

# Computer Science

The study of computer science to 100- or 200-level provides students with sufficient skills to use computers effectively as a tool in other disciplines. The study of computer science to 300-level provides students with sufficient knowledge of computing principles and sufficient experience of computing practice to commence work as computing professionals, or, with sufficiently good results, to undertake the honours year. The honours year provides a further year of professional development for students planning industry-based careers and also serves as a foundation for students considering research careers.

A Bachelor of Computer Science (BCS) degree is available through the Faculty of Engineering. See the *Electrical engineering and computer science (p.1)* entry of this Handbook for details.

Computer science, as a science major, is not available to students enrolled in the software engineering stream of the BE/BSc. These students will be required to complete a major in an alternative science discipline.

## 100-level

Undergraduate course officer: Ms L Walker

The Department of Computer Science and Software Engineering offers three 100-level subjects. Students who intend to proceed to 200-level computer science must take both the subjects 433-141 Computing Fundamentals A and 433-142 Computing Fundamentals B before proceeding to 200-level studies in computer science.

Students not planning to proceed to later year studies in computer science, and seeking an introduction to programming, can choose to take either 433-141 or 433-171 Introduction to Programming. Neither subject assumes previous programming experience and both subjects place a strong emphasis on practical work. Project work in 433-141 involves the use of the programming language Haskell, a modern functional language which has powerful facilities for expressing programming ideas, and which is an excellent language for introducing many important concepts in programming. Project work in 433-171 is carried out in the language C, which is a widely used language in scientific and engineering applications.

The subject 433-171 covers a large amount of material which is included in the subject 433-142, and for this reason it is not possible to gain credit for completing 433-142 after gaining credit for 433-171, and vice versa. For similar reasons it is not possible to gain credit for the information systems subject 615-145 Concepts in Software Development 1 after gaining credit for 433-142, and vice versa.

Students who complete only 433-171 cannot progress to 200-level computer science study. However, students who complete 433-171 and then wish to take further substantial studies in computer science can subsequently complete 433-141 Computing Fundamentals A. Then, after self-study of bridging material covering the topics included in 433-142 but not in 433-171, and with the approval of the department, a student who has completed 433-171 and 433-141 may progress to 200-level subjects by completing an exemption test and demonstrating their mastery of the concepts covered in 433-142. For details of this sequence, contact the Department of Computer Science and Software Engineering.

In addition to 433-141 and 433-142, students planning to major in computer science must complete 25 points (two subjects) of first year study in the Department of Mathematics and Statistics. Students intending to proceed with 300-level studies in computer science are also encouraged to complete the subject 431-102 Digital Electronics and Microprocessors. The 12.5 point subject 431-102 must be taken as non-science points.

## 200-level

Undergraduate course officer: Ms L Walker

The Department of Computer Science and Software Engineering offers the following 200-level subjects: 433-252 Software Development Principles and Tools, 433-253 Algorithms and Data Structures, 433-254 Software Design, 433-255 Logic and Computation, and 433-257 Frontiers of Computer Science. Students who have completed both 433-141 and 433-142, and 25 points of study in the Department of Mathematics and Statistics are eligible to take all of these subjects.

Students planning to major in computer science must complete all of 433-252, 433-253, 433-254, and 433-255. The 6.25 point subject 433-257 is optional, and must be taken as non-science points.

Students intending to proceed with 300-level studies in computer science but not major in computer science are required to complete 433-252, 433-253, and 433-254.

Students who are intending to take some 200-level studies in computer science but not to continue with 300-level studies in computer science, are advised to enrol in either or both of the subjects 433-252 and 433-253. Subject 433-252 should be taken prior to, or concurrently with 433-253. Students

seeking an appreciation of the mathematical basis for computing to complement their studies in mathematics or linguistics, may enrol in 433-255 as a single subject at the second year level.

Students majoring in computer science intending to proceed to BSc (Hons) in computer science are strongly advised to undertake study of mathematics and statistics at the second year level, and are encouraged to complete the subjects 433-257 Frontiers of Computer Science and 431-102 Digital Electronics and Microprocessors. The 6.25 point subject 433-257 and the 12.5 point subject 431-102 must be taken as non-science points.

## 300-level

Undergraduate course officer: Ms L Walker

The Department of Computer Science and Software Engineering offers the following 300-level subjects: 433-303 Artificial Intelligence, 433-313 Computer Design (additional prerequisite: 431-102), 433-330 Theory of Computation, 433-332 Operating Systems, 433-341 Software Engineering Process and Practice, 433-343 Professional Issues in Computing, 433-351 Database Systems, 433-353 Networks and Communications, 433-361 Programming Language Implementation, 433-371 Interactive System Design, 433-380 Graphics and Computation, 433-385 Modelling, Analysis and Visualisation, 433-398 Directed Study 3A and 433-399 Directed Study 3B. Note that 433-343, 433-398 and 433-399 must be taken as non-science points. The subject 615-335 Distributed Systems will also be of interest to some students.

Students intending to major in computer science must complete at least four of 433-303, 433-313, 433-330, 433-332, 433-341, 433-351, 433-353, 433-361, 433-371, 433-380 and 433-385.

Students intending to proceed to 400-level computer science should note the minimum requirements for acceptance to BSc (Hons) listed below. These requirements are met by students who have completed a major in computer science.

Students enrolled in the BSc may take 400-level subjects only if they meet the prerequisites and have gained approval from the Department of Computer Science and Software Engineering. Such subjects must be taken as non-science points.

## Bachelor of Science (Honours) and other 400-level options

Coordinator: Dr L Naish

Students who wish to consolidate their knowledge of computer science and who have completed a BSc with a major in computer science with an honours grade average in their third year studies should consider undertaking the BSc (Hons) year. This involves two components, 433-401 Computer Science Research Project (37.5 points) and five 400-level advanced coursework subjects (62.5 points). Completion of the honours year serves both as a preparation for postgraduate studies and an opportunity to strengthen practical skills before seeking industry employment. To be eligible for entry to the BSc (Hons) degree in computer science students must have:

- completed 50 points of 300-level computer science;
- passed the subject 433-255 Logic and Computation (Prior to 2000: 433-255 Models of Computation);
- passed at least 25 points of 100-level mathematics or statistics;
- satisfied the Bachelor of Science (Honours) *Admission requirements (p.1)*.

Note:

- 1 While 50 points of 300-level study in computer science is a minimum entry requirement for the BSc (Hons) program in computer science, students should note that the 400-level honours subjects offered by the department have individual prerequisites that may not be satisfied by some combinations of 50 points at 300-level. Students wishing to retain a wide range of options at the 400-level are advised to select at least four of 433-303, 433-330, 433-341, 433-351, 433-361, and 433-380 as part of their third-year program of study.
- 2 Students should also note that study of mathematics or statistics at the second year level is strongly recommended.
- 3 Students from other institutions and other backgrounds should contact the honours coordinator to determine their eligibility for entry to the BSc (Hons) degree.

For further information about the honours program please refer to *Bachelor of Science (Honours) and Bachelor of Information Systems (Honours) (p.1)*.

The Department of Computer Science and Software Engineering also offers the Postgraduate Diploma in Science (Computer Science) for students from other backgrounds who may need to take a program of study that includes some 300-level subjects. This is a one-year full-time program comprising six subjects (of which at most two may be at 300-level) and a 25.0 point research project. Details of the Postgraduate Diploma in Science appear in the Faculty of Science Postgraduate Handbook.

## Suggested subjects

The recommended subject sequence for a BSc student intending to major in computer science is:

### 100 level subjects

- both of 433-141 and 433-142 (25.0 points)
- two or three 100-level subjects in mathematics and statistics (25.0 or 37.5 points)
- optional enrolment in 431-102 Digital Electronics and Microprocessors (12.5 points, non-science)
- other 100-level science or non-science subjects to make up 100 points.

### 200 level subjects

- all of computer science 433-252, 433-253, 433-254, 433-255 (50.0 points)
- optional enrolment in two 200-level subjects in mathematics and statistics (25.0 points)
- other 100- and 200-level subjects from the Department of Computer Science and Software Engineering or other departments in the Faculty of Science to make up 100 points, including optional enrolment in 433-257 (6.25 points, non-science).

### 300 level subjects

- At least four of 433-303, 433-313, 433-330, 433-332, 433-341, 433-351, 433-353, 433-361, 433-371, 433-380 and 433-385 (50.0 points)
- Other 200- and 300-level subjects from the Department of Computer Science and Software Engineering or other departments in the Faculty of Science to make up 100 points, possibly including additional subjects from the list above, 433-343 (12.5 points, non-science) and 615-335 Distributed Systems.

### 400 level subjects

For a list of the 400-level subjects available in the BSc (Hons) degree, see *Bachelor of Science (Honours) and Bachelor of Information Systems (Honours) (p.1)*.

## Further Information

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## 100-level subjects

The subjects listed below are regarded as science subjects for the BSc and BAsC. Each subject is worth 12.5 points.

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### 433-141 Computing Fundamentals A

See full subject details on page 13.

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### 433-142 Computing Fundamentals B

See full subject details on page 13.

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### 433-171 Introduction to Programming

See full subject details on page 14.

## 200-level subjects

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### 433-252 Software Engineering Principles & Tools

See full subject details on page 14.

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### 433-253 Algorithms and Data Structures

See full subject details on page 14.

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### 433-254 Software Design

See full subject details on page 14.

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### 433-255 Logic and Computation

See full subject details on page 14.

## 300-level subjects

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### 433-303 Artificial Intelligence

See full subject details on page 15.

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### 433-313 Computer Design

See full subject details on page 15.

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### 433-330 Theory Of Computation

See full subject details on page 15.

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### 433-332 Operating Systems

See full subject details on page 15.

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### 433-341 Software Engineering Process & Practice

See full subject details on page 15.

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### 433-351 Database Systems

See full subject details on page 16.

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### 433-353 Networks & Communications

See full subject details on page 16.

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### 433-361 Programming Languages Implementation

See full subject details on page 16.

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### 433-371 Interactive System Design

See full subject details on page 16.

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### 433-380 Graphics and Computation

See full subject details on page 17.

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### 433-385 Modelling, Analysis and Visualisation

See full subject details on page 17.