640-182 Physics for Biomedicine

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, practicals, tutorials/workshops, computer-aided learning.
Time Commitment:	Contact Hours: 36 one-hour lectures; 11 one-hour tutorials; 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 (either) or *Introduction to Mathematics* or equivalent. Assumed knowledge: some knowledge of physics to Year 10 level.
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 will develop students' appreciation of the importance of physical principles to biomedicine as well as their understanding of the principles underpinning human structure and function, medical diagnostics and therapeutics. The subject provides an introduction to: *Mechanics:* in the context of human and animal movement (introduction to Newton's laws of motion, energy transfer and transformation). *Fluids:* blood flow, respiration (pressure in fluids, fluid flow, viscosity); *Thermal physics:* energy balance of living organisms (thermal energy, temperature, heating processes, first law of thermodynamics); *Electricity and magnetism:* bioelectricity, nerve conduction, electrical safety (forces between electric charges, electric circuits, resistance, capacitance, magnetic forces); *Atomic physics and lasers:* fluorescence imaging and spectroscopy (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 is not available as a breadth subject.
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; # manage time effectively in order to be prepared for regular practical and tutorial classes, tests and the examination.
Notes:	This unit is only available to students enrolled in the Bachelor of Biomedicine. Required equipment: laboratory coat and safety glasses.