640-172 Physics 2: Life Sciences & Environment

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:	VCE Unit 3/4 Mathematical Methods or equivalent. It will be assumed that students are familiar with the content of *Physics 1* or *Physics 1: Fundamentals*.
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 aims to develop students' understanding of the physics principles underpinning biological and environmental systems. It is designed for students with a sound background in physics, whose interests lie mainly in the biological sciences. Topics include: Fluids: blood pressure and the circulatory system, breathing and respiration (pressure in fluids, fluid flow, viscosity). Thermal physics: heating and cooling, energy balance of living organisms, ion movement across membranes (temperature and thermal energy, phase changes, heat transfer mechanisms, first law of thermodynamics, diffusion). Electricity and magnetism: bioelectricity, nerve conduction, electrical safety, power transmission, synchrotron, biological effects of electromagnetic fields (electric charge and field, electric potential, capacitance, electric circuits, resistance, magnetic fields and forces, Faraday's law of induction). Atomic physics and lasers: fluorescence imaging and spectroscopy, laser surgery (structure of the atom, photons, spectroscopy, interaction of light with matter); Radiation: radiation safety, therapeutic uses of radiation (the atomic nucleus, isotopes, nuclear decay and radiation, physical and biological half-life, ionising radiation); and Imaging: modern biomedical imaging (X-rays, CT-scans and angiography, ultrasound imaging, positron emission tomography).
Objectives:	To enable students to understand the importance of physical principles to biological and environmental sciences, and develop their capacity to: # understand and explain the physics principles of fluids, thermal physics, electricity and magnetism, atomic, radiation and imaging physics; # apply these principles using logical reasoning, together with appropriate mathematical reasoning, to a variety of familiar and novel situations and problems in the biological and environmental sciences; 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, B Jones and S Field, College Physics: A Strategic Approach, 2nd edition, Addison-Wesley, 2007.
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 Bachelor of Veterinary Science(PV)
Related Majors/Minors/ Specialisations:	First year physics