PHYC30012 Computational Physics

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	This subject is not offered in 2014. 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. Estimated total time commitment 120 hours
Prerequisites:	Physics **Subject** / **Study Period Commencement:** / **Credit Points:** PHYC30018 Quantum Physics — Semester 1 — 12.50 **And Mathematics** Either both of **Subject** / **Study Period Commencement:** / **Credit Points:** MAST20009 Vector Calculus — Semester 1, Semester 2 — 12.50 MAST20026 Real Analysis — Semester 1, Semester 2 — 12.50 Or both of **Subject** / **Study Period Commencement:** / **Credit Points:** MAST20009 Vector Calculus — Semester 1, Semester 2 — 12.50 MAST10009 Accelerated Mathematics 2 — Semester 2 — 12.50
Corequisites:	None
Recommended Background Knowledge:	Prior computing experience is recommended but not essential.
Non Allowed Subjects:	None
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/
Contact:	**Email: PHYC30012@physics.unimelb.edu.au (mailto:PHYC30012@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.
Learning Outcomes:	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/2014/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2014/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2014/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2014/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 Majors/Minors/ Specialisations:	Physics Physics Physics (specialisation of Physics major) Science credit subjects* for pre-2008 BSc, BASc and combined degree science courses Science-credited subjects - new generation B-SCI and B-ENG.