Together, Physics 1: Advanced and Physics 2: Advanced introduce students to most of the main branches of physics and include a variety of applications in other areas of study in the sciences. They are suitable physics subjects for students wishing to major in any physical, technological, or biological discipline.

Physics 1: Advanced uses an approach that is somewhat deeper and more mathematically advanced than Physics 1. The School of Physics strongly encourages students who are interested in this approach to take the advanced subject sequence, provided that they have a high enough score in each of the Year 12 subjects Physics and Specialist Mathematics (or equivalent, for non-VCE students).

Prerequisites:
Excellent results in VCE Unit 3/4 Physics and Unit 3/4 Specialist Mathematics (normally an unscaled score of at least 35 in each) or equivalent.

Semester: 1
Credit points: 12.5
Contact hours:
35 lectures (3 per week, except Good Friday)
11 one-hour tutorials (1 per week)
28 hours of practical work (pre-laboratory activities plus seven to nine weeks of 2- or 3-hour workshop sessions)

Lecturers:
Professor David Jamieson (weeks 1 to 6)
Associate Professor Robert Scholten (weeks 7 to 12)

Prescribed Textbook

Each student should possess a copy of the prescribed textbook, from which questions and problems will be recommended. Other useful books to which lecturers may refer can be found in the Baillieu Library.

Syllabus
The subject will cover most of the topics listed below, and will be illustrated by applications to physical and biological sciences. Vector notation and differential and integral calculus will be used whenever appropriate.

Mechanics: Applications: Describing and explaining translational and rotational motion, for example in the contexts of human and animal movement and transport. Principles: Newton’s laws of motion, both translational and rotational; energy transfer and transformation; momentum and impulse; simple harmonic motion, equilibrium.


Waves and sound: Applications: Water waves; seismic waves; production and detection of sound, eg. musical instruments, hearing; ultrasound. Principles: reflection and refraction, superposition, resonance, energy transport, absorption, Doppler effect.


Special relativity: Applications: Particle accelerators, the ‘twin paradox’. Principles: Einstein’s modification of Newtonian physics, relativity of time and space, equivalence of mass and energy.

Noticeboards
Notices for First-Year Physics appear on boards in the corridor outside the level 2 tutorial rooms (David Caro (Physics) podium building).
Online resources

The Learning Management System (LMS) site for this subject will contain general subject information, contact details for staff, electronic versions of handouts and copies of PowerPoint slides as well as links to other internet sites of relevance to the subject. The site will be updated regularly throughout the semester.

To access the LMS site you will need to have activated your university email account since you will be required to enter your login name and password. Lecturers in this and other subjects may choose to send you reminders and other useful information by email.

There are online Mastering Physics resources linked to the textbook, including guided problem solving for the recommended problems and provision of the text in the form of an ebook.

Tutorials

Tutorials associated with this subject are held weekly in the David Caro (Physics) building podium (the eastern wing), in tutorial rooms on level 2, commencing in the second week of each semester.

Allocation to tutorials can be found on students’ individual timetable. Lists are also posted on the noticeboard in the level 2 corridor of the David Caro building podium in Week 1 of each semester.

All students are strongly advised to work regularly on the recommended questions and problems, as an ability to explain physics ideas and solve problems are important elements in passing the subject.

Laboratory workshop classes

The laboratory workshops will focus on developing students’ expertise in three areas in Semester 1 – Mechanics, Waves and Optics. Students will complete a group of workshops in each area. Note that laboratory workshops begin in the third week of the semester.

The Physics 1: Advanced Laboratory Manual and the Physics Practical Notebook may be purchased from the University Bookshop from the beginning of Week 2.

Laboratory classes are in the Physics 1 Laboratories on the 3rd and 4th levels of the David Caro podium. The mark for laboratory work counts as part of the overall result, and satisfactory completion of this component is required for a pass in the subject (see below under assessment).

Tests and assignments for feedback

To encourage first-year students to work systematically throughout each semester, and to provide two-way feedback on student progress, lecturers will set regular assignments and tests of various kinds.

There will be three assessment tasks for feedback each semester:

(1) A 20-minute short-answer test to be answered in a lecture in Week 4 (5%)
(2) An individual assignment due in Week 8 (5%)
(3) A 20-minute examination-type question to be answered in a test in Week 10 (5%)

Assignment coversheet: Each assignment must be submitted with a signed coversheet, available from the subject’s LMS Assessment resources page. Students should be familiar with the University’s policy on academic honesty and plagiarism, which can be found at http://www.academichonesty.unimelb.edu.au.

Assignment extensions: any requests for extension to the due date for the assignment are submitted to the Director of First-Year Studies, using the form available on the LMS Assessment resources page. Since students are expected to be planning their work to meet the submission deadline, extension requests must be submitted at least three days before the due date. Consideration will be given to circumstances outside a student’s control that have significantly hampered their ability to complete the assignment by the due date.

Absence from a test or laboratory workshop: If a student is absent for a reason that is outside their control, medical or otherwise, they should present the relevant documentation (eg. medical certificate) to the teaching administration officer, Mr Colin Entwisle, in the First Year Learning Centre as soon as possible so that he can reschedule the workshop or test if it is possible.

Assessment

Ongoing assessment of practical work during the semester (25%); two written tests with a total duration of up to 1 hour, held early and mid semester (10%); one written assignment requiring up to 4 hours of work outside class time during the semester (5%); a 3-hour written examination in the examination period (60%).

Satisfactory completion of practical work is necessary to pass the subject (i.e. attendance and submission of work for at least 80% of workshop sessions together with a result for assessed work of at least 50%).