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

2021

Module 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.

Corequisite module: Mathematics 114

Language policy:

Afrikaans and English in the same class group:

- During lectures and in online learning material, 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 (during lectures or in online forums) 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.

Module relevance in programme:

The role of this module is to develop the students' understanding for a subset of **physical phenomena** and introduce them to a systematic approach to developing **mathematical models** of the natural world. It also offers a structured approach to **problem identification and problem solving strategies,** the value of which is not restricted to the course itself. The module starts with the basics of **classical mechanics** which connects to (Physics 224 and 254) where the former extends various concepts of classical mechanics and the latter serves as a basic introduction into **quantum mechanics** in 3rd year physics (Physics 344). 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 3rd year physics (Physics 314) and which is also applicable for physical chemistry (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.

Lecturers:

Dr CM Steenkamp (Course coordinator)
E-mail address: cmsteen@sun.ac.za (preferred method of communication)
Telephone number: (021) 808-3374 / 3391
Office: Room 1044 in the Merensky Building

Prof KK Müller-Nedebock
E-mail address: kkmn@sun.ac.za (preferred method of communication)
Telephone number: (021) 808-3386 / 3391
Office: Room 1009 in the Merensky Building

Dr G Bosman (Coordinator of the practicals)
E-mail address: gwb@sun.ac.za (preferred method of communication)
Telephone number: (021) 808-2525 / 3391
Office: Room 1046 in the Merensky Building

Mentor:

The Department of Physics has appointed a staff member as mentor for each year of its physics programme. Students are welcome 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 the first year programme is **Dr G Bosman**
E-mail address: gwb@sun.ac.za (preferred method of communication)
Telephone number: (021) 808-2525 / 3391
Office: Room 1046 in the Merensky Building

Module content:

Prof Müller-Nedebock will lecture these topics: Physical quantities, vectors, motion in one, two and three dimensions, applying Newton's laws of motion, work and energy, conservation of momentum and energy, rotation, periodic motion and gravitation.
Dr Steenkamp will lecture: fluid mechanics, heat and temperature, thermal properties of matter, the laws of thermodynamics.

Study material:

- Prescribed textbook: "University Physics" (Pearson/Addison-Wesley) by Young and Freedman. Any edition of the book can be used.
- We also recommend the use of the LibreTexts free online book, University Physics parts I and II. The link is available on the Ph114 SUNLearn page.
- Study guidelines and other study material will be available on a weekly basis on SUNLearn.

AUGMENTED LEARNING PLAN – What to expect?

The offering of face-to-face contact sessions will depend on COVID-19 regulations. Any changes will be announced on the Ph114 SUNLearn Announcement forum.

COMMUNICATION:
We expect you to visit the SUNLearn module page of Physics 114 regularly and to read the e-mail that is sent to you from the SUNLearn forums at least once a day.
You are welcome to communicate with the lecturers using the SUNLearn discussion forums and our e-mail addresses given above.

LECTURES are replaced by asynchronous ONLINE LEARNING. Learning material for every week will be posted on the Physics 114 SUNLearn page. Please work through it at your own pace.

- *Tip: Make sure you are up to date with the Physics learning material by Monday evening so that you are prepared for the tutorial on Tuesday!*
- *Test your understanding by completing the weekly quizzes. It also earns you easy marks.*

TUTORIALS are compulsory synchronous learning sessions on Tuesdays 14:00-17:00.
We advise you to attend the **face-to-face tutorials** in rooms in the Merensky Building during the time slot Tuesday 14:00-17:00. However, face-to-face attendance is not compulsory.
Alternatively we will accommodate you to **attend the tutorials online**, using SUNLearn and Microsoft Teams during the same time slot Tuesday 14:00-17:00.

- *During a tutorial you can expect to practice applying the work of the previous week, do exercises in problem solving, and hand in a brief formative assessment for marks by 17:00.*
- ***Face-to-face attendance** will benefit you as direct interaction with peers and tutors are proven to improve learning. Please bring your student card, hand sanitiser and your electronic device that you use to access SUNLearn along (a phone with WiFi access is sufficient).*
- ***Online attendance**: Go to the tutorial on SUNLearn by 14:00, work through the exercises, do the formative assessment (usually opened at 16:00) and submit your answer by the stated time (usually 17:00). Help will be available throughout the afternoon via a Microsoft Teams chat. Download the MS Teams App from https://www.microsoft.com/en-za/microsoft-teams/download-app*

PRACTICALS are compulsory synchronous learning sessions, replacing the tutorial on some Tuesdays 14:00-17:00. Dates and instructions for the practicals will be announced on the Physics 114 SUNLearn page.
We advise you to attend the face-to-face practicals in rooms in the Merensky Building during the time slot Tuesday 14:00-17:00.
Alternatively we will accommodate you to attend the practicals online, using SUNSpace and Microsoft Teams during the same time slot Tuesday 14:00-17:00.

- *Practicals will normally include watching an introductory video (before the session, in preparation), working through activities, do data analysis and calculations, and it always include writing a report for marks.*
- ***Face-to-face attendance** is of great benefit as you can see what your peers are doing and get direct help from tutors/lecturers. Please bring your student card, hand sanitiser and your electronic device that you use to access SUNLearn along (a phone with WiFi access is sufficient). For some practicals you may need to use a computer, and that part you can do at home or in the computer user area NARGA.*
- ***Online attendance:** Please go to the practical on SUNLearn by 14:00, work through the material and submit your report by the given deadline. Help will be available throughout the afternoon via a Microsoft Teams chat. Download the MS Teams App from https://www.microsoft.com/en-za/microsoft-teams/download-app*

NOTE: Every Tuesday 14:00-17:00 you have Physics – either tutorial or practical.
If the COVID regulations would force us to switch to fully online teaching it will be announced clearly on SUNLearn. If this happens the tutorials and practicals will continue online by means of the SUNLearn page during the same time slot Tuesday 14:00-17:00.

TESTS and EXAMS will be written in venues on campus. If COVID regulations would force us to change this it will be communicated clearly on SUNLearn Announcement forum. Please see the details below.

Learning opportunities - summary:

Learning opportunity	**Format (f2f = face-to-face)**	**Relevance**
Study the **online learning material** (notes, voice recordings, brief videos)	SUNLearn	Essential to prepare for other tasks.
Test your understanding by completing the weekly **quizzes.**	SUNLearn	Not compulsory, but beneficial and earn you marks.
The **TUTORIALS** are the most important opportunity to learn physics by doing, asking questions, discussion with peers, tutors and lecturers, and handing in an assessment.	F2f attendance: Merensky building, Tuesday, 14:00-17:00. Online attendance: Do the tutorial online on SUNLearn Tuesday, 14:00-17:00.	**Compulsory synchronous activity** The formative assessments done during the tutorial count marks.
The **PRACTICALS** are essential to help you to develop skills and understand scientific measurement.	F2f attendance: Merensky building, Tuesday, 14:00-17:00. Online attendance: Do the practical online on SUNLearn Tuesday, 14:00-17:00.	**Compulsory synchronous activity** Reports count marks. If you have missed a practical (even if it is with a valid reason) you must normally catch it up.
Participate on the **discussion forums** on the Ph114 SUNLearn page (ask questions and respond to others).	SUNLearn	Not compulsory.
The lecturers will from time to time announce group-consultation on a specific topic	F2f. The room and time will be announced in advance.	No compulsory.
Use the **ePhys resource** to practice crucial skills.	ePhys module page on SUNLearn	Not compulsory, but highly beneficial to you. You will earn bonus marks for Ph114.

Assessments and marks:

Assessment	**Where and when?**	**Contribution towards marks (%).**
Assessments contributing to your class mark		
ePhys Quizzes	ePhys SUNLearn page	Bonus marks added to class mark up to 7%
Weekly Quizzes about Physics 114 topics	Physics 114 SUNLearn page	5 %
Formative assessments during Tutorials	F2f attendance: You will submit your work in writing during the tutorial session in the Merensky building, Tuesdays 14:00-17:00. Online attendance: Submit your work online on the Ph114 SUNLearn page during the tutorial session Tuesdays 14:00-17:00.	20 %
Practical reports	F2f or online attendance: Submit your report online on the Ph114 SUNLearn page, after you have attended the practical session either f2f or online. Practical sessions are on some Tuesdays 14:00-17:00 and the specific dates will be announced.	25 %
Test 1 (Early assessment)	Default: in Merensky building lecture rooms. *If COVID regulations would force us to switch to an online test it will be announced on SUNLearn and the date of the test will not change.* For dates see "Exam timetable" on: https://web-apps.sun.ac.za/academic-exam-timetable/index.html#/start/	15 %
Test 2 (Class test)		35 %
CLASS MARK calculated by adding these marks		100 %

Exams		
Exam 1 and 2 You must write one of the two exams and you can choose which one. However, it is advisable to write the first exam, because if you do not pass the first exam you may get access to the second exam in order to reach a pass mark.	Default: Exams are written on the dates and in the exam venues allocated by the SU exams office. *If COVID regulations would force us to switch to an online exam it will be announced on SUNLearn and the date of the exam will not change.* See "Exam timetable" and "Exam locations" on: https://web-apps.sun.ac.za/academic-exam-timetable/index.html#/start/	100 %
EXAM MARK		100%

Calculation of FINAL MARK for module:

(CLASS MARK) x 0.6 + (EXAM MARK) x 0.4 = FINAL MARK

Academic support:

- **The lecturers** are available for consultation (either face-to-face in the Merensky building or using Microsoft Teams). Please e-mail the lecturer to make an appointment.
- During **tutorials** you have the opportunity to ask questions and discuss the work with the lecturer or a tutor and fellow students.
- We plan to use the **Microsoft Teams chat function** during the time slot Tuesday 14:00-17:00 to provide support to students who have to do a tutorial or practical online.
- Please use the **discussion forums on the Ph114 SUNLearn page** to post questions or comments and respond to questions of others. The lecturers will also check the discussion forums regularly and respond.
- For very urgent enquiries or communication of confidential nature (for example reasons for absence, medical certificates) please e-mail Dr Steenkamp (cmsteen@sun.ac.za).

Exemptions from practicals, time table clashes and absence with reason:

Exemptions from practicals: Students who have **done first year physics practicals** during previous years may **apply for exemption** from the practicals. Please e-mail Dr Bosman (gwb@sun.ac.za) to apply.

Time table clashes: Students who have **time table clashes with the Tuesday 14:00-17:00 sessions** must urgently e-mail Dr Steenkamp (cmsteen@sun.ac.za) to solve this problem.

Self-quarantine: If you have to self-quarantine but not feeling ill, it is your responsibility to keep up to date with the work provided on SUNLearn. Please attend the tutorials and practicals online on Tuesdays 14:00-17:00 and hand in the assessment or report.

Absence with reason: If you missed a tutorial, practical, test or exam due to illness or a personal or family crisis we want to accommodate that. Please e-mail Dr Steenkamp (cmsteen@sun.ac.za), say for what time you have been absent, and attach a copy of your doctor's certificate or a letter from your parent/guardian/councillor explaining the situation.

- ***Tutorials:*** *You do not have to catch up on the formative assessment if you were absent with reason, but you should study the tutorial material in your own time.*
- ***Practicals:*** *You must normally do the practical that you missed at a later date. Contact Dr Bosman (gwb@sun.ac.za) to make an arrangement.*
- ***Tests:*** *If you missed Test 1 or Test 2 you have to take a "sick test" once you are back. Sick tests are usually oral tests.*
- ***Exams:*** *If you missed Exam 1 for any reason you must write Exam 2. If you decided not to write Exam 1 and you then miss Exam 2 for any reason there is unfortunately no further exam opportunity.*