640-243 Quantum Mechanics & Thermal Physics

Credit Points:	12.500
Level:	Undergraduate
Dates & Locations:	2008, This subject commences in the following study period/s: Semester 1, - Taught on campus.
Time Commitment:	Contact Hours: 36 lectures and 12 1-hour tutorials Total Time Commitment: 120 hours
Prerequisites:	Physics 640-121 and 640-122 (or 640-141 and 640-142). Mathematics: one of 620-121, 620-140, 620-141 or equivalent.
Corequisites:	Mathematics: one of 620-122, 620-142, 620-211; and one of 620-113, 620-123 or 620-143.
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
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. Students who feel their disability may impact upon their active and safe participation in a subject are encouraged to discuss this with the relevant subject coordinator and the Disability Liaison Unit.
Coordinator:	Dr J McCallum
Subject Overview:	This subject introduces students to two fundamental areas of physics and is divided into two parts. In the quantum mechanics section, the framework of wave mechanics is established, while in thermal physics, concepts such as work, heat, temperature and entropy are introduced. The physics underlying both these components is central to an understanding of many processes in physics, chemistry and engineering. Students completing this subject will be able to: # explain the basic principles of quantum physics and the zeroth, first and second law of thermodynamics; # solve and analyse simple quantum mechanical problems; and # calculate and interpret the thermodynamic properties of several simple systems. In addition students will enhance their ability to: # participate effectively as part of a group in tutorials; and # plan effective work schedules to meet the deadlines for submission of assessable work and prepare for examinations. Specific topics to be covered in the quantum mechanics section include the experimental basis of quantum mechanics; wave-particle duality, probability interpretation and the wave function; wavepackets; SchrÃ¶dinger equation; one-dimensional examples such as potential steps, barriers and wells, linear momentum; operators and expectation values; an idea of three-dimensional problems and the hydrogen atom. The thermal physics section will cover the zeroth, first and second law of thermodynamics, kinetic theory, the microscopic origin of entropy, heat engines and refrigerators, paramagnetism, phase changes and chemical thermodynamics.
Assessment:	Tests totalling up to 2 hours during the semester (10%); assignments totalling up to an equivalent of 3000 words due at the end of the semester (10%); a 3-hour written examination in the examination period (80%).
Prescribed Texts:	Modern Physics (Serway, Moses and Moyer), 3rd edn, Brooks/Cole-Thomson Learning, 2005

Breadth Options:	This subject is a level 2 or level 3 subject and is not available to new generation degree students as a breadth option in 2008. This subject or an equivalent will be available as breadth in the future. Breadth subjects are currently being developed and these existing subject details can be used as guide to the type of options that might be available. 2009 subjects to be offered as breadth will be finalised before re-enrolment for 2009 starts in early October.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Notes:	This subject is available for science credit to students enrolled in the BSc (pre-2008 degree only), BASc or a combined BSc course.