640-243 Quantum Mechanics & Thermal Physics

Credit Points:	12.50
Level:	2 (Undergraduate)
Dates & Locations:	2009, This subject commences in the following study period/s: Semester 1, - Taught on campus. Lectures and tutorials.
Time Commitment:	Contact Hours: 36 one-hour lectures and 12 one-hour tutorials Total Time Commitment: 120 hours total time commitment.
Prerequisites:	One of # 640-121 # 640-141 # 640-161 Plus one of # 640-122 # 640-142 # 640-162. Plus one of # 620-121 # 620-140 # 620-141 # 620-151 # 620-161
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	*Quantum mechanics and Special Relativity,* *Thermal and Classical Physics*
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 Nicole Bell
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 these components is central to an understanding of many processes in physics, chemistry and engineering. 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; Schrodinger 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.

Objectives:	Students completing this subject should 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.
Assessment:	Ongoing assessment of practical work during the semester including:log-book record keeping and participation (10%)a written report of up to 2,000 words (10%) Satisfactory completion of practical work is necessary to pass the subject, including attendance and submission of work for at least 80% of workshop sessions, together with a result for assessed work of at least 50%.One written test with a total duration of up to 30 minutes, held mid semester (5%)Two written assignments requiring a total of up to 8 hours of work outside class time during the semester (10% in total)A 3-hour written examination in the examination period (65%)
Prescribed Texts:	Serway, Moses and Moyer, Modern Physics, 3rd edn, Brooks/Cole-Thomson Learning, 2005
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; # participate as an effective member of a group in tutorial discussions; # 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, the examination and to complete assignments.
Notes:	This subject is available for science credit to students enrolled in the BSc (pre-2008 degree only), BASc or a combined BSc course. Students of this subject will share lectures with *Quantum Mechanics and Special Relativity* and *Thermal and Classical Physics*. The subject coordinator's approval is required for enrolment. The subject is available only to students in pre-2008 BSc (or its combined courses) who require successful completion of this subject for their degree. It will not be offered to New Generation BSc students and will not run again after 2009.