PHYC90015 Quantum and Electronic Materials

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 36 hours comprising 2 one-hour lectures per week and 1 one-hour tutorial per week. Total Time Commitment: Not available
Prerequisites:	Entry into the MSc (Nanotechnology) program or with permission of the course coordinator.
Corequisites:	None
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. 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.
Contact:	.
Subject Overview:	Nanotechnologies seek to exploit the quantum mechanical properties of materials whose structural dimensions lie between the molecular limit that forms the conventional basis of chemistry and the continuous solid-state limits of metallurgy, mineralogy, materials science and solid-state physics. The course will examine the interdisciplinary approach to research that is being employed in this field to develop, for example, polymers and smart materials that respond to their environment, optical metamaterials, molecular self-assembly, biomimetic devices that copy natural processes in industrial-scale processes, as well as single photon sources, semi-conducting nano-devices, nanowires, quantum dots and new methods to image nanoscale materials. A practical approach to the underlying quantum mechanical principles involved in the design of quantum and electronic materials will be adopted, emphasising engineering applications rather than formal theoretical development. A hands-on approach will be taken in which the use of state-of-the-art modelling tools is demonstrated for the design of materials and devices.
Objectives:	The objectives of this subject are: # to provide students with the skills to analyse quantum mechanical systems relevant to nanotechnology; # to obtain a general working knowledge and understanding of nanotechnology functionality based on these principles; and # to understand from a quantum mechanical viewpoint the operation of a range of devices and applications.
Assessment:	One assignment totalling 4,000 words due towards the end of semester and contributing 50% to the final mark for the subject, plus one two-hour written examination at the end of the semester contributing 50% to the final mark.
Prescribed Texts:	None
Recommended Texts:	*Principles of Nanotechnology: Molecular-Based Study of Condensed Matter in Small Systems*, by G Ali Mansoori (University of Illinois at Chicago, USA), World Scientific.
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:	At the completion of this subject, students should gain: • problem-solving skills including engaging with unfamiliar problems and identifying relevant strategies; • analytical skills including the ability to construct and express logical arguments and to work in abstract or general terms to increase the clarity and efficiency of the analysis; • the ability to work in a team, through interactions with other students.
Notes:	Students undertaking this subject will be expected to regularly access an internet-enabled computer.