12998-144(16) Introductory Physics B (3l, 3p)

2017

Course summary:

An introductory physics module with a mathematical approach and emphasis on the fundamental concepts, with contents: Electrostatics, electrodynamics, magnetism and special relativity.

Prerequisite modules:

- *Physics 114*
- *Mathematics 114*

Co-requisite module: Mathematics 144

Language policy:

Afrikaans and English in the same class groups:
During each lecture, all information is conveyed at least in English. Summaries and/or explanation of the core concepts will also be given in Afrikaans. Questions in Afrikaans and English will, at the least be answered in the language of the question. Students will be supported in Afrikaans and English during a combination of appropriate facilitated learning opportunities.

Interpreting services from English to Afrikaans.

Module relevance in programme:

The role of this module is to guide the students in developing a basic understanding for a subset of physical phenomena and offers, together with Physics 114, the first systematic approach to developing mathematical models of the natural world. It also offers a structured approach to problem identification and problem solving strategies which are not restricted to the course itself. The module introduces the key basic concepts in electrostatics, electrodynamics and magnetism which are revisited and extended in electromagnetism 254. The module concludes with a basic treatment of special relativity which lays the foundation for relativity 342.

Outcomes of course:

This calculus-based course exposes the student to a first systematic treatment of electricity and magnetism. It also lays the foundation for more advanced physics courses which may lead to eventual specialization in physics. Students shall understand both the conceptual framework and be able to apply the calculus-based formalism to various physical situations.

Lecturer:

Dr GW Bosman (course coordinator)
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Dr JN Kriel
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Mentor:

The Department of Physics has appointed a staff member as mentor for each year of its physics programme to be available to students for consultation. Students should feel free to discuss general issues related to the physics programme or specific modules in the programme with the relevant mentor, in addition to usual consultations with their individual lecturers of modules.

The mentor for first year programme and its modules is Dr GW Bosman gwb@sun.ac.za

Course content:

Formal lectures
The following topics are covered during formal lectures: Electricity and magnetism: Electrostatics, electric fields and Gauss' law, potential, capacitance, currents and resistance, electrical circuits. Magnetic fields, force on moving charges in magnetic field, sources of magnetic fields. Brief introduction to electromagnetic induction and special relativity.

Practicals
The practical component of the course consists of experiments related to the course material. Students work in pairs. Each student, however, has to record his/her results in a report on each experiment. This mark counts towards the class mark.

Practical (Tutorials):

Tutorials will occur each week. On days where practical laboratory work is also scheduled, the session will commence with a tutorial of one hour to be followed by the practical until 17:00. During tutorial sessions in which there is no scheduled practical the tutorial shall end at 17:00. There will be 6 practical sessions for laboratory work. During the tutorial sessions students have the opportunity to solve problems related to the course work and to participate in other activities to enhance their understanding of the content covered during the lectures. During each tutorial session students should expect to produce work that will contribute to their class mark. The nature of assignments and assessments will be varied.

Study material:

Prescribed textbook: **"Sears and Zemansky's University Physics"**
(Addison-Wesley, 14th edition) by Young and Freedman.
We will also accommodate students who use the older 13th edition of this textbook.

Learning opportunities:

1. Tutorials (weekly, either 1 hour or 3 hours in duration).
2. A selection of lecture material available on SUNLearn (formats will be varied)
3. Solutions to selected problems available on SUNLearn.
4. Practicals
5. ePhys exercises on selected topics (SUNLearn)

Assessment:

Methods of Assessments
Tutorial problems, tutorial tests, homework assignments, group work, in-class quizzes
Class test
Practical laboratory reports
Examination

Venue and time of assessment opportunities
Tutorial tests: during the tutorial session.
Class test: See timetable.
Exam: See timetable.
Supplementary exam: See timetable.

Availability of marks:
Most marks will be available within two weeks after submission. The moderation processes for tests and exams may require more time.

Calculation of class mark:
Tutorials, homework, other assignments and practical report mark: 50% (laboratory work and the other assessments will be weighted roughly evenly) Class test: 50%

Calculation of final mark:
Examination: 60%
Class mark: 40%

Admission to examination:
Class mark greater than or equal to 40%