600-657 Computational Nanotechnology

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	This subject is not offered in 2009.
Time Commitment:	Contact Hours: 60 hours comprising 1 one-hour lecture per week and 1 four-hour computer laboratory session per week. Total Time Commitment: Not available
Prerequisites:	Entry into the Master of Science (Nanotechnology) program or with permission of the course coordinator.
Corequisites:	None
Recommended Background Knowledge:	Familiarisation with concepts pertaining to the structure of materials and condensed matter, chemical bonding and types of interatomic interactions is highly desirable.
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.
Subject Overview:	The use of computational modelling is becoming critical to many areas of nanotechnology, both in terms of predicting properties and developing capabilities. This subject will introduce students to essential numerical simulation and visualisation techniques, via a variety of examples relevant to academic and industrial applications. Students will learn the principles and use of high-level software and methodology, such as Density Functional Theory, Molecular Dynamics, Monte-Carlo and Finite-Element Analysis, underpinning applications forming the focus of the laboratory projects.
Objectives:	The objectives of this subject are to provide students with: • the skills to critically assess different computational simulation methods and select the most appropriate method for specific problems in nanoscience and nanotechnology; • the skills to assess the suitability and accuracy of different computational methods; • the skills to effectively interpret and present computational results using appropriate visualization methods; • experience in the use of specialist scientific software and sophisticated visualization methods and programs; and • experience in the visualisation and presentation of scientific results to the level required for business and industry.
Assessment:	Four project assignments of 2,000 words each due throughout the semester (equally spaced). Assignments are equally weighted at 25% each.
Prescribed Texts:	None.
Recommended Texts:	*Nanostructures: Theory and Simulation,* by C. Delerue and M. Lannoo (ISBN-13: 978-3540206941) *The Handbook of Nanotechnology - Nanometer Structures: Theory, Modeling, and Simulation*, by Aklesh Lakhtakia (ISBN-13: 9780819451866)
Breadth Options:	This subject is not available as a breadth subject.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees

Generic Skills:	At the completion of this subject, students should gain: • problem-solving skills (especially through assignments) including engaging with unfamiliar problems and identifying relevant strategies; • analytical skills including the ability to construct and express logical arguments and to work in abstract or general terms to increase the clarity and efficiency of the analysis; • the ability to work in a team, through interactions with other students.
Notes:	This subject will not be available in 2009. Students undertaking this subject will be expected to regularly access an internet-enabled computer, and VPN (with login) to facilitate out of hours access. Access to a computer lab and specialist scientific software will be provided.
Related Majors/Minors/ Specialisations:	R05 PN Master of Science (Nanotechnology)