12998 - 114 (16) Introductory Physics A (3L, 3P)

2020

Course summary:

A calculus-based introductory systematic treatment of Newton mechanics that serves as the foundation for more advanced physics modules and eventual specialisation in physics. Experimental measurement and expression of physical quantities, kinematics, dynamics of translation, work and energy, rotational motion, statics, conservation laws, heat and thermodynamics.

C Mathematics 114

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 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 starts with the basics of classical mechanics which connects to 224 and 254 where the former extends various concepts of classical mechanics and the latter serves as a basic introduction into quantum mechanics. The concepts within classical mechanics will also be beneficial to particular applied mathematics modules. The final part of the module serves as an introduction to thermodynamics which are continued in 314 and which is also applicable for physical chemistry 254.

Outcomes of course:

The aim of the module is to lay the foundation for more advanced courses in physics and eventual specialization in physics. This calculus-based course serves as an introductory systematic treatment of Newtonian mechanics and aspects of thermodynamics. Students shall understand both the conceptual framework and be able to apply the calculus-based formalism to various physical situations.

Lecturer:

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Dr GW Bosman
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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 Mr GL Andrews glandrews@sun.ac.za

Course content:

Formal lectures
Topics covered during the lectures include: Physical quantities, translational kinematics and dynamics, work and energy, mechanical conservation laws, heat and temperature, heat transfer, kinetic theory of gases.

Laboratory work
The laboratory work consists of 3 experiments on topics related to the course material. Students work in pairs. Each student will be expected to record his/her own data and provide a written report at the end of each of the experiments. These reports will be handed in at the end of each practical and accessed individually. At the end of the semester each student completes an individual examination on the laboratory work covered during the semester.

Practical (Tutorials):

Tutorials will occur each week. On days where practical laboratory work is also scheduled, the session will start with a tutorial of one hour (14:00-15:00) followed by the practical 15:00-17:00. During tutorial sessions in which there is no scheduled practical the tutorial duration is 14:00-17:00. 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: **"University Physics"**
(Pearson/Addison-Wesley, 14th edition) by Young and Freedman.

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 a tutorial session
Class test: Visit My.SUN and look for the "Tests and exams timetable/venues" link, or follow this link https://web-apps.sun.ac.za/academic-exam-timetable/#/start/
Exam: Visit My.SUN and look for the "Tests and exams timetable/venues" link, or follow this link https://web-apps.sun.ac.za/academic-exam-timetable/#/start/

Supplementary exam: Visit My.SUN and look for the "Tests and exams timetable/venues" link, or follow this link https://web-apps.sun.ac.za/academic-exam-timetable/#/start/

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 for the module:

Examination mark: 60%

Class mark: 40%

Admission to examination:

A class mark of at least 40% should be attained in order to qualify for the exam.