

3.2.6 Bachelor of Computing in Computer Science

Overview

The Bachelor of Computing (Honours) in Computer Science or BComp (CS) programme aims to nurture students for a rewarding computing career in various industry sectors. Suitable for those who love hands-on work and keen to apply computing technologies to solve real-world problems, the programme will equip students with the critical knowledge and capacity to take on the world with confidence.

At the time of graduation, students are expected to demonstrate:

- Strong knowledge of computer science foundations and fundamentals, including (a) familiarity with common computer science themes and principles, (b) high-level understanding of systems as a whole, (c) understanding of the theoretical underpinnings of computer science and their influences in practice.
- In-depth knowledge in one or more computer science specialisations.
- Individual competence in applying sound principles and rigorous thinking to (a) analyse an application problem, (b) understand user's requirement, (c) formulate the problem in terms of computation requirements, (c) conceive novel solution ideas, (e) design appropriate solutions that meet the requirements, (f) implement the solution, (g) evaluate the effectiveness of the solution.
- Strong communication skills and ability to work with, and contribute to, a team to bring a range of technologies together to develop computer systems and solutions.
- Ability to engage in continuous professional development.
- Understanding of the responsibilities of an IT professional and the ethical, social, and legal issues related to computing.

Within 3-5 years from graduation, a graduate from the programme is expected to be able to:

- Have a career as IT professional engaging in research and/or development in one or more specialisation of computer science;
- Engage in a supportive or leadership role in a multi-disciplinary, collaborative, team environment;
- Engage in continuous learning of state-of-the-art advances in computer science (including graduate studies);
- Function as an ethical, legal and socially responsible member of the society;
- Apply computing knowledge and skills to contribute positively to the betterment of society.

For a well-rounded education, students pursuing this programme will also acquire knowledge in science, including life sciences, mathematics and physics.

Graduates with the Bachelor of Computing (Honours) in Computer Science degree can position themselves in a large number of exciting fields of work, including project management, knowledge engineering, software architecture, web design, digital media and security consultancy.

Degree Requirements

The Bachelor of Computing (Computer Science) programme requires at least 160 MCs.

Students will be required to satisfy 12 MCs of Industrial Experience Requirement by doing:

1. A 6-month internship through CP3880 Advanced Technology Attachment Programme (12 MCs)
2. Two 3-month internships through CP3200 Internship (6 MCs) and CP3202 Internship II (6 MCs).
3. IS4010 Industry Internship Programme (12 MCs) from the Department of Information Systems and Analytics.
4. A 3-month internship through CP3200 Internship (6 MCs) and CP3107 Computing for Voluntary Welfare Organisations (6 MCs).
5. iLead or NOC. For students who opt for iLead or NOC, the additional MCs beyond the 12-MCs allocated to Industrial Experience Requirement should be taken from Unrestricted Electives and/or exempted modules.
6. Other forms of industry experience approved by the Department of Computer Science.

PROGRAMME REQUIREMENTS (Total of 120 MCs)

Computer Science Foundation

CS1101S Programming Methodology

CS1231S Discrete Structures

CS2030 Programming Methodology II

CS2040S Data Structures and Algorithms

CS2100 Computer Organisation

CS2103T Software Engineering¹

CS2105 Introduction to Computer Networks

CS2106 Introduction to Operating Systems

CS3230 Design and Analysis of Algorithms

Computer Science Breadth & Depth

Complete 24 MCs of CS-coded or IFS-coded modules by satisfying the following conditions:

1. Satisfy at least one CS Focus Area for BComp (CS) by completing 3 modules in the Area Primaries, with at least one module at level-4000 or above. Computer Science Foundation modules that appear in Area Primaries can be counted as one of the 3 modules towards satisfying a Focus Area.
2. At least 12 MCs are at level-4000 or above.

Complete at least 8 MCs of Computer Systems Team Project modules from the following pairs, or modules approved by the Department of Computer Science:

- CS3205 Software Engineering Project, or
- CS3216 Software Product Engineering for Digital Markets and CS3217 Software Engineering on Modern Application Platforms, or
- CS3281 Thematic Systems Project I and CS3282 Thematic Systems Project II, or
- CS3283 Media Technology Project I and CS3284 Media Technology Project II.

Both CS3216 and CS3217 are 5-MC modules. Students who choose to take CS3216 and CS3217 will count 8-MC towards the Computer Systems Team Project requirement and 2- MC towards Unrestricted Electives. Students must take both CS3216 and CS3217 to complete the Software Engineering Team Project requirement. If a student completed only one of CS3216 and CS3217, he or she has to take

another pair of modules to meet the Computer Systems Team Project requirement.

Industry Experience Requirement² of at least 12 MCs

IT Professionalism

IS1103/X IS Innovations in Organisations and Society

CS2101 Effective Communication for Computing Professionals

ES2660 Communicating in the Information Age

Mathematics & Sciences

MA1521 Calculus for Computing³

MA1101R Linear Algebra I

ST2334 Probability and Statistics⁴

One Science Module⁵

2. UNIVERSITY LEVEL REQUIREMENTS (20 MCs)

As specified in Section 3.2.1.

3. UNRESTRICTED ELECTIVES (32 MCs)

As specified in Section 3.2.1. In addition, students without A-level or H2 Mathematics are required to complete the bridging module MA1301/X as part of the Unrestricted Electives.

Computer Science Focus Areas for BComp (CS)

CS modules are organised into Focus Areas of coherent modules according to technical areas of study. A CS Focus Area is satisfied by completing 3 modules from the Area Primaries, with at least one module at 4000-level or above. CS Foundation Modules (CFM) that appear in the Area Primaries can be counted as one of the 3 modules towards satisfying a Focus Area. In this case, a student has to read just two other modules in the Area Primaries to satisfy the Focus Area. Elective modules are grouped into the Focus Areas as a guide for indicating their related areas of study.

- Algorithms & Theory
- Artificial Intelligence
- Computer Security
- Computer Graphics and Games
- Database Systems
- Multimedia Information Retrieval

- Network and Distributed Systems
- Parallel Computing
- Programming Languages
- Software Engineering

Modules classified in each focus area can be found

at: <http://www.comp.nus.edu.sg/programmes/ug/focus/>

NUS Overseas Colleges (NOC) (Computer Science)

Students who attended NOC programme may:

1. count TR3201 Entrepreneurship Practicum (8 MCs) towards CS3882 Breakthrough Ideas for Digital Markets (4 MCs) and one bridging module at 4 MCs. The mapping to bridging module (MA1301/PC1221/PC1222) applies to CS students with A-level or equivalent qualifications in either Mathematics or Physics. These students replace the missing MCs for the bridging modules with unrestricted electives. Dummy CS codes CSX3741 and CSX3742 will be issued in place of MA1301 and PC1221/PC1222 respectively.
2. count TR3202 Start-up Internship Programme (12 MCs) towards Industrial Experience Requirement.
3. count TR3203 Start-up Case Study and Analysis towards Unrestricted Electives. Students working on computer systems term projects for TR3203 may seek approval to instead take TR3203P, which counts towards CS3205 Software Engineering Project or equivalent pairs. Alternatively, TR3203 can be mapped to TR3203E in which 8 MCs of CS-coded electives at level-3000 can be considered for the fulfilment of CS Breadth and Depth Requirements.

University Scholars Programme (Computer Science)

Students in the University Scholars Programme who choose the Bachelor of Computing (Computer Science) major will follow the Computer Science programme, but with the following variations:

1. They will read GER1000 Quantitative Reasoning (4 MCs) as compulsory module for the University Level Requirements (ULR). The remaining 16 MCs in ULR are replaced by the 3 USP Inquiry Modules and 1 USP Foundation module (i.e. University Scholars Seminar).
2. They will not be required to read CS2101 Effective Communication for Computing Professionals. It is replaced by USP Foundation module: Writing and Critical Thinking
3. They will not be required to read one Science Module (4 MCs). It is replaced by 1 USP Inquiry modules in Sciences and Technologies basket.
4. They will read CS3205 or other modules approved by the Department of Computer Science as independent study modules (ISMs) which will also be counted as 2 USP Inquiry modules in Sciences and Technologies basket.

Table 1: Summary of degree requirements for Bachelor of Computing (Computer Science)

MODULES	MCS	SUBTOTALS
UNIVERSITY LEVEL REQUIREMENTS		20
PROGRAMME REQUIREMENTS		108

MODULES	MCS	SUBTOTALS
Computer Science Foundation	36	
CS1101S Programming Methodology	4	
CS1231S Discrete Structures	4	
CS2030 Programming Methodology II	4	
CS2040S Data Structures and Algorithms	4	
CS2100 Computer Organisation	4	
CS2103T Software Engineering ¹	4	
CS2105 Introduction to Computer Networks	4	
CS2106 Introduction to Operating Systems	4	
CS3230 Design and Analysis of Algorithms	4	
Computer Science Breadth and Depth	44	
Complete 24 MCs of CS-coded or IFS-coded modules by satisfying the following conditions: 1. Satisfy at least one CS Focus Area for BComp (CS) by completing 3 modules in the Area Primaries, with at least one module at level-4000 or above. Computer Science Foundation modules that appear in Area Primaries can be counted as one of the 3 modules towards satisfying a Focus Area. 2. At least 12 MCs are at level-4000 or above.	24	
Complete at least 8 MCs of Computer Systems Team Project modules from the following pairs, or modules approved by the Department of Computer Science: CS3205 Software Engineering Project, or CS3216 Software Product Engineering for Digital Markets and CS3217 Software Engineering on Modern Application Platforms, or CS3281 Thematic Systems Project I and CS3282 Thematic Systems Project II, or CS3283 Media Technology Project I and CS3284 Media Technology Project II	8	
Industrial Experience Requirement ²	12	
IT Professionalism	12	
IS1103/X IS Innovations in Organisations and Society	4	
CS2101 Effective Communication for Computing Professionals	4	
ES2660 Communicating in the Information Age	4	
Mathematics and Sciences	16	
MA1521 Calculus for Computing ³	4	
MA1101R Linear Algebra I	4	
ST2334 Probability and Statistics ⁴	4	
One Science Module ⁵	4	

MODULES	MCS	SUBTOTALS
UNRESTRICTED ELECTIVES ⁶		32
Grand Total		160

¹ Students taking CS2103T Software Engineering must take CS2101 Effective Communication for Computing Professionals in the same semester.

² Students in the Department of Computer Science who aim for Honours (Highest Distinction) must pass the CP4101 BComp Dissertation. Students with CAP of 4.00 or higher after completing at least 70% (i.e. 112 MCs) of the MC requirement for the degree programme may opt to replace the Industry Experience Requirement by CP4101 B.Comp Dissertation (12 MCs). Note that the CP4101 project selection process takes place one semester ahead of the semester in which the students commence CP4101. Thus the students can tentatively select CP4101 projects; but the condition “CAP of 4.00 or higher after completing at least 70% (112 MCs) of the MC requirement for the degree programme” must be satisfied before they can commence CP4101 in lieu of Industry Experience Requirement.

³ Students pursuing a double degree in Computer Science and Mathematics/Applied Mathematics are recommended to replace MA1521 Calculus for Computing by MA1102R Calculus.

⁴ Students pursuing a double degree in Computer Science and Mathematics/Applied Mathematics or Second Major in Mathematics will take ST2131 Probability and ST2132 Mathematical Statistics in place of ST2334 Probability and Statistics. Students pursuing a Second Major in Statistics will take ST2131 in place of ST2334.

⁵ Students pursuing Second Major in Mathematics can count ST2132 towards Science Module requirements. Students cannot use ST2132 to meet the requirements of Second Major in Mathematics and have to choose another elective from List II of the Mathematics major. If a student has already taken ST2131 and later quits from the Second Major in Statistics programme, he/she will have to take ST2132 to fulfil the BComp (CS) degree requirements. For all other students: a student who have not taken ‘O’-level Physics, may take a Life-Science module to meet this requirement; A student who have ‘O’-level Physics but have not taken ‘A’-level / H2 Physics must take either PC1221/X or PC1222/X to meet the Science module requirement; A student who have taken ‘A’-level / H2 Physics may take either a Physics, Chemistry, Life-Science, Statistics, or Mathematics module as a Science module. The Science module must be a module from List S1 (recommended) or List S2. Please refer to: http://www.comp.nus.edu.sg/undergraduates/documents/Sciencemodules_S1_S2.pdf for details.

⁶ Students without A-level or H2 Mathematics are required to complete the bridging module MA1301/X as part of the Unrestricted Electives.

