Practicals
Experimental courses in Physics consist of a Theory part and a Practical part, both of which run for the duration of the semester in which the course is offered. A semester mark is compiled from the Theory and Practical.

1. Practical mark counts 30% of the semester mark for the particular course.
2. If a student is repeating a course, he/she may apply for exemption of the Practical provided he/she has previously obtained at least 50% for the relevant Practical. Should a student meet the criteria and exercise the option of exemption from a Practical, the formerly obtained Practical mark will not contribute to the final semester mark.
3. A sub-minimum of 50% is required for the Practical mark, in conjunction with a sub-minimum of 40% for the Theory mark of a particular course in order to gain entrance to the exam for that specific module.
4. Attendance of all scheduled practicals is compulsory.

Times for practicals

First year	:	1 x 4 hours per week
Second year	:	1 x 4 hours per week
Third year	:	1 x 6 hours per week

Further Examination entrance requirements
1. If a student is found to have attended less than 70% of lectures during a semester in a particular course, such a student may be refused entrance to the exam for that course.
2. The semester and final assessment mark weight is 50:50. A student needs a final mark of 50% to pass a module. The semester mark also contributes to the result of a supplementary assessment. The final result of a supplementary assessment is capped on 50%.

SC.5.17.1 PHYSICS LEVEL 5 (First Year)

Module PHY1A1E	Physics 1A1E
NQF Level	5
Credits	4
Presentation	Semester 1
Purpose	To supply students with the conceptual foundation of the laws, principles and methods in elementary mechanics. Through the acquisition of appropriate skills, the student will discover the application of elementary mechanics with the emphasis on fundamental mathematical techniques involved in solving Physics problems. Several mechanics topics will be covered in these topics. Students will also be exposed to basics of simple harmonic motion including mechanical wave properties and the proper mathematical expressions of these concepts. A student who has completed Physics 1A1E will be in a position to proceed and undertake the next module, Physics 1A2E.

Module learning outcomes: On completion of this learning event, the student should be able to:
- Formulate, discuss and explain the basic definitions of physical quantities, basic principles and the basic laws of elementary mechanics, simple harmonic motion, and elasticity and waves and sounds.
- Derive equations, explain, interpret and evaluate elementary theoretical models in elementary mechanics, simple harmonic motion and elasticity, and waves and sounds.
- Integrate basic concepts and theories to solve problems of elementary mechanics.
- Recognize and explain aspects of the application of the topics covered in this module in everyday life.

SC.5.17.2 PHYSICS LEVEL 5 (First Year)

Module PHY1A2E	Physics 1A2E
NQF Level	5
Credits	10
Presentation	Semester 2
Pre-requisite	PHY1A1E
Purpose	To supply students with the conceptual foundation of the laws, principles and methods in elementary mechanics. Through the acquisition of appropriate skills, the student will discover the application of mechanics both in linear and rotational dimensions. Students will be able to reflect on the role of these concepts of physics, in our technological environment. A student who has completed Physics 1A2E will be in a position to proceed and undertake the next module, Physics 1A3E.

Module learning outcomes: On completion of this learning event, the student should be able to:

- Formulate, discuss and explain the basic definitions of physical quantities, basic principles and the basic laws of elementary mechanics in both dimensions, that is, linear and rotational.
- Derive equations, explain, interpret and evaluate elementary theoretical models in elementary mechanics.
- Integrate basic concepts and theories to solve problems of elementary mechanics.
- Recognize and explain aspects of the application of the topics covered in this module in everyday life.

SC.5.17.3 PHYSICS LEVEL 5 (Second Year)

Module PHY1A3E	Physics 1A3E
NQF Level	5
Credits	10
Presentation	Semester 1
Prerequisites	PHY1A2E
Purpose	To supply students with the conceptual foundation of the laws, principles and methods in mechanics, oscillations and mechanical waves, and thermodynamics. Through the acquisition of appropriate skills, the student will discover the application of these topics and be able to reflect on the role of these concepts of physics, in our technological environment..

Module learning outcomes: On completion of this learning event, the student should be able to:

- Formulate, discuss and explain the basic definitions of physical quantities, the basic principles and the basic laws encountered in mechanics, oscillations and mechanical waves, and thermodynamics.
- Derive equations, explain, interpret and evaluate elementary theoretical models in basic mechanics, oscillations and mechanical waves, and thermodynamics.
- Integrate basic concepts and theories to solve elementary problems in mechanics, oscillations and mechanical waves, and thermodynamics.
- Recognize and explain aspects of the application of the topics covered in this module in everyday life.

SC.5.17.4 PHYSICS LEVEL 5 (First Year)

Module PHY1A01	Introductory Physics A
NQF Level	5
Credits	16
Presentation	Semester 1
Purpose	To supply students with the conceptual foundation for the laws, principles and methods used in elementary mechanics, waves and heat. Through the acquisition of appropriate skills, the student will discover the application of the laws, principles and methods relating to elementary mechanics, waves and heat, and will be able to reflect on the role thereof in physics and the technological environment.

Module learning outcomes: On completion of this learning event, the student should be able to:

- Formulate, discuss and explain the basic definitions of physical quantities, the basic principles and the basic laws encountered in elementary mechanics, waves and heat.
- Derive equations in, explain, interpret and evaluate elementary theoretical models in basic mechanics, waves and heat.
- Integrate basic concepts and theories to solve elementary problems in basic mechanics, waves and heat.
- Recognize and explain aspects of the application of elementary mechanics, waves and heat in everyday life.

SC.5.17.5 PHYSICS LEVEL 5 (First Year)

Module PHY1B01	Introductory Physics B
NQF Level	5
Credits	16
Presentation	Semester 2
Prerequisites	PHY1A01
Purpose	To supply students with the conceptual foundation of the laws, principles and methods in elementary electricity and magnetism. Through the acquisition of appropriate skills, the student will discover the application of elementary electricity and magnetism, optics and special relativity and will be able to reflect on the role thereof in physics and the technological environment.

Module learning outcomes: On completion of this learning event, the student should be able to:

- Formulate, discuss and explain the basic definitions of physical quantities, the basic principles and the basic laws encountered in elementary electricity and magnetism, optics and special relativity.
- Derive equations in, explain, interpret and evaluate elementary theoretical models in basic electricity and magnetism, optics and special relativity.
- Integrate basic concepts and theories to solve elementary problems in basic electricity and magnetism, optics and special relativity.
- Recognize and explain aspects of the application of elementary electricity and magnetism, optics and special relativity in everyday life.

SC.5.17.6 PHYSICS LEVEL 5 (First Year)

Module PHYG0A1	General Physics for Earth Sciences
NQF Level	5
Credits	15
Presentation	Semester 1
Purpose	Providing the first year geology and earth science student with intellectual and practical skills to analyse, interpret and apply certain elementary laws in physics applicable to the broader earth sciences. Through the acquisition of appropriate skills, the student will discover the application of these laws to their daily environment as an earth scientist/ physics student.

Module learning outcomes: On completion of this learning event, the student should be able to:

- Formulate, discuss and explain the basic definitions of physical quantities, the basic principles and the basic laws of physics applicable to the earth sciences.
- Explain, interpret and evaluate elementary theoretical models in physics applied to the earth sciences.
- Integrate basic concepts and theories to solve problems of elementary physics applied to the earth sciences.
- Recognize and explain aspects of the application of elementary physics as applied in a geological and earth science context.

SC.5.17.7 PHYSICS LEVEL 5 (First Year)

Module PHYG0B1	Physics of the Earth and its Natural Environment
NQF Level	5
Credits	15
Presentation	Semester 2
Prerequisites	PHYG0A1
Purpose	Providing the first year student with intellectual and practical skills to analyse, interpret and apply certain elementary laws in Physics with applications to the broader earth sciences. Through the acquisition of appropriate skills, the student will discover the application of these laws to their daily environment as an earth scientist/ physics student. In particular, the course provides the physical foundation needed for the understanding of geological and geomorphological processes, the oceans, the atmosphere and weather and the solar system.

Module learning outcomes: On completion of this learning event, the student should be able to:

- Formulate, discuss and explain the basic definitions of physical quantities, the basic principles and the basic laws of Physics relevant to the broader earth sciences.
- Understanding the physical functioning of basic natural phenomena related to the earth, the atmosphere, the oceans and the solar system.
- Recognize and explain aspects of the application of physics in the geological, geographical and natural environment.

SC.5.17.8 PHYSICS LEVEL 5 (First Year)

Module PHYL0A1	Physics for Life Sciences
NQF Level	5
Credits	15
Presentation	Semester 1
Purpose	Providing the first year life science student with intellectual and practical skills to analyse, interpret and apply certain elementary laws in Physics in the context of the life sciences. Through the acquisition of appropriate skills, the student will discover the application of these laws to their daily environment as a biological scientist/ physics student.

Module learning outcomes: On completion of this learning event, the student should be able to:

- Formulate, discuss and explain the basic definitions of physical quantities, the basic principles and the basic laws of physics applicable to the life sciences.
- Explain, interpret and evaluate elementary theoretical models in physics applied to the life sciences.
- Integrate basic concepts and theories to solve problems of elementary physics applied to the life sciences.
- Recognize and explain aspects of the application of elementary physics as applied in a biological context.

SC.5.17.9 PHYSICS LEVEL 6 (Second Year)

Module PHY002A	Classical Mechanics and Special Relativity
NQF Level	6
Credits	16
Presentation	Semester 1
Prerequisites	PHY1A01, PHY1B01 **and** MAT1B01
Purpose	○ Providing qualifying students with intellectual and practical skills to analyse, interpret and apply scientific laws and methods in various reference frames, advanced Newtonian mechanics, gravitational and central forces, inertial and non-inertial frames, Lagrange-mechanics, vibrations and various type of oscillations in Advanced Mechanics. Through the acquisition of appropriate skills the student will discover the application of advanced mechanics and will be able to reflect upon the application thereof in Physics and in the technological environment. ○ Presenting an overview of the development of classical mechanics from Galileo to Einstein ○ Providing students with knowledge and appreciation of the significance of special relativity. ○ Providing students with practical skills to execute advanced experiments in electricity, optics, mechanics and thermodynamics. To analyse, interpret and evaluate the collected data and to report on the experiments.

Module learning outcomes: On completion of this learning event, the student should be able to:

- Formulate, discuss and explain the definitions of physical quantities, the principles and the laws encountered, in classical mechanics and special relativity.
- Derive equations in, explain, interpret and evaluate advanced theoretical models in classical mechanics and special relativity.
- Integrate basic concepts and theories to solve problems in advanced mechanics and waves.
- Recognize and explain aspects of the application of classical mechanics and special relativity in everyday life.

SC.5.17.10 PHYSICS LEVEL ~~5~~ 6 (Second Year)

Module PHY002B	Static and Dynamic Electromagnetism
NQF Level	6
Credits	16
Presentation	Semester 2
Prerequisites	PHY1A01, PHY1B01 **and** (MAT2A10 and MAT2A20 **or** APM2A10)
Purpose	To equip students with a working knowledge of the concepts and methods in electromagnetism: origins and use of the differential forms of the laws of Gauss, Ampere, and Faraday, Maxwell's equations, alternating currents, and the physics of magnetic materials. The student shall, by acquiring the appropriate skills, be able to discover the applications of electromagnetism, and be in a position to recognize the applications thereof in the technological environment. This module is also to provide the students with practical skills to execute advanced experiments in electricity, optics, mechanics and thermodynamics. To analyse, interpret and evaluate the collected data and to report on the experiments.

Module learning outcomes: On completion of this learning event, the student should be able to:

- Formulate, discuss and explain the definitions of physical quantities, the principles and the laws encountered in static and dynamic electromagnetism.
- Derive equations in, explain, interpret and evaluate advanced theoretical models in static and dynamic electromagnetism.
- Integrate basic concepts and theories to solve problems in static and dynamic electromagnetism.

- Recognize and explain aspects of the application of in static and dynamic electromagnetism in everyday life.
- To execute, collect data, and report on experiments electricity, optics, mechanics, and thermodynamics.

SC.5.17.11 PHYSICS LEVEL 6 (Second Year)

Module PHY002Y	Thermal Physics, Optics and Waves
NQF Level	6
Credits	8
Presentation	Year
Prerequisites	PHY1A01, PHY1B01 and MAT1B01
Purpose	○ This module is to provide qualifying students with intellectual and practical skills to analyse, interpret and apply scientific laws and methods in thermal physics, waves, optics and basic quantum mechanics. Through the acquisition of appropriate skills the student will discover the application of thermal physics, waves, optics and basic quantum physics and will be able to reflect upon the application thereof in Physics and in the technological environment. ○ This module is to provide students with practical skills to execute advanced experiments in electricity, optics, mechanics and thermodynamics. To analyse, interpret and evaluate the collected data and to report on the experiments.

Module learning outcomes: On completion of this learning event, the student should be able to:

- Formulate, discuss and explain the definitions of physical quantities, the principles and the laws encountered, in thermal physics, waves, optics and basic quantum physics.
- Derive equations in, explain, interpret and evaluate advanced theoretical models in thermal physics, waves, optics and basic quantum physics.
- Integrate basic concepts and theories to solve problems in thermal physics, waves, optics and basic quantum physics.
- Recognize and explain aspects of the application of thermal physics, waves, optics and basic quantum physics in everyday life.

SC.5.17.12 PHYSICS LEVEL 7 (Third Year)

Module PHY003A	Quantum Mechanics and Modern Physics
NQF Level	7
Credits	30
Presentation	Semester 1
Prerequisites	PHY002A, PHY002B **and** (MAT2B10 and MAT2B20 **or** APM2B10)
Purpose	The purpose of this module is to provide qualifying students with intellectual and practical skills to analyse, interpret and apply scientific laws and methods in quantum mechanics and some fields of physics using these methods (nuclear and particle physics). Through the acquisition of appropriate skills the student will discover the application of quantum mechanics, nuclear and particle physics and will be able to reflect upon the application thereof in other branches of physics and in the technological environment.; to provide the students with practical skills to execute experiments in electronics, to analyse, interpret, evaluate the collected data and to report on the experiments, and to apply this knowledge to everyday appliances.

Module learning outcomes: On completion of this learning event, the student should be able to:

- Formulate, discuss and explain the definitions, the postulates, the principles and the basic concepts encountered in special relativity and the definitions of physical quantities, the principles and the laws encountered in quantum mechanics.
- Derive equations in, explain, interpret and evaluate theoretical models in quantum mechanics, nuclear and particle physics.
- Integrate concepts and theories to solve problems in quantum mechanics, nuclear and particle physics.

- Recognise and explain aspects of the application of quantum mechanics, nuclear and particle physics in other branches of physics and in technology.
- Execute experimental projects in electronics effectively and responsibly.
- Collect, analyse, interpret and evaluate experimental data collected from experiments electronics.
- Integrate the data collected in the experiments with elementary theories in electronics.
- Write clear and concise reports on their experiments in electronics.

SC.5.17.13 PHYSICS LEVEL 7 (Third Year)

Module PHY003B	Mathematical, Statistical and Solid State Physics
NQF Level	7
Credits	30
Presentation	Semester 2
Prerequisites	PHY003A
Purpose	The purpose of this module is to provide qualifying students with intellectual, mathematical and practical skills to analyse, interpret and apply concepts and functions in statistical physics: Maxwell-Boltzmann, Bose-Einstein, Fermi-Dirac statistics, specific heat of solids, lasers, phonon and photon gas, free electron gas, and Bose condensation as well as to apply scientific laws and methods in working with crystal and electron structures, magnetic, electronic and superconducting properties of materials. Through the acquisition of appropriate skills, the student will discover the application of statistical and solid state physics and will be able to reflect upon the application thereof in other branches of physics and in the technological environment.

Module learning outcomes: On completion of this learning event, the student should be able to:

- Grasping and mastering the mathematical formalism on which modern advanced physics is based
- Formulate, discuss and explain the definitions of physical quantities, the principles and the basic laws encountered in statistical physics and solid state physics.
- Derive equations in, explain, interpret and evaluate theoretical models in statistical physics and solid state physics.
- Integrate concepts and theories to solve problems in statistical physics and solid state physics.
- Recognize and explain aspects of the application of statistical physics and solid state physics in everyday life and in technology.
- Conduct appropriate experimental work in the laboratory, analyse data and report her/his results.