



Introduction

PHY1013F (Physics for Engineers) is a semester course, the second half of the first level physics course, for students registered in the Faculty of Engineering and Built Environment. Since we are in second year of the Covid-19 pandemic, the course will operate in a Physical Distanced Learning, low density Approach. Engagement with written material, online videos, participation in online tutorials will be crucial component of the learning process during this strange and difficult time.

Expectations

The teaching staff has high expectations of you. You are all capable of passing this course well. Your goal should be a final mark of 60% and above. To meet this goal you need to be convinced that it is a FACT that good learning incorporates:

- Feedback (that is our responsibility, except that it also entails contacting us via emails to make an appointment)
- Active Learning (reading or listening is not being active enough – you must engage in modelling and problem-solving as much as possible)
- Cooperation (working with others has many benefits)- Telegram social Network sites will be used as platform to enable collaboration among other students.
- Time on task (there is no substitute for many hours of actually modelling the physical phenomena of interest and of solving problems)

Purpose of the subject and Course Goals

The subject “Physics” is the study of the phenomena that we observe in the physical world. The desired outcomes of studying these phenomena are the ability to describe and explain them. Mathematical models are an essential component in this process. They help our understanding and enable us to predict behaviour, which is also one of the essential aspects of the practice of engineering. This course is an introduction to experimental and mathematical modelling of the physical world.

The goals of the course are to provide students with an opportunity to establish a scientific way of thinking about everyday physical phenomena, thereby becoming familiar with an engineering approach to modelling the real world and learning appropriate strategies for solving problems. The primary aim is to help students become better problem solvers. The course aims to provide a solid understanding of the basic principles of electro-magnetism at an introductory level, using calculus. Students are encouraged to develop an appreciation of the way in which mathematical physics provides a clear and concise description of the physical world. Tackling the material in the course seriously will provide a working knowledge of the fundamental concepts in electromagnetism, using vectors and calculus. The subject “Physics” is really about scientists trying to find “models” of the real world. These models involve concepts (like force, energy, acceleration) that are related mathematically, by carefully observing experiments. The objectives of the course are also to provide an environment in which students can be

exposed to the concepts and their related models, grapple with the concepts, understand them at a foundational level and learn how to approach relevant problems. Physics forms the foundation upon which Engineering is built.

Course Outline – topics covered:

The material is slightly reduced from the handbook description but the core is still the same, simple harmonic motion and vibration, electric charge, field, potential energy and potential, capacitance, current and resistance, circuits including multi-loops, magnetic field force, Faraday’s law, inductors.

Textbook

The textbook for the course is “*Physics for Scientists and Engineers: A Strategic Approach*” by Knight(Pearson, Addison Wesley). Chapters 15, 22-30 (in ed.4). The daily VULA(www.vula.uct.ac.za) ‘Lessons’ are based on sections found on the textbook. However, there are other resources that I have made available on VULA because you may find them more to your liking or they may be able to complement the text in a positive way.

Any other standard first year calculus-based physics text will be adequate for the course. However, you must realize that the problems that are set for in-class activities and workshops will be taken from “Physics for Scientists and Engineers”. Below are the names of a few other standard texts.

- Fundamentals of Physics - Halliday, Resnick and Walker (Wiley)
- University Physics - Young & Freedman, (Addison-Wesley)
- Physics for Scientists and Engineers- Serway & Jewett, (Brooks Cole)

Lecturer and Tutor information

Both me and the tutors are available for online consultation through zoom or Microsoft teams/telegram social network site anytime during the working hours (08:30-16:30). Table below shows contact details for tutors and myself.

Lecturer	Dr. Moses Basitere	Tutor	Mr. Kevin Barends
Office		E-mail	BRNKEV010@myuct.ac.za
E-mail	moses.basitere@uct.ac.za	Tutor	
Telephone		E-mail	

Monday	Tuesday	Wednesday	Thursday	Friday
Test	Lecture	Lecture	Lecture	Lecture
	Optional practice Quiz	Optional Practice Quiz	Optional Practice Quiz	Optional Practice Quiz
WPS Solutions				WPS Workshop

Lessons

The daily readings and tutorials questions, as well as weekly worksheets are found by using the “Lessons” tool on Vula. There you will find that you are directed to certain readings each day, as well as videos that have been placed on VULA. The resources are there for you to learn. If you do not think that you properly understand something, it is your responsibility to use more than one resource that has been shown there, or to find other resources or to contact me or the tutors via email or Q&A session on WhatsApp social network site.

Lessons will be set for Tuesday through Friday. Obviously, you are free to do them in your own time. However, the quizzes will always be on Monday of each week, testing the material of the previous week.

Tutorials & worksheets

Tutorials and worksheets will be posted on VULA via lessons tool each week. The tutorials will have about 2 questions per day and worksheets will have 6 or so problems for consolidation at the end of the week. Each Thursday we will have Weekly Problem set Workshop consultation using Zoom for 2 hours between 14:00-16:00. Daily consultation through appointment can be done with both me and the tutor and also through the use of Social Media Network Telegram. Students are encouraged to collaborate on social media and ask questions and assist each other on social media as part of creating a community of practice.

Assessment

The student in the course is assessed on performance in each of the activities in the course. The final mark in the course is determined according to the table below.

Assessment event	Course % contribution
Weekly Tests (WPS)	15%
Class Tests	20%
Labs	15%
Exam	50%
TOTAL	100 %

Weekly Tests

There will be a **weekly test** that covers the previous week’s daily tutorial questions and weekly tutorial material each Monday. The weekly test will be administered through “tests and quizzes” tool. Some will be “multiple choice questions” and others will be “calculated questions”. The calculated questions are structured so that each student is given different values for the parameters of the problem and therefore has different answers. The weekly test will be on **Monday each week** at 09h00-10h00.

Quiz

Please note that you have an optional daily practice quiz each day. The quiz will consist of reading quiz and problem based questions will not carry any weight.

Class Tests

There will be two **class tests** written and invigilated on campus for this course. The Class Tests will assess your knowledge, skills, understanding, modelling and problem-solving abilities. Understanding will be assessed through problem solving as well as through questions of a qualitative nature. The class tests will assess what has been covered in class, homework, tutorials and workshops.

Class Test 1 – Tuesday 13 April 2021 (TBC) day before

Class Test 2 – Tuesday 01 June 2021 (TBC)

The tests are there to provide feedback on the progress you are making towards advancing your understanding of the concepts and principles and your approach to problem solving. Attendance at the tests is compulsory. When absence is unavoidable, an application for exemption must be made to **Dr. Moses Basitere**. Applications on medical grounds must be accompanied by a valid medical certificate.

Exam

There will be a final course exam in June written during the university exam period. The Exam will assess your knowledge, skills, understanding, modelling and problem-solving abilities.

Laboratory Sessions

The Physics department has plans for you to engage in some online laboratory activities at home and report on these. Those of you who have completed these practical's last year will be exempted and therefore not have to repeat them. You will be informed about these practical's by Mr Dieter Geduld, dieter.geduld@uct.ac.za. Applications on medical grounds must be accompanied by a valid medical certificate. Please check the laboratory schedule for date for online laboratory.

Faculty of Science Code of Honour

The University of Cape Town's official statement of general rules and policies, including a statement of values and expected student and staff conduct, can be found here:

http://www.students.uct.ac.za/sites/default/files/image_tool/images/434/study/handbooks/2020/UCT_Handbook_3_2020.pdf

All students in the Faculty of Science are required to familiarize themselves with UCT's rules and policies.

The Faculty of Science takes UCT's statement of values seriously. Among other things, every member of the Faculty of Science – student and staff – is expected to strive for personal and academic integrity; to be respectful and tolerant towards others; to honour the rights, personal choices and property of others; to take responsibility for their behavior individually and in groups; and generally, to act as a responsible citizen in our academic community and beyond. As stated in the above-mentioned document: “Truth, fairness, consistency and integrity in both academic and other work, and in all personal and institutional relationships” are key elements of UCT's academic values.

We are currently in a global crisis and recognize that distance learning will be a challenge for many students. Nonetheless, we must strive to uphold these values. We ask students to commit to this Code of Honour (i.e. doing what is morally right) when completing tasks remotely: all assignments and tests must be a student's own work, with no input from others (unless otherwise specified), and no work can be plagiarized.

Students may report to their course convener or Science/Engineering Faculty if they believe that other UCT students have breached this code. The Faculty of Science commits to supporting our students in this difficult time and requests their full commitment to the integrity of the academic project.

Please commit to this by completing the “Code of Honour” Quiz on the PHY 1013F/1015F, 2021 Vula site.

Duly Performed Certificate = Competency assessment

At this university you are required to perform adequately during the semester in order to be permitted to write the final examination. The requirements are clearly specified above and will be repeated often as the course progresses.

In order to meet the DP / competency requirements, a student must:

- obtain an average of more than **40%** in your Vula gradebook.
- obtain an average of more than **40%** for the laboratory reports.
- attend and write at least **90%** of the weekly tests.

Exam Sub-minimum Mark

The sub-minimum for the exam is **40%**. If you obtain less than 40% you fail the course irrespective of your course grade.

Medical Excuses

No medical certificates will be accepted as an excuse for missing anything but tests. If you are sick at the time of a test, submit a medical certificate and you will be excused. If you are absent for a laboratory or tutorial, you will have an opportunity to catch up later in the course.

Rules to Consider (From UCT Rules Handbook)

G18.11 A student found guilty by a university disciplinary court of dishonest conduct in relation to examinations may be disqualified.

G18.12 Dishonesty, including plagiarism or the submission by a student of other people's work as his/her own, in an examination or in any other form of assessment will be dealt with in terms of the disciplinary rules.

PHY103F/PHY1015 F Online schedule

week	date	Topic				
1						
March	15	Simple Harmonic motion(SHM)				
	16	SHM and Circular motion				
	17	SHM and Energy				
	18	Dynamics of SHM				
	19	The pendulum/ Compound pendulum				
2						
March	22	Public holiday- Human Rights Day				
	23	Weekly Test				
	24	Electric Charge				
	25	Electric force				
	26	Electric field				
3						
	29	Weekly Test				
	30	superposition				
	31	Continuous distribution/ More distribution				
April	1	Electric flux				
	2	Good Friday				
4						
April	5	Family day				
	6	Quizz				
	7	Gauss Law				

	8	Electro-static equilibrium				
	9	Potential Energy				
5						
April	12	Weekly Test				
	13	Test 1				
	14	Electric Potential				
	15	Potential of point charge and dipole				
	16	Potential of continuous distribution				
6	19	Weekly Test				
	20	Conductors in E-S equilibrium				
	21	Capacitance				
	22	capacitors				
	23	Circuits				
7						
April	26	Weekly Test				
	27	Freedom day holiday				
	28	Energy stored				
	29	Current, current density				
	30	Conductivity + Resistivity				
May						
Vac	3	Vacation				
	4	Vacation				
	5	Vacation				
	6	Vacation				
	7	Vacation				
8	10	Weekly Test				
	11	Resistance, Ohm's law				

	12	Kirchhoff+ basic circuit				
	13	Kirchhoff+ basic circuit				
	14	Energy and Power				
9						
May	17	Weekly Test				
	18	Series+ parallel resistors				
	19	Circuits(+multi-loop)				
	20	RC Circuits				
	21	RC Circuits				
10						
May	24	Weekly Test				
	25	Magnetism, magnetic field				
	26	Source of Magnetic field				
	27	Magnetic field of a current				
	28	Magnetic dipole				
11						
May	31	Weekly Test				
June	1	Ampere's law and solenoid				
	2	Magnetic force on a charge				
	3	Magnetic field +Elec force on a charge				
	4	Motion of charge in B				
12						
June	7	Weekly Test				
	8	Test 2				
	9	Magnetic force on wires				

	10	Forces and torque on loops				
	11	Induced currents, motional emf				
13						
June	14	Weekly Test				
	15	Motional emf				
	16	Youth Day				
	17	Magnetic flux				
	18	Lenz's Law & Faraday's law				
14						
End of Lecturers	21	Inductors?LR Circuits				
	22	Weekly Test				
EXAM						