Programme Specification

BEng Software Engineering (2018-19)

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided.

Awarding Institution	University of Southampton
Teaching Institution	University of Southampton
Mode of Study	Full-time
Duration in years	3
Accreditation details	British Computer Society (BCS)
	Institution of Engineering and Technology (IET)
Final award	Bachelor of Engineering with Honours (BEng (Hons))
Name of award	Software Engineering
Interim Exit awards	Bachelor of Engineering (BEng)
	Certificate of Higher Education (CertHE)
	Diploma of Higher Education (DipHE)
FHEQ level of final award	Level 6
UCAS code	G4G6
Programme code	4465
QAA Subject Benchmark or other external reference	Computing 2007
Programme Lead	Gary Wills (gbw)

Programme Overview

Brief outline of the programme

Computer Science and Software Engineering drive the fundamental technologies of today's connected world. Every area of our lives, from medicine and healthcare to industrial applications, global trade, transport, communications, entertainment and security, is dependent on computing technology. As a result, computer science is now one of the fastest growing job fields in the world and skilled computer scientists are very much in demand.

The Software Engineering programme at the University of Southampton is a world-leading research-led undergraduate programme that aims to give students a robust, in-depth grounding in the discipline, while offering

a broad range of optional modules that derive from the research carried out by staff in ECS (for example, the Cyber Security themed degree draws on expertise from the EPSRC/GCHQ-awarded Academic Centre of Excellence in Cyber Security Research). The programme is designed to give you experience of core technologies and techniques, while making it possible for you to work in depth and specialise in what really interests you by focussing your studies in one of six specialist areas (Software Engineering, Artificial Intelligence, Distributed Systems and Networks, Image and Multimedia Systems, Mobile and Secure Systems, and Cyber Security) through our themed degrees. Our project work will enable you to acquire valuable skills in teamwork, project planning, time management and presentation, applying your learning to design and build problems, and working to a brief, and we also offer the opportunity to spend a year in industry as part of our "with Industrial Studies" variant degrees. All of these experiences will stand you in good stead as you move into your career. Our outstanding lab facilities and research-led teaching ensure that, at the end of your programme, your skills will be highly regarded by leading employers.

Your contact hours will vary depending on your module/option choices. Full information about contact hours is provided in individual module profiles.

Learning and teaching

A range of learning and teaching methods are used on this programme, including:

- Staff-led lectures, demonstrations, laboratories and seminars
- Directed reading
- Student-led seminars and presentations
- Specification, design, analysis, implementation and verification exercises
- Revision for written examinations
- Staff and post-graduate supervision of your research dissertation
- Industrial placements

Assessment

A range of assessment methods are used on this programme to enable students to demonstrate their achievement of the intended learning outcomes, including:

- Written examinations
- In-class tests
- Design exercises
- Programming exercises
- Oral presentations
- Written assessments, including technical reports, literature searches and surveys
- Assessed laboratories and logbook checks
- Group work exercises, presentations and reports

Special Features of the programme

N/A

Please note: As a research-led University, we undertake a continuous review of our programmes to ensure quality enhancement and to manage our resources. As a result, this programme may be revised during a student's period of registration; however, any revision will be balanced against the requirement that the student should receive the educational service expected. Please read our Disclaimer to see why, when and how changes may be made to a student's programme.

Programmes and major changes to programmes are approved through the University's programme validation process which is described in the University's Quality handbook.

Educational Aims of the Programme

The aims of this programme are to:

- Provide you with a solid foundation and to develop the skills needed for a wide range of professional engineering careers as a high quality practitioner and leader in business, technology, research and development
- Provide a balance of theoretical, design and practical subjects which allows you to exploit your individual talents
- Provide a coherent selection of specialist subjects which allows you to focus your studies in a themed area within computer science and software engineering
- Have a flexible structure which is relevant and attractive not only to you, but also to staff, and industry and which is responsive to advances in technology and the needs of the community
- Be at the leading edge of scholarship in computer science and software engineering
- Maximise the benefit of an environment in which staff are carrying out internationally respected research
- Provide an environment which contributes towards your personal and professional development and acts as a foundation for a wide range of subsequent study and lifelong learning
- Provide a learning environment with sufficient laboratories, appropriate up-to-date software and hardware, and a first class web-site, motivating you towards the practice of engineering
- Provide a supportive pastoral environment with opportunities for you to participate in social and recreational activities.

Programme Learning Outcomes

Knowledge and Understanding

On successful completion of this programme you will have knowledge and understanding of:

A1. The following topics, which are defined in the QAA Computing Benchmark:

Architecture, Artificial Intelligence, Comparative Programming Languages, Computer Communications, Compilers and Syntax-Directed Tools, Computer Networks, Computer Vision and Image Processing, Concurrency and Parallelism, Databases, Data Structures and Algorithms, Distributed Computing Systems, Document Processing, e-Business, Graphics and Sound, Human-Computer Interaction, Information Retrieval, Information Systems, Intelligent Information Systems Technologies, Management Issues, Middleware, Multimedia, Operating Systems, Professionalism, Programming Fundamentals, Security and Privacy, Simulation and Modelling, Software Engineering, Systems Analysis and Design, Theoretical Computing, Web-based Computing

A2. The broader software engineering context, the state of the art in software engineering, and the application of advanced software engineering techniques.

Teaching and Learning Methods

The topics listed in skill A1 are taught mainly through lectures and directed reading. Learning is reinforced through tutorials (in Parts I and II – the first two years of study), the supervision of individual and group projects, and other coursework assignments.

Skill A2 is taught through lectures and directed reading that form part of specialist modules, and through the individual project in Part III.

Assessment Methods

Knowledge and understanding of the topics listed in skill A1 is assessed mainly through written examinations, with some in-class tests, coursework and project work contributing to the assessment of these areas.

Skill A2 is assessed through written examinations, in-class tests and coursework, and through the individual project in Part III.

Subject Specific Intellectual and Research Skills

On successful completion of this programme you will be able to:

B1. Elicit, record, and analyse requirements arising from specific problems with given practical

B2. Apply appropriate knowledge, theory, tools, methods and techniques to plan, specify, design, model, implement, test, and document computer-based solutions both individually and in teams

B3. Describe the context and processes involved in the effective deployment of computer-based solutions, including the use of quality systems and engineering management practices

B4. Evaluate computer-based solutions, both existing and hypothetical, in terms of general quality attributes and also possible trade-offs presented within a given problem

B5. Critically evaluate the impact of current and emerging methods and technologies

B6. Recognise the professional, moral and ethical issues involved in the exploitation of computer technology and be guided by the adoption of appropriate professional, ethical and legal practices

B7. Explain the financial, social and environmental factors of significance to engineering, and the broader obligations of engineers to society

B8. Recognise any risks or safety aspects that may be involved in the operation of computing equipment within a given context

Teaching and Learning Methods

Skills B1-B4 are the subject of modules in each Part, taught mainly through lectures and tutorials. Practical software development skills are also taught in computer laboratories. These outcomes are further developed through coursework and project work ranging from programming exercises in Part I, to major individual (Part III) and group (Part IV) design projects.

Skills B5 and B9 are taught through the demonstration and use of up-to-date methods and technologies, Guest Lecturers from industry, and, for MEng students, industrial placements, and specialist seminars, including directed reading of research materials.

Skills B6-B8 are covered in lectures and tutorials in the first part and further developed through guest lectures and directed reading, particularly in Parts III and IV.

Assessment Methods

Skills B1-B4 are assessed through programming exercises, design exercises, design projects, logbook checks, oral presentations, and technical design reports. Skills B5 and B9 are assessed through technical reports and oral presentations. Skills B6-B8 are assessed through technical reports and logbook checks.

Transferable and Generic Skills

On successful completion of this programme you will be able to:

C1. Manage your learning and development including time management and organisational skills

C2. Solve problems of a non-routine nature in creative and innovative ways

C3. Work as a member of a team, recognising the different roles within a team, different ways of organising teams, and the requirements and responsibilities of leadership

C4. Present clearly and succinctly to a range of audiences (orally, electronically and in writing) rational and reasoned arguments that address a given information handling problem or opportunity, using either current or emerging technologies

C5. Demonstrate numeracy and use appropriate mathematics in communicating results, concepts and ideas, and cases with a quantitative dimension; use mathematics as a tool to solve complex problems

C6. Operate computing and other IT equipment effectively, taking into account its logical and physical properties

C7. Retrieve information effectively, using, for example, browsers, search engines and catalogues

C8. Explain the need for continuing professional development in recognition of lifelong learning

Teaching and Learning Methods

Skills C1-C3 are covered in lectures in Part I, but are mainly developed through the significant practical problem- solving elements of the programme in later Parts, which contribute 50% or more to your final degree classification. Adherence to deadlines is encouraged through late submission penalties.

Skills C4-C7 are covered in lectures in Part I, and written guidelines are provided in support of specific assessed coursework and project reports. Skill C5 is also developed through in-class tests.

Skill C8 is covered in lectures in Part I, and is reinforced through the focus on current and emerging technologies, particularly in Parts III and IV.

Skill C9 is covered in lectures and seminars in Part IV.

Assessment Methods

Skills C1, C2, and C6 are assessed implicitly as part of all our coursework and project assessments.

Skill C3 is assessed through the use of group projects in Parts II and IV, in which students are asked to rate their own and other team member's contributions; student marks for group work therefore contain both a component based on the performance of the group as a whole, and a component based on each group's collective reflection on individual contributions.

Skills C4, C5 and C7-C9 are assessed through technical reports and presentations. Skill C8 is not formally assessed.

Programme Structure

The programme structure table is below:

Information about pre and co-requisites is included in individual module profiles.

Part I

Typical course content

The degrees offered within the Software Engineering programme are based around a common core that spans all four years of the programme. In the first two years ('Parts') of the programme, students take compulsory modules that introduce them to the basic theory underpinning computer science, the ethical and legal framework in which computer scientists and software engineers work, the practicalities of working with computers, and key techniques and application areas. In Parts III and IV, the core topics focus on professional practice, with major individual and group projects, and taught modules covering industrial practice and engineering management. There is also a range of optional modules offered in Parts III and IV; many of these options are in the six specialist areas of Artificial Intelligence, Distributed Systems and Networks, Image and Multimedia Systems, Mobile and Secure Systems, Software Engineering, and Cyber Security.

If you successfully complete three full parts of study, you may graduate with an honours degree: BEng (hons). If you successfully complete four full parts of study, you may graduate with a MEng degree. If you obtain at least 60 ECTS credits in one of the five specialist areas across all four Parts (25% of your overall credits), you qualify for the award of MEng Software Engineering (a "themed degree").
Students may transfer between themed degree programmes (and from a themed programme to MEng Computer Science) providing that they have met the relevant requirements for specialist modules.

Students intending to graduate with MEng degrees are strongly recommended to spend 20 weeks in industry, usually as two 10-week summer placements. Alternatively, if you complete a year in industry, as part of the "with Industrial Studies" variant, you will complete a study worth 30 ECTS credits at level 6, which will qualify you for the award of the enhanced degree. Consult the ECS Industrial Liaison Tutor for advice concerning placements.

Programme details

Available Modules

The information in this programme specification is accurate at the time of writing, but may change in minor ways from year to year due to staff availability or other factors. Some of these modules are subject to pre- requisites and exclusions that, for brevity, are not given here; this information is available in the module specifications on the ECS Website.

The module requirements for each programme are shown for each Part below; modules are either core (must be taken and passed), compulsory (must be taken), optional (may be taken) or specialist (optional but contributing to the

requirements of a themed degree).

It should be noted that it may not be possible to run some optional modules if the number of students registered on the module is very small. It should also be noted that optional module choice can be restricted by the University Timetable, which varies from year to year: some optional modules may clash with other optional or compulsory modules. Please be aware that many modules are shared between different cohorts; the class size depends on cohort size, which varies from year to year.

Part I Core

In your first year, you will take 60 ECTS at FHEQ Level 4, 30 ECTS in each semester as shown below. Note that all Part I modules are core, and must be passed in order to progress.

Code	Module Title	ECTS	Type
COMP1201	Algorithmics	7.5	Core
COMP1203	Computer Systems I	7.5	Core
COMP1204	Data Management	7.5	Core
COMP1215	Foundations of Computer Science	7.5	Core
COMP1205	Professional Development	7.5	Core
COMP1206	Programming 2	7.5	Core
COMP1202	Programming I	7.5	Core
COMP1216	Software Modelling and Design	7.5	Core

Part II

In your second year, you will take 60 ECTS at FHEQ Level 5, 30 ECTS in each semester. Note that certain modules are marked as specialist modules, which count towards the requirements for a themed degree (that compulsory modules are also marked as specialist reflects our view that all students should have some exposure to the breadth of specialisms on offer).

Broadening options may be chosen from the list of modules provided by the Curriculum Innovation Project.

Part II Compulsory

Code	Module Title	ECTS	Type

COMP2214	Advanced Software Modelling and Design	7.5	Compulsory
COMP2207	Distributed Systems and Networks	7.5	Compulsory
COMP2208	Intelligent Systems	7.5	Compulsory
COMP2213	Interaction Design	7.5	Compulsory
COMP2209	Programming III	7.5	Compulsory
COMP2212	Programming Language Concepts	7.5	Compulsory
COMP2211	Software Engineering Group Project	7.5	Compulsory
COMP2210	Theory of Computing	7.5	Compulsory

Part III

The major element of Part III is the Individual Project, which runs all year. In semester 1, students intending to graduate with a MEng degree must take COMP3219 Engineering Management and Law.

You will also take 30 ECTS of optional modules (22.5 ECTS for MEng students) from the list below, for a total load of 30 ECTS per semester. You may select at most 15 ECTS worth of options from outside the programme.

If you wish to graduate with a themed degree (MEng Computer Science with X or MEng/BEng Software Engineering), you must take at least 15 ECTS of specialist modules, and your Individual Project must be related to your theme.

Broadening options may be chosen from the list of modules provided by the Curriculum Innovation Project.

Part III Core

Code	Module Title	ECTS	Type
COMP3200	Part III Individual Project	22.5	Core

Part III Optional

Select 75 credits

Please note COMP3200 is split across both semesters with 15crs in Semester 1 and 30crs in Semester 2. You will need to pick 45 optional credits in S1 and 30 optional credits in S2. Please ensure you have equal split of credits across both semesters

Part III Optional Group 1

Select at least 30 credits

Please select at least 30 credits from the following:

Code	Module Title	ECTS	Type
COMP3211	Advanced Databases	7.5	Optional
COMP3207	Cloud Application Development	7.5	Optional
COMP3201	Cyber Security	7.5	Optional
COMP3215	Real-Time Computing and Embedded Systems	7.5	Optional

Part III Optional Group 2

Code	Module Title	ECTS	Type
ELEC3219	Advanced Computer Architecture	7.5	Optional
COMP3210	Advanced Computer Networks	7.5	Optional
COMP3212	Computational Biology	7.5	Optional
COMP3204	Computer Vision	7.5	Optional
COMP3219	Engineering Management and Law	7.5	Optional
COMP3218	Game Design and Development	7.5	Optional
MATH3081	Operational Research	7.5	Optional
MATH3082	Optimisation	7.5	Optional
ELEC3201	Robotic Systems	7.5	Optional
COMP3217	Security of Cyber Physical Systems	7.5	Optional
COMP3208	Social Computing Techniques	7.5	Optional

Part III Optional Group 3

You may only take one of the Machine Learning modules.

Code	Module Title	ECTS	Type
COMP3223	Foundations of Machine Learning	7.5	Optional
COMP3222	Machine Learning Technologies	7.5	Optional

Progression Requirements

The programme will follow the University's regulations for ***Progression, Determination and Classification of Results: Undergraduate and Integrated Masters Programmes*** or the University's regulations for ***Progression, Determination and Classification of Results: Standalone Masters Programmes*** as set out in the General Academic Regulations in the University Calendar: http://www.calendar.soton.ac.uk/sectionIV/sectIV-index.html

Support for student learning

There are facilities and services to support your learning some of which are accessible to students across the University and some of which will be geared more particularly to students in your particular Faculty or discipline area.

The University provides:

- library resources, including e-books, on-line journals and databases, which are comprehensive and up-to-date; together with assistance from Library staff to enable you to make the best use of these resources
- high speed access to online electronic learning resources on the Internet from dedicated PC Workstations onsite and from your own devices; laptops, smartphones and tablet PCs via the Eduroam wireless network. There is a wide range of application software available from the Student Public Workstations.
- computer accounts which will connect you to a number of learning technologies for example, the Blackboard virtual learning environment (which facilitates online learning and access to specific learning resources)
- standard ICT tools such as Email, secure filestore and calendars.
- access to key information through the MySouthampton Student Mobile Portal which delivers timetables, Module information, Locations, Tutor details, Library account, bus timetables etc. while you are on the move.
- IT support through a comprehensive website, telephone and online ticketed support and a dedicated helpdesk in the Hartley Library.
- Enabling Services offering support services and resources via a triage model to access crisis management, mental health support and counselling. Support includes daily Drop In at Highfield campus at 13.00 – 15.00 (Monday, Wednesday and Friday out of term-time) or via on-line chat on weekdays from 14.00 – 16.00. Arrangements can also be made for meetings via Skype.
- assessment and support (including specialist IT support) facilities if you have a disability, long term health problem or Specific Learning Difficulty (e.g. dyslexia).
- the Student Services Centre (SSC) to assist you with a range of general enquiries including financial matters, accommodation, exams, graduation, student visas, ID cards
- Career and Employability services, advising on job search, applications, interviews, paid work, volunteering and internship opportunities and getting the most out of your extra-curricular activities alongside your degree programme when writing your CV
- Other support that includes health services (GPs), chaplaincy (for all faiths) and 'out of hours' support for students in Halls and in the local community, (18.00-08.00)
- A Centre for Language Study, providing assistance in the development of English language and study skills for non-native speakers.

The Students' Union provides

- an academic student representation system, consisting of Course Representatives, Academic Presidents, Faculty Officers and the Vice-President Education; SUSU provides training and support for all these representatives, whose role is to represent students' views to the University.
- opportunities for extracurricular activities and volunteering
- an Advice Centre offering free and confidential advice including support if you need to make an academic appeal
- Support for student peer-to-peer groups, such as Nightline.

Associated with your programme, you will be able to access:

- the tutorial system – every student has a Personal Tutor, and there is also the Senior Tutoring team if your personal tutor is not available (see the Student Handbook for further details on the personal tutor system)
- Faculty computer workstations with a range of software, manuals and books, with early to late access through a card-lock mechanism
- Student Teaching and Computing Support (STACS) helpdesk for computer support and programming advice
- postgraduate demonstrators, who support programming intensive modules
- a website with notes for every module
- the Student Handbook

Methods for evaluating the quality of teaching and learning

You will have the opportunity to have your say on the quality of the programme in the following ways:

You will have the opportunity to have your say on the quality of the programme in the following ways:

- Completing student evaluation questionnaires for each module of the programme, which feed into Faculty-level module and programme reporting
- Acting as a student representative on various committees, e.g. Staff-Student Liaison Committees, Faculty Programmes Committee OR providing comments to your student representative to feed back on your behalf
- Serving as a student representative on Faculty Scrutiny Groups for programme validation
- Taking part in programme validation meetings by joining a panel of students to meet with the Faculty Scrutiny Group

The ways in which the quality of your programme is checked, both inside and outside the University, are:

- Regular module and programme reports which are monitored by the Faculty
- Programme validation, normally every five years
- External examiners, who produce an annual report
- Professional body accreditation
- A national research evaluation (which is relevant because our research activity contributes directly to the quality of your learning experience)
- Higher Education Review by the Quality Assurance Agency

Further details on the University's quality assurance processes are given in the Quality Handbook.

Further details on the University's quality assurance processes are given in the *Quality Handbook.*

Career Opportunities

Graduates from our undergraduate computer science and software engineering programme are employed worldwide in development and consultancy roles by a number of leading companies at the forefront of information technology, some have gone on to doctoral study and University careers, while others have been involved in IT start-ups. ECS runs a dedicated Careers Hub which is affiliated with over 100 renowned companies, including IBM, ARM, Microsoft Research, Imagination Technologies, Nvidia, Samsung and Google to name a few, and we hold our own annual Engineering and Technology Careers Fair.

External Examiner(s) for the programme

Name: Professor Georg Struth - University of Sheffield

Name: Dr Anthony J Beaumont - Aston University

Students must not contact External Examiner(s) directly, and external examiners have been advised to refer any such communications back to the University. Students should raise any general queries about the assessment and examination process for the programme with their Course Representative, for consideration through Staff: Student Liaison Committee in the first instance, and Student representatives on Staff: Student Liaison Committees will have the opportunity to consider external examiners' reports as part of the University's quality assurance process.

External examiners do not have a direct role in determining results for individual students, and students wishing to discuss their own performance in assessment should contact their Personal Academic Tutor in the first instance.

Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided. More detailed information can be found in the programme handbook.

Appendix 1:

Students are responsible for meeting the cost of essential textbooks, and of producing such essays, assignments, laboratory reports and dissertations as are required to fulfil the academic requirements for each programme of study. In addition to this, students registered for this programme also have to pay for:

Additional Costs

Type	Details
Stationery	You will be expected to provide your own day-to-day stationary items, e.g. pens, pencils, notebooks, etc). Any specialist stationery items will be specified under the Additional Costs tab of the relevant module profile.
Textbooks	Where a module specifies core texts these should generally be available on the reserve list in the library. However due to demand, students may prefer to buy their own copies. These can be purchased from any source. Some modules suggest reading texts as optional background reading. The library may hold copies of such texts, or alternatively you may wish to purchase your own copies. Although not essential reading, you may benefit from the additional reading materials for the module.
Approved Calculators	Candidates may use calculators in the examination room only as specified by the University and as permitted by the rubric of individual examination papers. The University approved models are Casio FX-570 and Casio FX-85GT Plus. These may be purchased from any source and no longer need to carry the University logo.
Printing and Photocopying Costs	In the majority of cases, coursework such as essays; projects; dissertations is likely to be submitted on line. However, there are some items where it is not possible to submit on line and students will be asked to provide a printed copy.

In some cases you'll be able to choose modules (which may have different costs associated with that module) which will change the overall cost of a programme to you. Details of such costs will be listed in the Module Profile. Please also ensure you read the section on additional costs in the University's Fees, Charges and Expenses Regulations in the University Calendar available at www.calendar.soton.ac.uk.