640-112 Physics 2: Advanced

Credit Points:	12.50
Level:	1 (Undergraduate)
Dates & Locations:	2009, This subject commences in the following study period/s: Semester 2, - Taught on campus. Lectures, tutorials and practical laboratory classes.
Time Commitment:	Contact Hours: 36 one-hour lectures (three per week); 11 one-hour tutorials (one per week); 27 hours of practical work (pre-laboratory activities plus nine weeks of 2- or 3-hour workshop sessions). Total Time Commitment: 120 hours total time commitment.
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). It will be assumed that students are familiar with the content of *Physics 1: Advanced* or *Physics 1*.
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Students may only gain credit for one of *Physics 2: Advanced*, *Physics 2*, *Physics 2: Life Sciences and Environment*, *Physics for Biomedicine*, 640-142 (prior to 2008), 640-152 (prior to 2008), 640-162 (prior to 2008).
Core Participation Requirements:	It is University policy to take all reasonable steps to minimise the impact of disability upon academic study and reasonable steps will be made to enhance a student's participation in the University's programs. This subject requires all students to actively and safely participate in laboratory activities. Students who feel their disability may impact upon their participation are encouraged to discuss this with the subject coordinator and the Disability Liaison Unit.
Coordinator:	Assoc Prof Michelle Livett
Subject Overview:	This subject is designed for students with a strong interest and background in physics, and aims to provide a deep understanding of a broad range of physics principles and applications. Topics include: Fluids: water and air pressure, breathing, hydraulics, flight (pressure in fluids, buoyancy, fluid flow, viscosity, surface tension). Thermal physics: heating and cooling, energy balance in environments, engines, refrigerators (temperature and thermal energy, kinetic theory, phase changes, heat transfer mechanisms, first law of thermodynamics, diffusion). Electricity and magnetism: electrical devices, lightning, household electricity and electrical safety, electric motors, power generation and transmission, Earth's magnetic field, particle accelerators, communications (electric charge and field, conductors and insulators, electric potential, capacitance, resistance, electric circuits, magnetic field, Faraday's law of induction, Maxwell's equations, electromagnetic waves). Quantum and atomic physics: spectroscopy, lasers (photon, blackbody radiation, matter waves, quantisation in atoms, interaction of light with matter, x-rays). Nuclear physics and radiation: nuclear energy, radiation safety, formation of atoms in stars, carbon dating (the atomic nucleus, radioactive decay, half-life, ionising radiation, nuclear fission and fusion).
Objectives:	To challenge students to develop further their understanding of the importance of physics principles and develop their capacity to : # understand and explain the physics principles of fluids, thermal physics, electricity and magnetism, quantum, atomic and nuclear physics; # apply these principles using logical reasoning, together with appropriate mathematical reasoning, to a variety of familiar and novel situations and problems; and # acquire experimental data using a range of measurement instruments and interpret these data.

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%).
Prescribed Texts:	R Knight, Physics for Scientists and Engineers: A Strategic Approach with Modern Physics, 2nd edition, Addison-Wesley, 2008
Breadth Options:	This subject potentially can be taken as a breadth subject component for the following courses: # **Bachelor of Arts (https://handbook.unimelb.edu.au/view/2009/D09)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2009/F04)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2009/A04)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2009/M05)** You should visit **learn more about breadth subjects (http://breadth.unimelb.edu.au/breadth/info/index.html)** and read the breadth requirements for your degree, and should discuss your choice with your student adviser, before deciding on your subjects.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	A student who completes this subject should be able to: # explain their understanding of physics principles and applications lucidly, both in writing and orally; # acquire and interpret experimental data and design experimental investigations; # participate as an effective member of a group in tutorial discussions, laboratory and study groups; # think independently and analytically, and direct his or her own learning; and # manage time effectively in order to be prepared for regular practical and tutorial classes, tests and the examination.
Notes:	This subject is available for science credit to students enrolled in the BSc (both pre-2008 and new degrees), BASc or a combined BSc course.
Related Course(s):	Bachelor of Optometry
Related Majors/Minors/ Specialisations:	First year physics