DEPARTMENT OF PHYSICS AND ELECTRONICS

PHYSICS 1E1

COURSE BROCHURE

2026

Contents

1. THE COURSE

Physics 1E1 (Elementary Physics) is a terminal, non-calculus course intended for candidates majoring in the biological sciences. It consists of one-semester course that runs in the first half of the year.

The fact that Physics 1E1 is a terminal course means that it does not normally provide entry into Physics 2. However, candidates who attain a sufficiently high standard in Physics 1E1 may be allowed to register for Physics 102, obtain credit in Physics 1 and then proceed to Physics 2, provided they also obtain at least 30% for Maths 1.

2. OUTCOMES and ASSESSMENT

Learning outcomes for the Physics 1E1 course are specified below. The means of assessment are described in paragraphs 12 and 14.

- **Basic knowledge**
  Students will know and apply the concepts and laws of physics to understand and explain the behaviour of the physical world.

- **Skills**
  Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively and for making informed decisions.

3. ADMINISTRATION

Physics 1E1 will be taught by Dr Stanley Kuja, Ms Ponka Mokgolo and Dr Kate Bryan.

The laboratory technician is Mr Luvuyo (Chris) Sobayeni, the office administrator is Ms Verushca Kiewiets, and the Physics 1E1 Course coordinator is Dr Stanley Kuja (Office 33). If you have any issues regarding the lectures or practical classes, you are welcome to see Dr Kuja.

4. LECTURES

You are **expected** to attend all lectures. Except for tutorials on Thursdays, all lectures will be held in the Upper Lecture Theatre (Physics Department) at the following times:

Monday	10:30	(period 4)
Tuesday	11:25	(period 5)
Wednesday	07:45	(period 1)
Friday	09:35	(period 3)

5. RULES OF ENGAGEMENT

(i) Strive to attend 100% of your lectures. If you miss more than one lecture per course per week you are likely to experience problems of passing;

(ii) Be in the venue and seated before the start of the lecture;

(iii) Participate and ask questions;

(iv) You are expected to attend 100% of your practicals/tutorial. If you can't attend you need to submit a Leave of Absence request;

(v) No eating or drinking in practicals/tutorials

(vi) No electronic devices, earphones or music in the lecture venue or laboratory. Cellphones can be used in class only when the lecturer allows to do so.

6. NOTICES

The solutions and other course material will be available from the Physics Department website as well as from RU connected website. The onus is on you to check the notice board and the websites regularly.

7. PRACTICALS

You will be assigned to a particular group on a particular day of the week by the Dean of Science. Your practicals will be held in Room 17 in Physics Department.

Before each practical there is an introductory talk at 14:00 in the Physics Laboratory (Room 17). We expect you to have read the instructions for the correct practical beforehand. Some of the theoretical material covered in the practicals and pre-practical talks is **not** covered in lectures. For every practical, it is your responsibility to ensure that all **HURDLES** are signed in your practicals manual by a demonstrator before you leave and that you are marked present. **Attendance of practicals and tutorials is compulsory.**

If you miss a practical for any reason, arrange with a member of staff, to catch up on the missed work as soon as possible. (See DP REQUIREMENTS below).

8. TUTORIALS

Tutorials are normally held each Thursday at 8:40 a.m (period 2).

Tutorials will be taken up with the discussion of pre-assigned problems you will have tackled in advance of the session and of other questions you may have. Solutions to all problems will be posted on RU connected website.

9. TEXTBOOKS

You are required to obtain your own copy of each book prescribed for the course you are doing.

For **Physics 1E1** the prescribed textbook is

- R A Serway and Vuille C 2012 *College Physics International Edition (9th edition).* A soft copy of this textbook will be uploaded on RU connected.

10. CALCULATORS

You are expected to have a scientific calculator, which you will need in all practicals, tests and examinations.

11. HANDOUTS

During the year, you will receive a considerable quantity of printed matter from us, such as the practical manual, test papers, pamphlets and the like. To cover the cost of printing, we debit your account with the University, R130.00 for Physics 1E1.

12. TESTS

There will be a test approximately every two weeks. You will sit the test during the usual lecture time. These tests are intended to encourage you to keep up with the work and help you keep track of your progress. The average of your test marks in each semester make up your Class Record Mark, **which is combined with your examination marks to give your final mark for the semester.**

The venue for each test will be announced. The provisional dates of the PHY 1E1 tests are:

27 February	24 April
13 March	15 May
10 April	

Any changes to these dates will be announced in lectures.

Usually the test comprises multiple choice questions and a "free-response" section. The marks are usually but not always divided in the ratio 80:20.

WARNING: Some may think it easy and convenient to cooperate with others writing a test. It certainly is easy to detect such attempts at collusion. Since the tests count directly towards your final result, attempts at cheating are taken seriously and the penalties for cheating are very severe.

If you miss a test, you will be given a mark of zero unless you have obtained prior permission to miss the test from your lecturer or from the Head of Department, or an appropriate MEDICAL CERTIFICATE is provided, preferably by a doctor. See the official Department notice titled "LEAVE OF ABSENCE".

13. DP REQUIREMENTS

To be allowed to write the examinations, you must have "duly performed" the work of the class.

For each semester this means

(a) attending **at least 80 %** of the lectures;

(b) attending **at least 80 %** of the tutorial sessions;

(c) attending **at least 80 %** of the practical sessions;

(d) obtaining a class record mark of **at least 40 %** for Physics 1E1

14. EXAMINATIONS, FINAL MARK AND SUBMINIMA

To be admitted to an examination, you must have met the DP requirements as indicated above.

The final examinations for each semester are held at the end of that semester. In the theory papers the marks are divided equally between a multiple-choice and a "free response" section. No choice of questions is allowed in any of the examination papers. This has the advantage from your point of view that you don't have to spend precious time in deciding which questions to answer.

The Physics 1E1 examinations in June consist of a 3-hour theory paper and a 2-hour practical.

In each semester the **final** mark is calculated as follows.

$$\text{Exam \%} = (2 \times \text{Theory \%} + \text{Prac \%})/3$$

$$\text{Final \%} = (2 \times \text{Exam \%} + \text{Class Record \%})/3$$

Inclusion of the Class Record mark implies that should your Class Record be a low mark, your written examination will have to be very much better, for you to pass.

Thus if your Class Record is 40 %, you will need an examination mark of 55 %; if your Class Record is as low as 35% you will need 58 % in the written exams, a virtual impossibility, as, statistically speaking, your end of year mark is likely to be roughly within 5 points of your class record. Your average test mark is a very good indication of your performance in the examinations.

SUBMINIMA: The subminimum mark is 40% in Physics 1E1.

If you fail Physics 1E1 in June, but get above the subminimum you *may* be given a second chance in a Rewrite *Theory* and *Practical* Examinations in November. The class record will be used again to obtain a final supplementary result.

15. STUDY TECHNIQUES

In order to succeed at Physics, you are best advised to systematically and regularly work at the subject. We encourage you to study Physics at least an hour each day. This time should be spent:

(i) learning key concepts and definitions;

(ii) solving problems;

(iii) supplementing lecture notes using your textbook as necessary;

(iv) working on unfamiliar material.

The fact that we assign only a limited selection of tutorial problems should not deter you from attempting others. The set problems are the minimum number to be attempted in order to master the work. Please pay attention to examples worked out during lectures, examples provided in the recommended textbook as well as the problems set in the tutorials. Many such examples are usually the basis of the final examination paper.

ADP tutors are available to provide help, advice and additional tuition.

16. WEB PAGE

More details about the Physics Department and the courses on offer may be found on the Department's home page accessible via http://www.ru.ac.za or directly at http://phlinux.ru.ac.za/physics

PHYSICS 1E1 SYLLABUS

FIRST TERM

1. **MECHANICS**

MOTION IN ONE DIMENSION

Displacement; Speed; Instantaneous and Average Velocity; Graphical Interpretation of Velocity; Acceleration and Free Fall.

MOTION IN TWO DIMENSIONS

Introduction to Vectors - Vector Addition and Resolution of Vectors; Velocity and Acceleration in Two Dimensions; Relative Velocity.

FORCE AND MOTION

Force, Weight and Mass; Density; Newton's First Law; Newton's Second Law; Newton's Third Law; Free Body Diagrams; Friction; Centre of Gravity; Equilibrium; Torque.

WORK, ENERGY, AND POWER

Work; Kinetic Energy; Potential Energy; Conservative Forces; Dissipative Forces; Conservation of Energy; Power.

MOMENTUM

Linear Momentum; Impulse; Conservation of Momentum; Elastic Collisions.

SECOND TERM

CIRCULAR MOTION

Uniform circular motion; Centripetal acceleration; Angular velocity and acceleration; Torque

2. **THERMAL PHYSICS**

TEMPERATURE AND THE BEHAVIOUR OF GASES

Temperature and States of Matter; Thermal Expansion; Heat Transfer by Conduction, Convection and Radiation.

3. **VIBRATIONS and WAVE MOTION**

PERIODIC MOTION

Hooke's Law; Simple Harmonic Oscillator; Energy of an Harmonic Oscillator; Period of an Harmonic Oscillator; The Simple Pendulum.

WAVE MOTION

Frequency, Amplitude, and wavelength; speed of waves on strings; Interference of waves; Beats; Reflection of waves.

SOUND

The nature and speed of sound; Sound waves in solids; Standing sound waves; Intensity of sound waves; Quality of sound.

PRACTICALS

1. Observations, Uncertainties and Graphical Methods
2. Density Measurements
3. Ray Tracing: Reflection, Refraction and the Refractive Index of a Prism
4. The Travelling Microscope: Apparent Optical Depth
5. Focal Length of Lenses and Transmission Grating (Diffraction)
6. Extension of a Spring
7. Super Pulley Force Table: concept of equilibrium
8. The Simple Pendulum
9. Surface Tension of a Liquid by Capillary Rise
10. The Project STAR Spectrometer: Common Spectral Lines