

# PHYC30012 Computational Physics

Credit Points:	12.50																										
Level:	3 (Undergraduate)																										
Dates & Locations:	2012, 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. Estimated total time commitment 120 hours																										
Prerequisites:	<p>Physics</p> <p>One of</p> <table><tr><th>Subject</th><th>Study Period Commencement:</th><th>Credit Points:</th></tr><tr><td>PHYC30018 Quantum Physics</td><td>Semester 1</td><td>12.50</td></tr></table> <p># 620-321 Quantum Mechanics Advanced (prior to 2010) # 620-341 Quantum Mechanics (prior to 2009)</p> <p>And Mathematics</p> <p>Either both of</p> <table><tr><th>Subject</th><th>Study Period Commencement:</th><th>Credit Points:</th></tr><tr><td>MAST20009 Vector Calculus</td><td>Semester 1, Semester 2</td><td>12.50</td></tr><tr><td>MAST20026 Real Analysis with Applications</td><td>Semester 1, Semester 2</td><td>12.50</td></tr></table> <p>Or both of</p> <table><tr><th>Subject</th><th>Study Period Commencement:</th><th>Credit Points:</th></tr><tr><td>MAST20009 Vector Calculus</td><td>Semester 1, Semester 2</td><td>12.50</td></tr><tr><td>MAST10009 Accelerated Mathematics 2</td><td>Semester 2</td><td>12.50</td></tr></table> <p>Or for students who completed level 2 mathematics prior to 2010: # 620-296 Multivariable &amp; Vector Calculus (prior to 2010)</p> <p>Or for students who completed level 2 mathematics prior to 2009: One of # 620-231 Vector Analysis (prior to 2009) # 620-233 Vector Analysis Advanced (prior to 2009)</p> <p>And one of # 620-232 Mathematical Methods (prior to 2010) # 620-234 Mathematical Methods Advanced (prior to 2009).</p>			Subject	Study Period Commencement:	Credit Points:	PHYC30018 Quantum Physics	Semester 1	12.50	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	Subject	Study Period Commencement:	Credit Points:	MAST20009 Vector Calculus	Semester 1, Semester 2	12.50	MAST10009 Accelerated Mathematics 2	Semester 2	12.50
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Corequisites:	None																										
Recommended Background Knowledge:	Prior computing experience is recommended but not essential.																										
Non Allowed Subjects:	None																										

<b>Core Participation Requirements:</b>	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: <a href="http://www.services.unimelb.edu.au/disability/">http://www.services.unimelb.edu.au/disability/</a>
<b>Coordinator:</b>	Prof Elisabetta Barberio
<b>Contact:</b>	<b>Email: <a href="mailto:PHYC30012@physics.unimelb.edu.au">PHYC30012@physics.unimelb.edu.au</a></b> <b>(mailto:PHYC30012@physics.unimelb.edu.au)</b>
<b>Subject Overview:</b>	<p>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.</p> <p>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.</p>
<b>Objectives:</b>	<p>Students completing this subject should be able to:</p> <ul style="list-style-type: none"> <li># 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</li> <li># apply these methods to a range of physical situations.</li> </ul>
<b>Assessment:</b>	Five computer-based projects due during the semester, each equivalent to 1500 words, contributing 20% each.
<b>Prescribed Texts:</b>	None
<b>Recommended Texts:</b>	S Koonin, <i>Computational Physics</i> (FORTRAN edition) Addison-Wesley
<b>Breadth Options:</b>	<p>This subject potentially can be taken as a breadth subject component for the following courses:</p> <ul style="list-style-type: none"> <li># <b>Bachelor of Arts</b> (<a href="https://handbook.unimelb.edu.au/view/2012/B-ARTS">https://handbook.unimelb.edu.au/view/2012/B-ARTS</a>)</li> <li># <b>Bachelor of Commerce</b> (<a href="https://handbook.unimelb.edu.au/view/2012/B-COM">https://handbook.unimelb.edu.au/view/2012/B-COM</a>)</li> <li># <b>Bachelor of Environments</b> (<a href="https://handbook.unimelb.edu.au/view/2012/B-ENVS">https://handbook.unimelb.edu.au/view/2012/B-ENVS</a>)</li> <li># <b>Bachelor of Music</b> (<a href="https://handbook.unimelb.edu.au/view/2012/B-MUS">https://handbook.unimelb.edu.au/view/2012/B-MUS</a>)</li> </ul> <p>You should visit <b>learn more about breadth subjects</b> (<a href="http://breadth.unimelb.edu.au/breadth/info/index.html">http://breadth.unimelb.edu.au/breadth/info/index.html</a>) and read the breadth requirements for your degree, and should discuss your choice with your student adviser, before deciding on your subjects.</p>
<b>Fees Information:</b>	Subject EFTSL, Level, Discipline & Census Date, <a href="http://enrolment.unimelb.edu.au/fees">http://enrolment.unimelb.edu.au/fees</a>
<b>Generic Skills:</b>	<p>Students should enhance their ability to:</p> <ul style="list-style-type: none"> <li># participate effectively as part of a group; and</li> <li># plan effective work schedules and manage their time to meet the deadlines for submission of assessable work.</li> </ul>
<b>Notes:</b>	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 (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. Core selective subjects for B-BMED.