59420-113 (8) Engineering Physics (2l, 0.5P, 0.5T)

2021 (Updated 26 March)

Please note that information contained within this module framework can change at short notice due to changes in lockdown regulations. Please take note of all announcements made in this regard via e-mail and SUNLearn.

Course summary:

Introduction to physics and physical quantities, including: introduction to atomic physics; oscillatory motion, introduction to wave motion, superposition and standing waves, sound waves; light, refraction, polarization; introduction to nuclear physics.

Method of assessment: Flexible assessment

Language Policy:

Afrikaans or English in separate class groups (Parallel medium):
A class is divided into separate Afrikaans and English groups. Students provide their preferred language of teaching at registration. Additional learning opportunities involving students from both language groups will be used to promote integration. Online resources will be provided in both Afrikaans and English.

Module relevance in programme:

This module is a service module for first year engineering students. It covers a broad range of topics (oscillations, waves, simple harmonic motion, sound, light, light matter interaction, atomic physics, nuclear physics). The broad range of subjects has very little overlap with topics covered in the high school curriculum. As such the module broadens the student's knowledge of physics and hopefully fosters an appreciation for the subject. The student is exposed to a mixture of conceptual understanding and multi-faceted analytical problem solving. Developing these problem-solving strategies are essential for the student in his or her future studies. This module is supplementary to the general Engineering program. The different engineering disciplines will all benefit from the analytical tools developed during the course. Some of the concepts covered in Physics 113 will be expanded on in greater detail in Physics 152.

Outcomes of course:

The aim of the module is to familiarize the students with a number of fundamental concepts in physics, applicable to the field of engineering, and to instill an appreciation for physics based problem solving. Topics covered were chosen to complement the rest of the curriculum the student will be exposed to. By the end of the course the student should be familiar with a number of physical concepts as well as analytical problem solving techniques related to physical problems.

Lecturer:

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Course content and Timetable:

On your time table you will see periods for Lectures (L), Practicals (P) and Tutorials (T). Lecturers will be available for face-to-face consultations during the lecture period (L). Students are expected to use the practical period (P) to complete course material (see below). The tutorial period (T) will be used for a weekly, online tutorial test. Therefore students are only expected to be physically present on campus for the lecture period (L), if they require consultation or have questions that could not be addressed in the online environment.

Lectures:
Online video lectures will be loaded onto SUNLearn on a weekly basis. It is expected that students review the lectures as well as the accompanying prescribed reading every week. Lecture periods will be used as additional face-to-face consultation sessions to discuss problems, not for providing content. Students will be allocated to certain timeslots to ensure adherence to social distancing requirements. This will be communicated during the first week of classes. Topics covered include: oscillations and waves, with emphasis placed on simple harmonic motion. Superposition of waves, standing waves, sound. Light waves and wave optics, with emphasis on refraction and polarization. Introduction to atomic physics, electronic energy states, transitions, lasers and x-ray spectroscopy. Introduction to nuclear physics, nuclear radiation, activity and lifetimes.

Practicals:
No face-to-face practicals will be possible. Instead, students will be expected to conduct three "at-home" experiments. Each student should conduct these experiments on their own. All experiments are mandatory and must be completed in order to complete the course. Detailed descriptions of the experiments will be provided. All the experiments will be possible with equipment/components accessible to all students and no specialized equipment will be required. The experiments will be related to topics covered in the course. A template for the report for each experiment will be provided and should be completed. Dates for the submission of these reports will be communicated well in advance and will be spaced out

Tutorials:
Tutorial practice questions will be provided together with the lecture material every week. Students can use these questions to practice and to test their understanding of the week's content. Students are required to complete an online tutorial test/quiz every Wednesday during the tutorial period. These tests/quizzes will contribute towards the semester mark. The worst 2 marks from these tutorials will be disregarded when calculating your semester mark, therefore no excuse needs to be made when you have missed one of these opportunities.

Discussion forum:
There is a discussion forum on the Engineering Physics 113 SUNLearn page where students are encouraged to ask questions. The lecturers will answer these questions timeously.

Study material:

Prescribed textbook: "Principles of Physics, International student version, 10th edition" (Wiley).

Learning opportunities:

Online video lectures made available on every week. These lectures will sometimes include interactive quizzes (concept tests) to test understanding. Face-to-face consultations on Mondays during lecture periods, as scheduled. Students can continuously pose questions on the online discussion forum (SUNLearn) which will be dealt with by the lectures in a timeous fashion. Three do-at-home experiments which highlights some of the theory discussed in class.

Assessment:

Methods of Assessments
Tutorial tests and practical reports will combine to count 20% of the final mark. Assessment 1 (during test week) will contribute 30% and assessment 2, 50%.

Venue and time of assessment opportunities:
Assessment 1: Date: April 30 Time: 11:00 Venue: To be confirmed

Assessment 2: Date: July 9 Time: 09:00 Venue: To be confirmed

Assessment 3: Date: July 22 Time: 09:00 Venue: To be confirmed

Calculation of class mark:
Semester mark = 20% = tutorial tests and practical reports

Calculation of final mark for the module:
Final mark = Semester mark(20%) + Assessment 1 (30%) + Assessment 2 (50%)

Admission to examination:
All students that have successfully completed all 3 practical reports will be admitted to assessment 2