

# 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

	<b>Normal</b>	<b>Maximum</b>
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 <sup>a</sup>
BSc (Hons) Physics with Computing	78	8	15

<sup>a</sup>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

Writing Case Studies – WCS 2200(3)

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 (78 + 8 credits)

Code	Module Name	HRS /WK	Credits
		L+P	
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
WCS 2200(3)	Writing Case Studies	**	3

\*\* This module will consist of 9 Hours of Lectures and 36 Hours Self-Study.

### 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
<b>CORE</b>			
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
<b>CORE</b>			
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
WCS 2200(3)	Writing Case Studies	**	3

\*\* This module will consist of 9 Hours of Lectures and 36 Hours Self-Study.

**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**

<b>Code</b>	<b>Module Name</b>	<b>HRS/WK L+P</b>	<b>Credits</b>
<b>CORE</b>			
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
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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.