PHYC30020 Quantum Systems

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	2011, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus. Lectures and problem-solving classes
Time Commitment:	Contact Hours: 2 to 4 hours per week, 36 in total, lectures and problem-solving classes Total Time Commitment: Estimated total time commitment of 120 hours
Prerequisites:	Physics One of # 640-321 Quantum Mechanics Advanced (prior to 2010) # 640-341 Quantum Mechanics (prior to 2010)

Subject	Study Period Commencement:	Credit Points:
PHYC30018 Quantum Physics	Semester 1	12.50

Plus one of

640-342 Statistical Physics (prior to 2009)

Subject	Study Period Commencement:	Credit Points:
PHYC30017 Statistical Physics	Semester 2	12.50

(PHYC30017 Statistical Physics may be taken concurrently)

And Mathematics

Either both of

Subject	Study Period Commencement:	Credit Points:
MAST20009 Vector Calculus	Semester 1, Semester 2	12.50
MAST20026 Real Analysis with Applications	Semester 1, Semester 2	12.50

Or

620-296 Multivariable & Vector Calculus (prior to 2010)

For students who commenced second year level mathematics prior to 2009:

One of

620-231 Vector Analysis (prior to 2009)
620-233 Vector Analysis Advanced (prior to 2009)
MAST20009 Vector Calculus

And one of

620-232 Mathematical Methods (prior to 2010)
620-234 Mathematical Methods Advanced (prior to 2009).

Corequisites:	None
Recommended Background Knowledge:	None

Non Allowed Subjects:	Students may only gain credit for one of # PHYC30020 Quantum Systems # 620-353 Atomic, Molecular & Solid State Physics (prior to 2010)
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements of this entry.The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: http://www.services.unimelb.edu.au/disability/
Coordinator:	Prof Les J. Allen
Contact:	**Email: PHYC30020@physics.unimelb.edu.au (mailto:PHYC30020@physics.unimelb.edu.au)**
Subject Overview:	Quantum mechanics governs the structure of atomic, molecular and condensed matter state systems, the nature of light and charge, and the interactions between these systems. Whereas earlier subjects detailed the principles and foundations of quantum mechanics, this subject details properties of real systems and discusses applications of this fundamental field of enquiry. The necessary use of quantum ideas in developing an understanding of the structure of matter is emphasised. Topics covered include: # the one-electron approximation, diatomic molecules # basic crystal structures and bonding, reciprocal lattices # periodic systems, phonons, free-electron model, band structure, insulators, conductors and semi-conductors # the variational method, helium atom, basic density functional theory # superconductivity.
Objectives:	To challenge students to expand their knowledge of fundamental physics principles and develop their capacity to: # explain the role that quantum mechanics plays in a range of real physical systems # apply quantum mechanics to solve problems in a variety of physical systems # interpret the solutions to these problems.
Assessment:	Two assignments totalling up to an equivalent of 3000 words during the semester (10% each); a 3-hour written examination in the examination period (80%).
Prescribed Texts:	C Kittel, Introduction to Solid State Physics. 8th Ed, Wiley
Breadth Options:	This subject potentially can be taken as a breadth subject component for the following courses: # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2011/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2011/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2011/B-MUS)** 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: # analyse how to solve a problem by applying simple fundamental laws to more complicated situations

	# apply abstract concepts to real-world situations # solve relatively complicated problems using approximations # participate as an effective member of a group in tutorial discussions # manage time effectively in order to be prepared for tutorial classes, undertake the written assignments 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 Science
Related Majors/Minors/ Specialisations:	Physics (specialisation of Physics major) Science credit subjects* for pre-2008 BSc, BASc and combined degree science courses