

PHY1004W: *Matter and Interactions* Course Information 2018

PHY1004W (Matter and Interactions) is the calculus-based first-year course for science students who intend to proceed to higher physics courses. It is also suitable for mathematicians, astronomers, chemists, computer scientists and geologists. Together with MAM1000W it is a prerequisite for the further physics course PHY2004W, which leads to the physics major. Students will normally be expected to have passed FET Physical Science and Mathematics with at least 60%. A full first-year Mathematics course such as MAM1000W (or equivalent) must have been passed or be taken concurrently. Applied Maths I is also strongly recommended.

The course consists of approximately 120 lectures, and 24 afternoon tutorial or laboratory sessions. The PHY1004W course convenor is: **Prof Andy Buffler**, Room 5.01, RW James building.

Course outline

The course will cover ...

- Mechanics: momentum principle, conservation of energy, energy quantization, angular momentum
- Matter: atomic nature of matter, waves and particles
- Thermodynamics: statistical physics, entropy, probability theory
- Electricity: Fields and charges, potential, circuits, Gauss' law
- Magnetism: Fields and currents, magnetic forces, Faraday's law
- Electromagnetic radiation, waves, physical optics

... with an emphasis on ... analyses of systems based on a small number of fundamental principles; the atomic nature of matter, and the link between microscopic and macroscopic phenomena; a unified treatment of topics; and modelling of complex physical systems, including the use of numerical (computer) treatments.

Lecturers

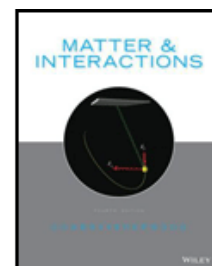
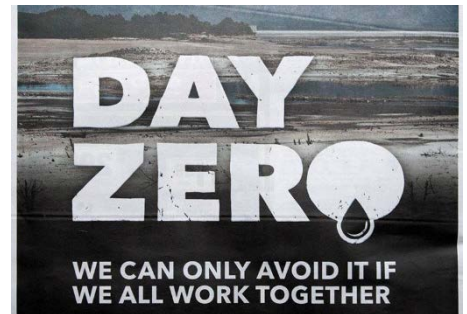
- Mechanics: Andy Buffler, Trisha Salagaram, Spencer Wheaton
- Electromagnetism: Katie Cole, Andy Buffler, Steve Peterson

Textbook

The prescribed textbook is *Matter and Interactions 4th Edition*, Ruth Chabay and Bruce Sherwood, John Wiley and Sons, 2015.

Lecture venue

All lectures will be held in Lecture Theatre LT4A, RW James Building, 3rd period, 10:00 - 10:45 (Monday to Friday). Afternoon tutorials take place in RW James Room 3B.



Computing

The numerical modelling of systems using a computer is a central part of the course. Instruction will be provided using the computer language Python together with the visual module. This [VPython](#) package is used in the textbook. All students are required to have their own laptop which must be brought to all activities (lectures, labs and tutorials).

Weekly problem sets

Each Friday morning a sheet of questions will be handed out before the lecture. (Copies of these WPSs will also be found on Vula.) Students are to work through all the problems (and are strongly encouraged to attempt the extra, textbook problems listed at the bottom of the sheet as well) by the end of the next week. (Students may consult with each other and approach the course tutor for help if necessary.) Full solutions to these problems must be handed in by each student into the box outside Lecture Room 4A before 10:00 on the hand in day. These will be checked by the course tutor and returned into the pigeonholes in PHYLAB1. A student will receive a 1 if the tutor believes that a reasonable attempt has been made at each problem. Marks thus obtained for these weekly problem sets will contribute 6% towards the final course mark. Worked solutions to the questions will be published on Vula for you to check your own work. *Note: These weekly problem sets and the tutorials are a good indicator of the type and standard of questions which can be expected in tests and exams.*

Course tutor

The two course tutors are Charlotte Hillebrand-Viljoen (Room 3.28) and Lauren Denny. They will deal with the weekly problem sets and be available at certain times for “hotseat” consultation.

Plagiarism declaration.

Every student needs to read the “What is plagiarism?” document available on the course Vula site and complete the plagiarism declaration (available as a Vula Quiz) before the end of the first week.

Communication

Notices, schedule changes, and other course material will be posted on the PHY1004W Vula site. You will also receive email correspondence from time to time, so check your UCT email regularly. The Vula chat room may be useful.

Laboratory

Dr Trisha Salagaram (Room 5.13) is the coordinator of the PHY1004W laboratory in the first semester. Mr Mark Christians (Preparation Room in PHYLAB1) is the Technical Officer to whom all administrative queries should be addressed in the first instance. Dr Nawahl Razak (Room 3.04) is the Chief Scientific Officer for the teaching laboratories. Laboratory sessions for PHY1004W students take place on Tuesday afternoons from 14h00. Certain laboratory reports will be designated as writing exercises, and particular emphasis will be placed in these on writing skills. **There is a separate handout regarding laboratories.**

Tutorials

Approximately once every four weeks, students will attend an afternoon tutorial session instead of a practical. At the start of the tutorial session a selection of about four or five problems will be assigned. The class will then be formed into groups of four to work through the assigned problems at a whiteboard in RW James 3B. Tutors will be present during the session.

Attendance and exemptions

Attendance at practicals, tutorials, tests and examinations is compulsory. Exemption from class tests will not be granted; students missing a test due to illness will sit another test as soon as they have recovered, provided that a medical certificate has been produced. Exemption from practicals, tutorials and weekly problem sets will only be considered on medical or compassionate grounds and normally requires a medical certificate or a letter of support. An application for exemption must be submitted on the form available from Mr. Christians in the first-year laboratory.

Short leave from the course

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 (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. Completion of the form is not required for medical certificates obtained on the day of the unplanned illness. These should be submitted in the usual way to the course convenor.

Assessment

PHY1004W is assessed as shown below:

6	Class (theory) tests	20%
2	Laboratory tests	12%
24	Weekly problem sets	6%
many	Laboratory reports	12%
1	June Examination (2 hours)	25%
1	November Examination (2 hours)	25%

You can check your up-to-date grades for the course on a special app written for this purpose, available here: <http://webapp-phy.uct.ac.za/webmarks/1004w>

Duly performed (DP) requirement

A student will be regarded as having duly performed the work of the course, and thus qualify to write the final examination, if he/she has: written all class tests and achieved a class record (based on tests and problem sets) of at least 40%; completed all laboratory reports, and obtained a laboratory record of at least 50%; written both of the laboratory tests; and attempted at least 75% of all weekly problem sets.

DP certificates may be withheld from students who fail to meet these minimum requirements. Students who are not awarded DP certificates will not be permitted to write the November examination.

General communication

Keep an eye out for meetings of the *Society of Physics Students*.

The main physics website may be useful <http://www.phy.uct.ac.za>

... as well as our departmental Facebook page: <https://www.facebook.com/uctphysics>



UCT Physics Department

PHY1004W Lecture schedule 2018

Week	Date	Mon	Tue	Wed	Thu	Fri
1	Feb 19-23	Mech	Mech	Mech	Mech	Mech
2	Feb 26 - Mar 2	Mech	Mech	Mech	Mech	Mech
3	Mar 5 – 9	Mech	Mech	Mech	Mech	Mech
4	Mar 12 -16	Mech	Mech	Mech	Mech	Mech
5	Mar 19 - 23	[test day]	Test 1	[Human R]	Mech	Mech
6	Mar 26 - 30	Mech	Mech	Mech	Mech	[Easter]
7	Apr 2 - 6	[Easter]	vac	vac	vac	vac
8	Apr 9 -13	Mech	Mech	Mech	Mech	Mech
9	Apr 16 - 20	Mech	Mech	Mech	Mech	Mech
10	Apr 23 - 27	Mech	Mech	Mech	Test 2	[Freedom]
11	Apr 30 - May 4	Mech	[Workers]	Mech	Mech	Mech
12	May 7 - 11	Mech	Mech	Mech	Mech	Mech
13	May 14 - 18	Mech	Mech	Mech	Mech	Mech
14	May 21 – 25	Mech	Mech	Mech	Test 3	swot
15	May 28 ...	swot	swot	exams	exams	exams
		More exams then vacation		
1	Jul 23 - 27	EM	EM	EM	EM	EM
2	Jul 30 - Aug 3	EM	EM	EM	EM	EM
3	Aug 6 - 10	EM	EM	EM	[Women]	EM
4	Aug 13 -17	EM	EM	EM	EM	EM
5	Aug 20 - 24	EM	EM	EM	EM	Test 4
6	Aug 27 - 31	EM	EM	EM	EM	EM
7	Sep 3 - 7	EM	EM	EM	EM	EM
8	Sep 10 - 14	vac	vac	vac	vac	vac
9	Sep 17 - 21	EM	EM	EM	EM	EM
11	Sep 24 - 28	[Heritage]	EM	EM	EM	Test 5
12	Oct 1 - 5	EM	EM	EM	EM	EM
13	Oct 8 - 12	EM	EM	EM	EM	EM
14	Oct 15 - 19	EM	EM	EM	EM	Test 6
15	Oct 22 - 26	EM	EM	swot	swot	swot
		Exams ...				

AB	TS	SMW	KC	SP
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