

COMP20004 Discrete Structures

Credit Points:	12.50
Level:	2 (Undergraduate)
Dates & Locations:	This subject is not offered in 2014.
Time Commitment:	Contact Hours: 48 hours, comprising of two 1-hour lectures and one 2-hour workshop per week Total Time Commitment: 170 hours
Prerequisites:	One first year mathematics subject (12.5 points) OR Admission to the MC-ENG Master of Engineering (Software)
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Students cannot enrol in and gain credit for this subject and: 433-255 Logic and Computation
Core Participation Requirements:	<p>For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry.</p> <p>It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: http://services.unimelb.edu.au/disability</p>
Contact:	email: harald@unimelb.edu.au (mailto:harald@unimelb.edu.au)
Subject Overview:	<p>AIMS</p> <p>Formal logic and discrete mathematics provide the theoretical foundations for computer science. This subject is an introduction to the science of computing. It provides a grounding in the theories of logic, sets, relations, functions, automata and formal languages, providing concepts that underpin virtually all the practical tools contributed by the discipline, for automated storage, retrieval, manipulation and communication of data.</p> <p>INDICATIVE CONTENT</p> <ul style="list-style-type: none"> # Logic: Propositional and predicate logic, resolution proofs, mathematical proof # Discrete mathematics: Sets, functions, relations, order, well-foundedness, induction and recursion # Automata: Regular languages, finite-state automata, context-free grammars and languages, parsing # Additional non-examinable lectures give a taste of computability and complexity theory
Learning Outcomes:	<p>INTENDED LEARNING OUTCOMES (ILO)</p> <p>On completion of this subject the student is expected to:</p> <ol style="list-style-type: none"> 1 Use propositional and predicate logic as reasoning tools 2 Explain basic principles of mechanised reasoning, including resolution proof 3 Reason about properties of mathematical objects such as functions and relations 4 Apply discrete mathematical techniques to problems in computer science 5 Design and reason about simple finite-state automata

	6 Design and reason about regular expressions and context-free grammars
Assessment:	An individual 800-word homework set due around Week 6 (12%). Addresses Intended Learning Outcomes (ILOs) 1 and 2. A 45-minute mid-semester written test around Week 7 (12%). Addresses ILOs 1, 2 and 3. An individual 800-word homework set due around Week 11 (12%). Addresses ILOs 3, 4, 5, and 6. A 2-hour end-of-semester written examination (64%). Addresses all ILOs. Hurdle requirement: To pass the subject, students must obtain at least 50% overall and 32/64 in the written examination.
Prescribed Texts:	None
Recommended Texts:	Markinson, D. 2008 sets, Logic and Maths for Computing. Springer. Doets, K. and van Eijck, J. 2004 <i>The Haskell Road to Logic, Maths and Programming</i> . King's College Publ. Sipser, M. 2006 <i>Introduction to the Theory of Computation</i> . Thomson Course Technology, second edition
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:	On completion of this subject students should have developed the following skills: # Analytical skills # Reasoning and problem-solving skills # Ability to communicate with precision, rigour and efficacy # Ability to apply knowledge of science and engineering fundamentals # Capacity for creativity and innovation # Ability to undertake problem identification, formulation and solution
Notes:	LEARNING AND TEACHING METHODS The subject involves two 1-hour lectures per week followed by a 2-hour tutorial. Weekly tutorial problems are assigned and discussed in class. Tutors use some tutorial time to demonstrate applications of the theory, such as SAT-solver use, logic programming, and parsing. Lectures and tutorials are designed to be highly interactive, and the written assignments are designed to be challenging, so as to generate discussion. Although written assignments are submitted by students individually, in-plenum discussion of the problems is allowed, and encouraged. INDICATIVE KEY LEARNING RESOURCES The subject uses online reading materials and offers access to visualisation tools (the JFLAP suite), an online discussion forum, and advance access to all teaching materials, including slides used in lectures. CAREERS / INDUSTRY LINKS The subject is foundational. While the practice of computing changes fast, the theoretical underpinnings, and many of the basic concepts underlying computation, change only slowly. A foundation in logic and mathematics provides important conceptual tools that are used by theoreticians, computer scientists, and software engineering practitioners alike.
Related Course(s):	Master of Information Technology

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Related Majors/Minors/ Specialisations:	B-ENG Software Engineering stream Computer Science Master of Engineering (Software with Business) Master of Engineering (Software) Science credit subjects* for pre-2008 BSc, BAsC and combined degree science courses Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED