PHYC20010 Quantum Mechanics and Special Relativity

Credit Points:	12.5
Level:	2 (Undergraduate)
Dates & Locations:	2016, Parkville This subject commences in the following study period/s: Year Long, Parkville - Taught on campus. Please Note: This subject is a transitional subject that is available only to students that have already successfully completed one of PHYC20009 or PHYC20011. All other students wishing to undertake Level 2 Physics should select from the subjects PHYC20012, PHYC20013, PHYC20014 and PHYC20015.
Time Commitment:	Contact Hours: 3 x 1 hour lectures per week (total 27 lectures); 1 x one hour tutorial per week (total 9 classes); 1 x three hour laboratory class per week (total 6 classes) Total Time Commitment: Estimated total time commitment of 170 hours
Prerequisites:	One of

Subject	Study Period Commencement:	Credit Points:
PHYC10001 Physics 1: Advanced	Semester 1	12.50
PHYC10003 Physics 1	Semester 1	12.50
PHYC10005 Physics 1: Fundamentals	Semester 1	12.50

Plus one of

Subject	Study Period Commencement:	Credit Points:
PHYC10002 Physics 2: Advanced	Semester 2	12.50
PHYC10004 Physics 2: Physical Science & Technology	Semester 2	12.50
PHYC10006 Physics 2: Life Sciences & Environment	Semester 2	12.50

Plus one of

Subject	Study Period Commencement:	Credit Points:
MAST10006 Calculus 2	Semester 1, Semester 2	12.50
MAST10009 Accelerated Mathematics 2	Semester 2	12.50

Plus one of

Subject	Study Period Commencement:	Credit Points:
MAST10007 Linear Algebra	Summer Term, Semester 1, Semester 2	12.50
MAST10008 Accelerated Mathematics 1	Semester 1	12.50

MAST10013 UMEP Mathematics for High Achieving Students.

(MAST10007 Linear Algebra or MAST10008 Accelerated Mathematics 1 may be taken concurrently)

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.
Coordinator:	Assoc Prof Harry Quiney
Contact:	**Email: PHYC20010@physics.unimelb.edu.au (mailto:PHYC20010@physics.unimelb.edu.au)**
Subject Overview:	This subject introduces students to two key concepts in physics: quantum mechanics and Einstein's theory of special relativity. Quantum mechanics topics include the quantum theory of light, the particle nature of matter, matter waves, quantum mechanics in one dimension and tunneling phenomena. Special relativity topics will include the foundations of special relativity, spacetime invariance, simultaneity, and Minkowski diagrams, relativistic kinematics, the Doppler effect, relativistic dynamics, and nuclear reactions.
Learning Outcomes:	To challenge students to expand their knowledge of fundamental physics principles and develop their capacity to: # discuss the key observations and events that led to the development of quantum mechanics and special relativity; # explain the fundamental principles of quantum mechanics and special relativity and use these principles in the analysis of simple problems; # acquire and interpret experimental data and perform computer modelling.
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 Ed. Brooks/Cole-Thomson Learning, 2005
Recommended Texts:	NMJ Woodhouse, Special Relativity, Springer, 2003
Breadth Options:	This subject potentially can be taken as a breadth subject component for the following courses: # **Bachelor of Arts (https://handbook.unimelb.edu.au/view/2016/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2016/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2016/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2016/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: # 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, the examination and to complete assignments.
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. Students are strongly advised to undertake MAST20009 Vector Calculus in parallel with PHYC20010, to provide additional mathematical expertise for this subject and as it is a pre-requisite for second semester physics subjects.
Related Majors/Minors/ Specialisations:	Physics Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED