromagnetic waves - the Poynting theorem. Coaxial lines and wave guides.

PHYSI 2201(3) - MATHS FOR PHYSICISTS II (PQ: PHYSI 2101(3))
Complex variable theory, Calculus of residues. Dirac delta function, Fourier and Laplace Transforms, Parseval's Theorem, Convolution Theorem, applications.

PHYSI 2203(3) - OPTICS II (PR: A-Level Physics & Maths; PQ: PHYSI 1104(1))
Nature of light. Wave motion and wave superposition. Electromagnetic waves. Polarisation. Interference and Interferometry. Diffraction and diffraction gratings. Introduction to lasers. Introduction to optical fibres.

PHYSI 3000Y(5) - PROJECT (MR: 39 CREDITS IN YEAR I AND YEAR II CORE MODULES COMBINED)
Project work on a topic approved by the Department.

PHYSI 3001(5) - NUCLEAR PHYSICS (PQ: PHYSI 2005(3))
Nuclear structure and size. Binding energy and semi-empirical mass formula. Nuclear forces and nuclear models. Radioactivity (natural and artificial). Fission and fusion. Theories of alpha, beta and gamma decay. Nuclear reactions. Fission and fusion reactors. Controlled fusion. Fusion processes inside stars.

PHYSI 3104(5) - STATISTICAL PHYSICS (PR: PHYSI 1107(1))
Entropy and its relation to microscopic properties of a system. Basic methods of Statistical Mechanics – concept of Statistical ensembles. Microcanonical and canonical ensembles and their application for discrete systems. Classical systems: the Equipartition theorem, Ideal Classical gas. Introduction to Quantum Statistical Mechanics.

PHYSI 3006(5) - SOLID STATE PHYSICS I (PQ: PHYSI 2005(3))
Crystal diffraction and the reciprocal lattice, Lattice vibrations, Thermal properties, Free electron Fermi gas, Band theory, Semi-conductors, Fermi surfaces.

PHYCO 1100(1) - OPERATING SYSTEMS & SCIENTIFIC SOFTWARES
Introduction to Windows, and Internet. Use of office softwares for document processsing and spreadsheets. GNU, Graphic User Interfaces with Linux: KDE, Gnome, X-Window, Shells, File systems, Processes, I/O redirection, Editors, Home directory. Introduction to Lateχ and free scientific softwares.

PHYCO 1201(1) - NUMERICAL & SCIENTIFIC COMPUTING I (PR: A-Level Physics & Maths)
Fundamentals of C/Fortran programming. Interpolation. Numerical integration and differentiation. Applications to physical systems.

PHYCO 2001(3) - NUMERICAL AND SCIENTIFIC COMPUTING II (PQ: PHYSI 1201(1) & PHYCO 1201(1))
Introduction to Matlab. Numerical solution of differential equations. Matrix manipulations. Applications to physical systems.

PHYCO 2002(3) - COMPUTER SIMULATION METHODS (PQ: PHYSI 1102(1) & PHYSI 2101(3))
Selected topics from: Molecular dynamics, Monte Carlo simulations, Neural networks, Genetic algorithms, and/or other advanced/new topics.

PHYCO 3001(5) - SIGNAL AND IMAGE PROCESSING (PQ: PHYSI 2201(3))
Continuous and discrete signals. Noise. Signal-to-noise ratio. Effects of sampling (Nyquist theorem). Digitisation of analogue signals. Correlation and convolution. Spectral analysis. Imaging. Deconvolution techniques. Image enhancement.

ELECTIVES

PHYSI 3102(5) - ATOMIC & MOLECULAR PHYSICS (PQ: PHYSI 2005(3))
Review of Bohr's theory - observations in support of the theory, its limitations. QM approach for spinless one-electron atoms. The Stern Gerlach Experiment - Space quantisation and the electron spin. Spin effects in one electron atoms. Many electron atoms. The periodic table. The Zeeman Effect. Molecular Spectra.

PHYSI 3003(5) - ELEMENTARY PARTICLE PHYSICS (PQ: PHYSI 2005(3))
The standard model. Leptons, quarks, hadrons and gauge bosons. Strong, Electromagnetic and Weak interactions and transmission. Particle properties and quantum numbers. Conservation laws in particle physics. Introduction to Feynman diagrams.

PHYEL 2007(3) - ELECTRONICS & COMMUNICATIONS (PQ: PHYSI 1105(1))
Field Effect Transistors, Transistor circuits, Operational Amplifiers/Analogue to Digital Conversion and Digital to Analogue Conversion/Combinational circuits, Sequential circuits, Flip Flops, Registers, Counters, Serial and parallel data transfer. Communication theory – Analogue Modulation Schemes - AM and FM - Signal detection and demodulation. Digital modulation schemes. Noise.

PHYEL 3005(5) - CLASSICAL MECHANICS (PQ: PHYSI 2002(3))
Lagrangian formulation, Applications to physical examples, Hamiltonian formulation, Variational principles, Phase space, Poisson Brackets, Transition to quantum mechanics, Introduction to Hamilton-Jacobi equations.

PHYEL 3007(5) - MEDICAL PHYSICS (PR: A-Level Physics)
Aspects of dosimetry, nuclear medicine, radiotherapy, medical instrumentation, ultrasound, magnetic resonance imaging and radiology.

PHYEL 3009(5) - ELECTROMAGNETIC THEORY (PR: PHYSI 2201(3); PQ: PHYSI 2104(3) & PHYSI 2002(3))
Special relativity; Lorentz transformation; Lorentz scalars, vectors and tensors. Maxwell equations recast in relativistically covariant form; Electromagnetic field tensor; transformation laws for the electric and magnetic fields; invariants; Lienard-Wiechert potentials Lorentz force; Energy-momentum tensor; Radiation from accelerating charges.

PHYAS 2008(3) – ASTROPHYSICS I (PR: A-Level Physics & Maths & PHYSI 1009(1))
Our Solar System: Formation theories, Terrestrial and Outer planets, Planetary Motion. Stellar observational data: Stellar brightnesses, magnitude systems, stellar parallax and determination of stellar distances. Luminosities, effective temperatures and radii of stars. Binary stars and determination of stellar masses. Stellar spectra. Spectral Classification of Stars. Colour-magnitude diagrams. Stellar interiors: Hydrostatic equilibrium, composition, pressure and temperature inside stars. Energy generation and energy transport inside stars.

PHYAS 2011(3) - ASTRONOMICAL TECHNIQUES I (PR: A-Level Physics & Maths)
Introduction to observational techniques used for different astronomical windows. Optical Astronomy - optical telescopes and their accessories. Astronomy at other wavelengths. The Celestial Sphere, Spherical trigonometry and Coordinate systems used in astronomy. Time Keeping Systems for Astronomical purposes and civil life. Applications to the Sun and other astronomical objects.

PHYCO 2003(3) - BIOINFORMATICS (PQ: PHYCO 1100(1), PHYSI 1102(1) & PHYSI 1201(1); PR: PHYCO 1201(1))
Introductory bioinformatics. Fundamentals of molecular biology. Object oriented programming. Analysis of gene sequences. Human genome. Proteomics, Genomics and Pharmacogenomics. Introduction to molecular modelling and molecular docking.

PHYCO 2004(3) - COMPUTING CASE STUDY MODULE (PQ: PHYCO 1100(1) & PHYCO 1201(1))
Case study/Mini-project.

PHYCO 2010(3) - HIGH PERFORMANCE COMPUTING IN PHYSICS I (PQ: PHYCO 1100(1) & PHYCO 1201(1))
Parallel Programming and Parallelisation Strategies; Computer architectures and platforms; Message Passing using MPI Standards; OpenMP; Cluster and Grid computing; Collective Communication; Problem decomposition; Performance measurement. Parallel Programming toolkits (PETSc, Trilinos, etc)

PHYCO 3002(5) - DATABASES AND DATA MINING (PQ: PHYCO 1100(1))
Information & data. Architecture. Relational database systems, MySQL. Database management systems. Introductory data mining. Data warehouse. Data mining techniques. Security. Recovery. Novel concepts.

PHYCO 3003(5) - MICROPROCESSOR AND MICROCONTROLLER SYSTEMS (PQ: PHYEL 2007(3))
Chip architecture of microprocessor and microcontroller devices – ALU – registers - memory maps - addressing modes – interrupts - serial and parallel I/O ports - timers – program memory - assembly language programming - high-level language programming - hardware interfacing - PC Interfacing – applications.

PHYCO 3010(5) - HIGH PERFORMANCE COMPUTING IN PHYSICS II (PR: PHYCO 2010(3))
GNU/Linux networking; Shell programming (TCSH or BASH); Parallel Coding in Fortran/C/C++ and Matlab; Code Optimisation; Advanced Parallelisation: Graphics Processing Unit (GPU) hardware and architecture, CUDA, CTM and Cell; Application to some physics problems.

14 September 2012