BSc (Hons) Physics* – SC 341 (Under Review)

***Optional Minor: Astrophysics/Biology/Chemistry/Instrumentation/ Mathematics/Renewable Energy**

1. Context and 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. Moreover, there is a convergence between physics and other scientific disciplines, resulting in an increasing number of employment opportunities in technical areas requiring expertise at the interface of physics and these disciplines.

The BSc (Hons) Physics programme has been developed to provide a solid grounding in physics as a fundamental discipline while offering a secure foundation to a wide range of careers. To enhance accessibility to the various existing and probable future career opportunities, apart from modules in core areas of physics, the department also offers a variety of electives in applied and theoretical areas of physics as well as in other optional scientific disciplines. Overall, our programme combines the study of a fundamental discipline with the opportunity to develop skills in experimental and theoretical methods of problem solving.

2. Learning Outcomes

After successful completion of this programme, graduates should be able to:

- Demonstrate a conceptual understanding of physical principles in classical and modern physics.
- Demonstrate proficiency in the use of mathematics for the formulation as well as in the understanding of physics problems.
- Show competence in conducting scientific investigations in the laboratory and in the real world by designing and conducting experiments as well as processing and analyzing experimental data.
- Demonstrate knowledge, techniques and skills in solving problems through computational methods.
- Communicate ideas, principles, theories, including experimental findings effectively by oral, visual and written means.
- Show an awareness of major scientific issues affecting humanity and the environment.

3. Teaching and Learning Methods

Modules shall be taught over 10 weeks in accordance with the Learner-Centred Credit System (LCCS) at the University. Each module shall include at least 3 hours of contact per week, involve 6 hours of self-study per week and up to 9 hours of other learning activities per week for each semester. The contact hours shall include class hours, tutorials and practical sessions.

Details of the teaching and learning methods:

- Lectures including face-to-face and/or online teaching
- Practical works including lab demonstrations, hands-on practicals and instrumentation
- Self-learning, including case studies
- Designing/planning of experiments
- Project that provides the students with the opportunity to conduct an independent piece of research or study
- Other learning activities such as assignments, class tests, site visits/trips, seminars and revision.

4. Entry Requirements

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

4.2 Programme (Specific) Requirements:
Passes at GCE 'A' Level in Mathematics and Physics.

5. Programme Duration

Normal: 6 Semesters (i.e. 3 years)

Maximum: 10 Semesters (i.e. 5 years)

LCCS Credits per Semester

Minimum: 18 LCCS credits

Maximum (including retake modules): 54 LCCS credits

6. Minimum Credits Required for Award of Undergraduate Degree

A minimum of 196 LCCS credits will be required for degree award, with details as follows:

	LCCS Credits from		
Year of study	**Core taught modules**	**Project**	**Electives**
1	78	-	-
2	42	-	30*
3	30	16	
Total:	150	16	30*

* For BSc (Hons) Physics: at least 30 LCCS credits from year 2 and year 3 electives;

For BSc (Hons) Physics with optional Minor in Astrophysics or Instrumentation or Renewable Energy: at least 30 LCCS credits from year 2 and year 3 electives including a minimum of 24 LCCS credits in one of the optional Minors as applicable;

For BSc (Hons) Physics with optional Minor in Biology or Chemistry or Mathematics: at least 30 LCCS credits from electives including a minimum of 24 LCCS credits (at most 12 LCCS credits from year 1 electives) in one of the optional Minors as applicable.

7. Assessment and Deadlines

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 hours duration (normally a paper of 2 hours duration for modules carrying 6 LCCS credits or less, 2½ hours paper for modules carrying 7 - 9 LCCS credits, and a 3 hours paper for modules carrying 10 to 12 LCCS 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 40 - 50% of the overall percentage mark for the module(s) unless specified otherwise. Continuous assessment may be based on laboratory works, seminars and/or assignments and should include at least two (2) assignments/tests per year per module.

There will be a compulsory class test at the end of semester 1 for all modules taught in semester 1 and which are examined at the end of semester 2 of the given academic year, unless otherwise specified.

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; LCCS credits will be assigned on a pro-rata basis.

The following modules will be assessed solely by continuous assessment:

PHYCO 1100(1) – Operating Systems and Scientific Softwares
PHYCO 1201(1) – Numerical and Scientific Computing I
PHYSI 1006Y(3) – Physics Lab I
PHYSI 2106(3) – Physics Lab II
PHYSI 2206(3) – Experiment Design

The research project (PHYSI 3000Y(5)) will be assessed on dissertation and viva. The deadline for the submission of the project dissertation will be as per University of Mauritius regulations.

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.

8. List of Modules

A. Core modules

Module Code	Module Name	Learning Hours				LCCS Credits
		Lectures/ Tutorials	Practicals	Self-Study	Other Activities	
PHYCO 1100(1)	Operating Systems and Scientific Softwares	20	20	60	80	6
PHYCO 1201(1)	Numerical & Scientific Computing I	20	20	60	80	6
PHYSI 1101(1)	Mathematical Techniques for Physicists I	30	0	60	90	6
PHYSI 1201(1)	Mathematical Techniques for Physicists II	30	0	60	90	6
PHYSI 1102(1)	Mechanics I	30	0	60	90	6
PHYSI 1203(1)	Physics of Matter	30	0	60	90	6
PHYSI 1104(1)	Waves & Optics I	30	0	60	90	6
PHYSI 1204(1)	Electromagnetism I	30	0	60	90	6
PHYSI 1105(1)	Electric Circuits & Electronics	30	0	60	90	6
PHYSI 1006Y(3)	Physics Lab I	0	60	60	60	6
PHYSI 1107(1)	Thermal Physics	30	0	60	90	6
PHYSI 1208(1)	Quantum Physics	30	0	60	90	6
PHYSI 1009(1)	Introduction to Astronomy	30	0	60	90	6
PHYSI 2101(3)	Maths for Physicists I	30	0	60	90	6
PHYSI 2201(3)	Maths for Physicists II	30	0	60	90	6
PHYSI 2002(3)	Mechanics II	30	0	60	90	6
PHYSI 2203(3)	Optics II	30	0	60	90	6
PHYSI 2104(3)	Electromagnetism II	30	0	60	90	6
PHYSI 2005(3)	Quantum Mechanics I	30	0	60	90	6
PHYSI 2106(3)	Physics Lab. II	0	30	30	30	3
PHYSI 2200(3)	Experiment Design	0	30	30	30	3
PHYSI 3000Y(5)	Project/Dissertation	–	–	–	–	16
PHYSI 3001(5)	Nuclear Physics	30	0	60	90	6
PHYSI 3102(5)	Atomic & Molecular Physics	30	0	60	90	6
PHYSI 3003(5)	Elementary Particle Physics	30	0	60	90	6
PHYSI 3104(5)	Statistical Physics	30	0	60	90	6
PHYSI 3006(5)	Solid State Physics I	30	0	60	90	6

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

Module Code	Module Name	Learning Hours				LCCS Credits
		Lectures/ Tutorials	Practicals	Self-Study	Other Activities	
PHYEL 2007(3)	Electronics & Communications	20	20	60	80	6
PHYEL 2010(3)	Computational Physics	20	20	60	80	6
PHYEL 3005(5)	Classical Mechanics	30	0	60	90	6
PHYEL 3007(5)	Medical Physics	30	0	60	90	6
PHYEL 3009(5)	Electromagnetic Theory	30	0	60	90	6

C. Other Electives

And/or modules approved by the department

D. Optional Minors:

Astrophysics

Module Code	Module Name	Learning Hours				LCCS Credits
		Lectures/ Tutorials	Practicals	Self-Study	Other Activities	
PHYAS 2008(3)	Astrophysics I	25	10	60	85	6
PHYAS 2011(3)	Astronomical Techniques I	20	20	60	80	6
PHYAS 3008(5)	Astrophysics II	25	10	60	85	6
PHYAS 3011(5)	Astronomical Techniques II	20	20	60	80	6
PHYAS 3012(5)	Extragalactic Astronomy and Cosmology	25	10	60	85	6

Instrumentation

Module Code	Module Name	Learning Hours				LCCS Credits
		Lectures/ Tutorials	Practicals	Self-Study	Other Activities	
PHYIN 2012(3)	Electronics in Instrumentation I	25	10	60	85	6
PHYIN 2013(3)	Measurement & Sensors	25	10	60	85	6
PHYIN 2015(3)	Statistical Methods for Physicists	25	10	60	85	6
PHYIN 3012(5)	Electronics in Instrumentation II	20	20	60	80	6

Renewable Energy

Code	Module Name	Learning Hours				LCCS Credits
		Lectures/ Tutorials	Practicals	Self-Study	Other Activities	
PHYRE 2016(3)	Renewable Energy Resources I	25	10	60	85	6
PHYRE 2017(3)	Renewable Energy Resources II	25	10	60	85	6
PHYRE 2018(3)	Automatic Control and Regulation	25	10	60	85	6
PHYRE 2019(3)	Climate Dynamics	25	10	60	85	6
PHYRE 3014(5)	Energy Conservation	25	10	60	85	6
PHYRE 3015(5)	Energy Systems	25	10	60	85	6
PHYRE 3016(5)	Physics of the Atmosphere	25	10	60	85	6

Biology/Chemistry/Mathematics

Students will have to choose the optional minor modules for Biology, Chemistry or Mathematics from the respective department.

9. Programme Plan

YEAR 1

Module Code	Module Name	Learning Hours				LCCS Credits
		Lectures/ Tutorials	Practicals	Self-Study	Other Activities	
CORE						
PHYCO 1100(1)	Operating Systems and Scientific Softwares	20	20	60	80	6
PHYCO 1201(1)	Numerical & Scientific Computing I	20	20	60	80	6
PHYSI 1101(1)	Mathematical Techniques for Physicists I	30	0	60	90	6
PHYSI 1201(1)	Mathematical Techniques for Physicists II	30	0	60	90	6
PHYSI 1102(1)	Mechanics I	30	0	60	90	6
PHYSI 1203(1)	Physics of Matter	30	0	60	90	6
PHYSI 1104(1)	Waves & Optics I	30	0	60	90	6
PHYSI 1204(1)	Electromagnetism I	30	0	60	90	6
PHYSI 1105(1)	Electric Circuits & Electronics	30	0	60	90	6
PHYSI 1006Y(3)	Physics Lab I	0	60	60	60	6
PHYSI 1107(1)	Thermal Physics	30	0	60	90	6
PHYSI 1208(1)	Quantum Physics	30	0	60	90	6
PHYSI 1009(1)	Introduction to Astronomy	30	0	60	90	6

YEAR 2

Module Code	Module Name	Learning Hours				LCCS Credits
		Lectures/ Tutorials	Practicals	Self-Study	Other Activities	
CORE						
PHYSI 2101(3)	Maths for Physicists I	30	0	60	90	6
PHYSI 2201(3)	Maths for Physicists II	30	0	60	90	6
PHYSI 2002(3)	Mechanics II	30	0	60	90	6
PHYSI 2203(3)	Optics II	30	0	60	90	6
PHYSI 2104(3)	Electromagnetism II	30	0	60	90	6
PHYSI 2005(3)	Quantum Mechanics I	30	0	60	90	6
PHYSI 2106(3)	Physics Lab. II	0	30	30	30	3
PHYSI 2200(3)	Experiment Design	0	30	30	30	3
ELECTIVES						
Physics						
PHYEL 2007(3)	Electronics & Communications	20	20	60	80	6
PHYEL 2010(3)	Computational Physics	20	20	60	80	6
Astrophysics						
PHYAS 2008(3)	Astrophysics I	25	10	60	85	6
PHYAS 2011(3)	Astronomical Techniques I	20	20	60	80	6
Instrumentation						

PHYIN 2012(3)	Electronics in Instrumentation I	25	10	60	85	6
PHYIN 2013(3)	Measurement & Sensors	25	10	60	85	6
PHYIN 2015(3)	Statistical Methods for Physicists	25	10	60	85	6
Renewable Energy						
PHYRE 2016(3)	Renewable Energy Resources I	25	10	60	85	6
PHYRE 2017(3)	Renewable Energy Resources II	25	10	60	85	6
PHYRE 2018(3)	Automatic Control and Regulation	25	10	60	85	6
PHYRE 2019(3)	Climate Dynamics	25	10	60	85	6
And/or modules approved by the department.						

YEAR 3

Module Code	Module Name	Learning Hours				LCCS Credits
		Lectures/ Tutorials	Practicals	Self-Study	Other Activities	
CORE						
PHYSI 3000Y(5)	Project/Dissertation	–	–	–	–	16
PHYSI 3001(5)	Nuclear Physics	30	0	60	90	6
PHYSI 3102(5)	Atomic & Molecular Physics	30	0	60	90	6
PHYSI 3003(5)	Elementary Particle Physics	30	0	60	90	6
PHYSI 3104(5)	Statistical Physics	30	0	60	90	6
PHYSI 3006(5)	Solid State Physics I	30	0	60	90	6
ELECTIVES						
Physics						
PHYEL 3005(5)	Classical Mechanics	30	0	60	90	6
PHYEL 3007(5)	Medical Physics	30	0	60	90	6
PHYEL 3009(5)	Electromagnetic Theory	30	0	60	90	6
Astrophysics						
PHYAS 3008(5)	Astrophysics II	25	10	60	85	6
PHYAS 3011(5)	Astronomical Techniques II	20	20	60	80	6
PHYAS 3012(5)	Extragalactic Astronomy and	25	10	60	85	6
Instrumentation						
PHYIN 3012(5)	Electronics in Instrumentation II	20	20	60	80	6
Renewable Energy						
PHYRE 3014(5)	Energy Conservation	25	10	60	85	6
PHYRE 3015(5)	Energy Systems	25	10	60	85	6
PHYRE 3016(5)	Physics of the Atmosphere	25	10	60	85	6
And/or modules approved by the department.						

Note: Not all electives may be on offer. The list of modules is not exhaustive.