

UNL71 Physics – Course Outline

About the Course

The unit is a preparatory physics unit designed to help you gain the necessary knowledge to enter into a tertiary study. This unit provides a foundation for the study of matter and its motion through space and time. Physics is needed for those who wish to move into engineering, high military applications and fields in space study. This unit covers topics equivalent to those covered in the last two years of physics at high school. The unit concentrates on the concepts and models which physics uses to enhance your understanding of the real world and the techniques for presenting and analysing the data from experimental observation.

This unit includes individual tutorial support with an experienced high school physics teacher. Tutorial support is via email, phone and an online classroom with discussion forums.

The unit has flexible enrolment dates to meet your needs. Start your study when you want and complete the unit any time within the 12 month enrolment window. This unit requires a minimum of 220 hours or 18 weeks to complete.

Aim

The main aim of this course is to assist the learner to obtain skills and competence in physics suitable for commencing studies in tertiary programs with a substantial component of physical science.

At the end of this course the learner should:

- Demonstrate competence in using physical measurements and scientific notation
- Demonstrate a sound knowledge of the basic laws of force and linear and wave motion
- Demonstrate a sound knowledge of the theory of gases, energy and momentum
- Demonstrate a sound knowledge of electric circuits, magnetism and the laws of optics
- Demonstrate a sound knowledge of atomic and nuclear physics
- Demonstrate confidence and competence in applying the basic laws of physics to problem solving situations

- Have acquired a pre-requisite knowledge and confidence to undertake studies which require a higher level of competence in physical science
- Be motivated to continue with lifelong learning where skills in physics are required.

Structure

UNL71 Physics consists of nine modules with an overview of the topics covered in the Study Guide found in the online classroom. A range of Activities is included for the learner to work through to develop experience in problem solving. Detailed solutions for all Activities are included in each Module.

Progress Tests and lab activities are also provided at appropriate points in the course. Students are required to successfully complete nine (9) progress tests and eight (8) lab activities to be eligible to sit for the final examination.

Tutorial Support is available from the UNL71 Physics Teacher. This support, which can be accessed by the online classroom, phone or email, is designed to help students clarify their understanding of concepts, to provide details of solutions to exercises, and to answer other relevant queries.

Pre-requisite knowledge

Normally, candidates for UNL71 Physics should be competent in mathematics including algebraic manipulation, solutions of linear and quadratic equations, properties including (graphs) of linear quadratic trigonometrically and exponential functions and knowledge of the theory of logarithms is also desirable. Students who feel they need to develop their mathematical skills are referred to UNL32 Senior Mathematics.

The content of each Topic is studied with the Activities providing learning experiences.

Specimen Examination

The specimen exam or practice final exam is available once you have completed approximately 80% of the course. The Practice test allows students to work through similar problems under exam conditions which allow them to see if they are pacing themselves appropriately to be successful on the final exam. Most students who are successful on the practice exam find they are successful on the final exam as they are prepared for the type of questions and the exam format they will have during the final exam.

Hours of Study

In general the course should be completed in a minimum of 220 hours of study. The actual time required by an individual student to receive a successful result, however, will depend on the background, time available and needs of the learner. A majority of students take 540 hours to complete the course over the 12 months.

Assessment

The chapter questions, progress tests and the Specimen Examination are designed to help students prepare for the final examination for UNL71 Physics. Examinations are prepared and assessed by the UNL71 Physics Teacher.

To be eligible to sit for the final, closed book examination, students are required to achieve a mark of 60% or higher each on ALL progress tests and lab activities. The formal, supervised examination covers the content. Candidates who successfully complete the course are awarded a Statement of Achievement, which lists the percentage mark gained and a grade of Pass, Credit, Distinction or High Distinction. Students who fail to obtain the minimum mark required for a Pass grade, after submitting a reasonable attempt, may then be eligible to sit a second examination at the teachers' discretion. Examinations are not held at set times, rather, they are arranged through the Unilearn office after the student has successfully completed the required materials with a score of 60% or higher on each.

Practical Components

UNL71 Physics consists of eight practical lab activities to meet the required 20+ hours of practical work. These lab activities account towards your final grade and can be done either in your home, office or even your backyard if required. Lab activities are hosted through our online classroom, so there is no need to go to a campus or book a room anywhere; they have been developed to be conveniently accessible online.

Lab Activities	Types of Labs	Hours
Forces and Motion- Forces and Motion Lab Activity 1	Virtual/Hands-On	4
Energy and Momentum - Circular Motion and Gravity Lab Activity 2	Virtual/Hands-On	4
Thermal Physics - Specific Heat Lab Activity 3	Virtual/Hands-On	2
Wave Motion - Wave Unit Lab Activity 4	Virtual/Hands-On	2
Electricity and Magnetism - Faraday Electromagnetic Lab 5	Virtual/Hands-On	4
Electrical Circuits - Ohm's Lab Activity 6	Virtual/Hands-On	4
Atomic and Nuclear Physics - Alpha Decay Lab Activity 7	Virtual	2
Atomic and Nuclear Physics - Beta Decay Lab Activity 8	Virtual	2
	Minimum Total Hours	20+

Hands-on components for the labs

Lab Activity 1 - In the Forces and Motion unit, students learn about collecting and analysing experimental data. Students conduct an experiment timing the oscillations of a simple pendulum and relating it to the length of the pendulum.

Lab Activity 2 - In the Circular Motion and Gravitation Lab Activity, students are encouraged to describe the relationship between the Sun, the Earth and the Moon and relate their observations to a simulation.

Lab Activity 3 - In the Thermal Physics Unit, student will make observations of the melting ice, boiling water and apply their knowledge of specific heat to adding milk to a cup of tea or coffee.

Lab Activity 4 - In the Wave Motion unit, students relate their observations of vibrating strings and musical instruments to wave properties and the behaviour of waves.

Lab Activity 5/6 - The Electricity and Magnetism unit encourages student to find examples of electro-magnets in home appliances and in the Electrical Circuits Unit, students investigate voltages, power supplies, alternating or direct current etc. in appliances.

Grading Scheme

Students are required to complete all required materials (progress tests and lab activities) with a score of 60% or above on each in order to be eligible to sit the final exam. A student's final grade is an accumulation of all required content and will be weighted as follows:-

Progress Tests	10%
Lab Activities	10%
Final Exam	80%
	100%

Grade	% required
High Distinction (HD)	85% and above
Distinction (D)	75 - 84%
Credit (C)	65 – 74%
Pass (P)	50 - 64%
Fail	0 – 49%

Content

Module 1 - New Century Senior Physics: Concepts in context, second edition.

Unit 1 Physical quantities & measurement

- Ch 1 Measurement and quantities

Unit 2 Forces and motion

- Ch 2 Motion in a straight line
- Ch 3 Vectors and Graphing
- Ch 4 Forces in action
- Ch 5 Projectile, circular and periodic motion
- Ch 6 Astrophysics
- Ch 7 Hydrostatics: the physics of fluids

Unit 3 Energy and momentum.

- Ch 8 Momentum
- Ch 9 Work and Energy

Unit 4 Thermal physics

- Ch 10 Heat and temperature
- Ch 11 Heat and matter
- Ch 12 Heat transfer

Unit 5 Wave motion

- Ch 13 Wave motion in one dimension.
- Ch 14 Wave motion in two dimensions.
- Ch 15 Light - a wave.
- Ch 16 Sound, music and audio technology.

Unit 6 Optics

- Ch 17 Reflection of light
- Ch 18 Refraction
- Ch 19 Lenses
- Ch 20 Optical instruments

Unit 7 Electricity

- Ch 21 Electrostatics
- Ch 22 Electric circuits
- Ch 23 Electronics
- Ch 24 Electronic systems

Unit 8 Magnetism & electromagnetism

- Ch 25 Magnetism and electromagnetism
- Ch 26 Electromagnetic induction

Unit 9 Atomic and nuclear physics

- Ch 27 Atomic structure
- Ch 28 Nuclear physics
- Ch 29 Quantum physics and fundamental particles