UNIVERSITY OF CAPE TOWN
Department of Physics
PHY2004W Intermediate Physics 2020

Instructors A/Prof. Mark Blumenthal (Coord) **(EM)**: RW James 5.03 / 650 3347 / mark.blumenthal@uct.ac.za
Prof. Andy Buffler **(VW)** : RW James 5.01 / 650 3339 / andy.buffler@uct.ac.za
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Dr Sahal Yacoob **(CM)** : RW James 5.05 / sahal.yacoob@uct.ac.za

Course Tutor The course tutor can be consulted at the indicated times if you have problems with the course material or the weekly problem sets.
Sal Ahmad / AHMSAL001@myuct.ac.za — *Consultation times to be announced*

Prerequisite PHY1004W, a full first year course in Mathematics, and MAM2000W or (MAM2004H and MAM2047H) as co-requisite. A final mark of 60% and higher in PHY1004W is highly recommended.

Web Site Course material and announcements will be posted on Vula.

Syllabus

Vibration and Waves (VW) (20 lectures):
Simple harmonic motion; damping; complex numbers; forced oscillations and resonance; coupled oscillators; mechanical waves; normal modes of different systems in 1D and 2D; Fourier analysis; travelling waves; sound.

Classical Mechanics (CM) (40 lectures):
Euler's equation; Lagrange's equation; generalised coordinates and constrained systems; Hamiltonian formalism; phase space and Liouville's theorem; planetary motion; systems of particles; rigid bodies; coupled oscillators; special relativity; relativistic mechanics.

Electromagnetism (EM) (30 lectures):
Electrostatics; special techniques for potentials; electric fields in matter; magneto-statics; magnetic fields in matter; current; Ohm's law; electromagnetic induction; electrodynamics; Maxwell's equations.

Quantum Mechanics (QM) (30 lectures):
The basic assumptions of quantum mechanics; solutions of Schrodinger's equation; properties of wave functions and operators; one-dimensional applications; angular momentum in quantum mechanics; three-dimensional applications; the hydrogen atom; approximate methods.

Textbooks

Vibration and Waves
VIBRATIONS and WAVES by A.P. French, (M.I.T Introductory Physics Series, Van Nostrand). [Will be supplied.]

Classical Mechanics
CLASSICAL MECHANICS by John R. Taylor (University Science Books, 2005).

Electromagnetism
INTRODUCTION to ELECTRODYNAMICS (4th edition) by D.J. Griffiths (PEARSON, 2013).

Quantum Mechanics
INTRODUCTION to QUANTUM MECHANICS (2nd edition) by D.J. Griffiths (PEARSON, 2005).

Lectures 4th Period (11:00 - 11:45) , Monday–Friday, RW James Lecture Theatre LT4A
Bring a calculator and writing material as problems are often solved during lectures.

PHYLAB 2 The lab course will run remotely. For the second semester the labs will be experimental. New labs will be issued every second week on Monday. Hand-in will now take place two weeks following the lab via Vula. Clear instructions will be provided when the lab material is issued. **There will be no option for late hand-in.**

Tutorials There will be no whiteboard tutorials but the class tutors will be available everyday online for help and extra guidance. The course tutors will be in touch via Vula regarding exact arrangements.

Problem Sets Each week on Friday a problem sets will be issued as before that is due on the following Friday at 11:00 via Vula. A scanned in copy of your workings taken with your camera phone is perfectly acceptable. There is no need to type up your solutions. The WPS are part of the DP requirements and will count towards the final mark.

Class Tests There will be two short class tests for each module that will be issued online. Check the course calendar for dates.

Assessment As a consequence of UCT's emergency response to the COVID-19 pandemic, all lectures, laboratories and tutorials will take place in an online (distance learning) mode. All assessments will be of a continuous nature. The November examination will cover material from the entire year. Please see the revised DP requirements and assessment table below. Class Tests (20%), Problem Sets (10%), Laboratory Record (20%). Modules from the first two quarters will be examinable in the final exam in November(50%). Final (aggregate) mark of 50% is required to pass the course. There is a sub-minima criterion of (40%) for the examination. Students may bring a self-generated formula sheet of 3 double-sided A4 pages to examinations. All supplementary and deferred exams will be written in January 2021.

DP Certificate To be awarded a DP for this course students must have: participated in all class tests with an overall average of at least 40%; submitted **ALL** lab activities with an overall average of at least 50%; and submitted at least 80% of the weekly problem sets. To be awarded a final grade code of "Pass" for this course students must have: met all DP requirements; participated in all class tests and exams; and achieved an aggregate of 50% or greater. There is a 40% subminimum for the exam component.

Exemptions Exemption from class tests will not be granted; students missing a test due to illness will need to take a make-up test when they have recovered, provided that a medical certificate has been produced. Exemption from practical and weekly problem set assessment will only be considered on medical or compassionate grounds and normally requires a medical certificate from a registered medical practitioner or a letter of support. The medical certificate should be emailed (along with a medical certificate receipt form, found on the Vula course web page) to Jill Patel (jill.patel@uct.ac.za). If a student wishes to be granted an exemption or extension for a course requirement associated with a planned short absence from the course, then there is a form to complete (Science Faculty short leave form available on the course Vula site). This form needs to be submitted to the course convenor at least 3 working days prior to the period in question. Irreversible plans (such as flight bookings) must not be made before approval of leave is granted.

Plagiarism The real criterion is this: work that you hand in for credit is work that you must yourself understand. If copying from others is detected, the work of both the copier and the copied will not be marked, and a mark of zero will be awarded to each, and university disciplinary procedures may be invoked. Submitting the solutions taken from the solutions posted on the website by the class tutor in previous years, also constitutes copying. A mark of zero may be awarded, or a nominal mark may be awarded at the discretion of the course convener.

Semester 2

Monday	Tuesday	Wednesday	Thursday	Friday
03 August EM-01	04 August EM-02	05 August EM-03	06 August EM-04	07 August EM-05
10 August *Women's Day* *Public Holiday*	11 August EM-06 LAB: Cap	12 August EM-07	13 August EM-08	14 August EM-09 **WPS Hand-in**
17 August EM-10	18 August EM-11	19 August EM-12 Class Test: EM1	20 August EM-13	21 August EM-14 **WPS Hand-in**
24 August EM-15 LAB: LRC **Cap: Hand-in**	25 August EM-16	26 August EM-17	27 August EM-18	28 August EM-19 **WPS Hand-in**
31 August EM-20	01 September EM-21	02 September EM-22	03 September EM-23	04 September EM-24 **WPS Hand-in**
07 September EM-25 LAB: Mag Induction **LRC: Hand-in**	08 September EM-26	09 September EM-27 Class Test: EM2	10 September EM-28	11 September EM-29 **WPS Hand-in**
14 September EM-30	15 September EM-31	16 September EM-32	17 September EM-33	18 September EM-34 **WPS Hand-in**
21 September **Mid Break**	22 September **Mid Break**	23 September **Mid Break**	24 September **Mid Break**	25 September **Mid Break**
28 September **Mid Break**	29 September **Mid Break**	30 September **Mid Break**	01 October **Mid Break**	02 October **Mid Break**
05 October QM-01 LAB: Skin Effect **Mag Ind: Hand-in**	06 October QM-02	07 October QM-03	08 October QM-04	09 October QM-05
12 October QM-06	13 October QM-07	14 October QM-08	15 October QM-09	16 October QM-10 **WPS Hand-in**
19 October QM-11 LAB: Wave Guide **Skin Eff Hand-in**	20 October QM-12	21 October QM-13 Class Test: QM1	22 October QM-14	23 October QM-15 **WPS Hand-in**
26 October QM-16	27 October QM-17	28 October QM-18	29 October QM-19	30 October QM-20 **WPS Hand-in**
02 November QM-21 LAB: Hall Effect **W Guide: Hand-in**	03 November QM-22	04 November QM-23	05 November QM-24	06 November QM-25 **WPS Hand-in**
09 November QM-26	10 November QM-27	11 November QM-28 Class Test: QM2	12 November QM-29	13 November QM-30 **WPS Hand-in**