

UNIVERSITY OF CAPE TOWN
DEPARTMENT OF PHYSICS
2018 PHY2010S COURSE INFORMATION SHEET

INTRODUCTION:

PHY2010S is second semester course which aims to teach concepts of electromagnetism and semiconductors to a second year undergraduate level within an engineering context. The content is based on a vector calculus approach, with prerequisites in vector mathematics and calculus. Topics include: Energy bands in solids, charge carriers in semiconductors, diodes and transistors. Vector calculus (div, grad, and curl), Dirac delta functions. Coulomb's law, Gauss' law, Poisson's & Laplace's equations, electric fields in matter. Magnetic fields in matter, Biot-Savart law, Ampere's law, electromagnetic induction. Ohm's law, currents, circuits. Poynting's theorem, electromagnetic waves in vacuum.

Pre-requisites:

- PHY1012F and PHY1013S or equivalent;
- a full first year mathematics course;

Co-requisites:

- MAM2083F/S second year mathematics course

LECTURES:

Lectures are held Mondays, Tuesdays, Wednesdays and Fridays in the second period (09h00 – 09h45) in lecture theatre M320 (Maths block) during the second semester. The three lecturers for the course are:

Dr Tom LEADBEATER (Course convenor):

Tom.Leadbeater@uct.ac.za, (RW James 5.12), Consultation: Wednesday 15h00-16h00,

Dr Trisha SALAGARAM (Laboratory convenor):

Trisha.Salagaram@uct.ac.za, (RW James 5.13), Consultation: Mondays 14h00-15h30, and

Dr Gary TUPPER:

Gary.Tupper@uct.ac.za, (RW James 3.07d), Consultation: Thursdays 13h00-14h00.

COURSE TUTOR:

Linda Shelembe: Electrical and Mechanical Engineering Building, Office No. 331.9,
SHLLIN007@myuct.ac.za, Consultation: Tuesdays 13h00-14h00.

COMMUNICATION:

The course content will be provided on Vula. You are required to consult the course Vula site regularly; the course timetable, problem sheets and additional information will be posted there. University regulations require you to receive and check your email on your UCT account (eg abcxyz001@myuct.ac.za).

TEXTBOOK:

D.J. Griffiths, *Introduction to Electrodynamics*, 3rd or 4th edition Pearson / Prentice-Hall.
Essential materials will be made available on Vula.

CLASS TESTS:

Three class tests will be held during the semester. Provisional dates are 16th August, 20th September and 18th October. Class tests will be held from 17:30 until 19:30. The class test venue will be PHYLAB1. Attendance is compulsory in order to fulfil DP requirements.

WEEKLY PROBLEM SETS:

Weekly problem sets (WPSs) will be issued once per week (usually Fridays) via Vula. Copies of these WPSs can be found on Vula under Resources/WPS. You are to work through all the problems by the completion time which will be clearly stated (Usually before the Friday lecture). Although you may consult with each other and approach the course tutors for help, your solutions should not be copied from anyone else.

There will be a mixture of assessed problems examined digitally via Vula, and hand written submission requirements at the discretion of the lecturer in charge (typically this will be 3 digital problems sets and 1 hard copy per cycle). Hard copy solutions should be stapled, with the student's full name and student number clearly visible. The submitted problem sets will be assessed by a tutor and marks thus obtained will contribute towards the final course mark.

You should check your solutions against the model solutions posted after the deadline on Vula. You may use consultations with the course tutors to assist you further with these problems if need be.

LABORATORY:

Consult the separate laboratory information sheet available on Vula under Resources/Admin. The laboratory convenor is Dr Trisha Salagaram (Trisha.Salagaram@uct.ac.za), and senior demonstrator is Dr Tanya Hutton (Tanya.Hutton@uct.ac.za).

DP REQUIREMENTS:

In order to qualify for writing the final examination, the duly performed (DP) requirements must be fulfilled by the end of lectures. This requires:

- Completion of all laboratory reports,
- at least 75% of problem sets handed in,
- attendance in all class tests,
- a class record of at least 40%.

ASSESSMENT:

There is a sub-minimum requirement of 45% in the final examination. The pass mark is 50% for the course aggregate, calculated as:

- three class tests 20%
- twelve weekly problem sets 10%
- three laboratory reports 20%
- final examination 50%

The Course Convenor reserves the right to administer Vula quizzes, question sheets or laboratory exercises to supplement this material as required by accreditation standards.

ATTENDANCE AND EXEMPTIONS

Attendance at practicals, tests, and examinations is compulsory. Exemption from any of these will be considered ONLY on medical or compassionate grounds, and will normally require a medical certificate or an official letter of support. This documentation must be stapled behind a completed Missed Activity Excuse Form (obtainable on Vula under Resources/Admin) and submitted to the Course Convenor within a day of your return to classes. *In the case of a valid excuse, the Course Convenor reserves the right to administer a make-up test, WPS or laboratory.*