PHYC30012 Computational Physics

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus. Lectures, practical classes and project work
Time Commitment:	Contact Hours: 12 lectures, 12 tutorials, 24 hours of practical classes (two hours per week) and 72 hours of project work. Total Time Commitment: 6 contact hours per week for 12 weeks, plus 4 hours per week unscheduled, for programming and writing project reports. Total time commitment 120 hours
Prerequisites:	Physics One of # **640-331 Quantum Physics (/view/2010/640-331)** # 620-321 Quantum Mechanics Advanced (prior to 2010) # 620-341 Quantum Mechanics (prior to 2009) And Mathematics Either both of # **620-231 Vector Calculus (/view/2010/620-231)** # **620-295 Real Analysis with Applications (/view/2010/620-295)** 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) # **620-231 Vector Calculus (/view/2010/620-231)** And one of # 620-232 Mathematical Methods (prior to 2010) # 620-234 Mathematical Methods Advanced (prior to 2009).
Corequisites:	None
Recommended Background Knowledge:	Prior computing experience is recommended but not essential.
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:	Prof Stuart Wyithe
Contact:	**Email: c640364@physics.unimelb.edu.au (mailto:c640364@physics.unimelb.edu.au)**
Subject Overview:	This subject will introduce students to the use of computational techniques in the investigation of a wide class of problems in physics. Using professional computing tools, students will develop

	their programming skills and learn a range of numerical methods commonly used in physics research, and apply these techniques to the investigation of physical systems through the completion of projects. The five projects will be based on model problems in physics, and may include molecular vibrations, stellar structure, quantum spin systems, large-scale magnetic systems and gravitational lensing by point masses.
Objectives:	Students completing this subject shouldbe able to: # explain the application of a variety of computational techniques including differencing, root finding, quadrature, ordinary and partial differential equations, matrix eigenvalue problems, Monte Carlo methods and fast Fourier transforms to physical problems; and # apply these methods to a range of physical situations.
Assessment:	Five computer-based projects due during the semester, each equivalent to 1500 words, contributing 20% each.
Prescribed Texts:	None
Recommended Texts:	S Koonin, *Computational Physics* (FORTRAN edition) Addison-Wesley
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/2010/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2010/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2010/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2010/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:	Students should enhance their ability to: # participate effectively as part of a group; and # plan effective work schedules and manage their time to meet the deadlines for submission of assessable work.
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 Physics