

Programme Specification

MSc Software Engineering (2019-20)

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	1
Accreditation details	British Computer Society (BCS)
Final award	Master of Science (MSc)
Name of award	Software Engineering
Interim Exit awards	Postgraduate Diploma Postgraduate Certificate in Higher Education
FHEQ level of final award	Level 7
UCAS code	N/A
Programme code	4469
QAA Subject Benchmark or other external reference	Master's Degrees In Computing 2011
Programme Lead	Corina Cirstea (corina)

Programme Overview

Brief outline of the programme

This programme is a masters degree aimed at enabling students to further their specialist knowledge of Software Engineering. This programme is taken mainly by international students with a first degree in computing (or a closely related subject plus significant computing experience). The modules which comprise this masters degree covers state of the art techniques, technologies, and supporting tools, and expose students to their applications in meeting emerging business and social needs, and solving challenging problems. On this programme, students engage in focussed study on a number of advanced compulsory modules dedicated to Software Engineering and can also pick a range of options across areas as diverse as Artificial Intelligence, Cyber Security, Web Science, and Web Technology in order to complement their core degree topic.

There are two compulsory modules each semester, starting with a review of key topics in Software Engineering

designed to resolve the inevitable variety of background knowledge and to build a cohort with a strong ethos of collaborative working. In the second semester the students work on preparation for their project and enhancing their dissertation writing skills through the creation of a rigorous and peer reviewed project proposal.

Finally, during the summer the core research project enables students to demonstrate their mastery of specialist techniques, relevant methods of enquiry, and their ability to design and deliver advanced application, systems and solutions to a tight deadline, including the production of a substantial dissertation.

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

Learning and teaching methods are explained in the following sections covering programme learning outcomes.

Assessment

Assessment methods are explained in the following sections covering programme learning outcomes.

Special Features of the programme

Southampton is recognised to be internationally leading in the areas mentioned above and specialist modules are taught by staff involved in leading edge research. Students are therefore exposed to the most up to date thinking, current research problems, and state of the art techniques, technologies and tools.

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 the programme are to enable you to:

- 1) Develop original ideas and solve complex problems in new or unfamiliar environments, based on advanced knowledge of the principles and methodologies of Software Engineering
- 2) Integrate knowledge and handle complexity in this area of computer science, formulating sound judgements with incomplete or limited data
- 3) Communicate your conclusions and the underpinning knowledge and rationale clearly and unambiguously to specialist and non-specialist audiences
- 4) Develop your independent learning skills as required for continued professional development

Programme Learning Outcomes

Knowledge and Understanding

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

- A1. Key concepts of Software Engineering
- A2. Advanced concepts in some specialist areas of computer science such as Artificial Intelligence, Cyber Security, Software Engineering, Web Science and Web Technology
- A3. Specialist tools and techniques used to design, implement and verify software-based systems
- A4. Methods of software design, development, project management and testing
- A5. Applicable methods of research and enquiry within the discipline

Teaching and Learning Methods

A1-A5: Most modules consist of a combination of lectures, small group teaching, practical work, directed reading and coursework assignments. At the end of the taught part of the course you will undertake an individual project associated with a research group. Small group teaching, including all practical work, and the individual project accommodate different learning styles. One-on-one tutorials can support full-class lectures, when required.

Assessment Methods

Testing of the knowledge base is through a combination of unseen written examinations and assessed coursework in the form of problem solving exercises, laboratory reports with literature review components, design exercises, and individual and small-group projects.

Subject Specific Intellectual and Research Skills

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

- B1. Model and design advanced and specialised software applications or systems
- B2. Analyse software projects and choose appropriate management and development methodologies
- B3. Analyse problems to determine appropriate methods of design, testing and evaluation
- B4. Find, read, understand and explain literature related to advanced and specialised areas of Software Engineering, including scientific publications, industrial documentation, standards, ethical, legal and environmental guidance
- B5. Formulate a research project involving an advanced and specialised software application or system using appropriate state of the art techniques, technologies and tools

Teaching and Learning Methods

B1-B5: Most modules consist of a combination of lectures, small group teaching, and computer-based practical work including advanced software development tools, directed reading and coursework assignments, which can include a literature review. B5, B6: The Project Preparation module and the Individual Project itself concern the formulation of a research project. Small group teaching, including all practical work, and the individual project accommodate different learning styles. One-on-one tutorials can support full-class lectures, when required.

Assessment Methods

B1-B5: Testing of the subject specific intellectual and research skills is through a combination of unseen written examinations and assessed coursework in the form of problem solving exercises, laboratory reports with literature review components, design exercises, and individual and small-group projects. B4: The Project Preparation module and the dissertation from the MSc Project include a significant literature survey and peer review, and have assessment criteria related specifically to these skills. B5: The Project dissertation is centrally focussed on assessing software research and development skills.

Transferable and Generic Skills

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

- C1. Use conventional and electronic indexing and search methods to find technical information
- C2. Present technical information concisely in written and verbal forms to a range of audiences
- C3. Work in a pair or in a small group on a given task, managing your own contribution and the overall task
- C4. Work independently on a significant research project, managing time and risk in an effective manner
- C5. Recognise legal and ethical issues of concern to business, professional bodies, and society, including but not limited to information security, and follow relevant guidelines to address these issues

Teaching and Learning Methods

C1-C3: Most modules include small group teaching, practical work with one or more lab partners, directed reading and coursework assignments with a literature review component. The Project Preparation module includes project management and the delivery of a project plan via a presentation. Small group teaching, including all practical work, and the individual project accommodate different learning styles.

C4: The individual project includes independent research and report writing.

C5: Legal, ethical and professional issues are covered in the compulsory taught modules.

Assessment Methods

C1-C5: Coursework is generally assessed through written reports. The individual project is assessed by a dissertation of up to 15,000 words. The Project Preparation module is assessed via a literature review, as

well as written and presentation versions of the project plan.

Subject Specific Practical Skills

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

D1. Use specialist software development and analysis tools

Teaching and Learning Methods

D1: Most modules include practical work, involving use of specialised tools for software development or analysis. Example tools used include Rodin, AspectJ, JUnit.

Assessment Methods

D1: Assessment is based on coursework in the form of technical reports, software designs and implementation, and also the MSc dissertation.

Programme Structure

The programme structure table is below:

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

Where optional modules have been specified, the following is an indicative list of available optional modules, which are subject to change each academic year. Please note in some instances modules have limited spaces available.

Part I

Typical course content

The programme consists of eight taught modules, each worth 7.5 ECTS credit points (15 CATS) and an individual research project worth 30 ECTS credit points (60 CATS). Two compulsory modules cover core material of Software Engineering. Another compulsory module prepares you for your individual research project. Five optional modules from a range of topics (including advanced and specialised aspects of Artificial Intelligence, Cyber Security, Web

Science, and Web Technology) can be selected to tailor the programme to your interests.

Programme details

The programme runs over three semesters. The first semester consists of two compulsory modules and two optional modules. The second semester consists of the compulsory Project Preparation module and three optional modules. Following the first two semesters of the taught component of the programme, the students will undertake a research project which will be assessed by a degree dissertation.

For COMP6246 (Machine Learning Technologies) students should be comfortable with basic linear algebra and the fundamental principles of Calculus. With the approval of the programme leader, students with prior knowledge of linear algebra (including matrix operations), Calculus (including partial differentiation), probability and statistics can take COMP6245 (Foundations of Machine Learning) instead of COMP6246.

Most modules are shared with our Master of Engineering programmes in Computer Science and our specialist MSc programmes. 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.

Examinations are held at the end of Semester 1 (January) and at the end of Semester 2 (May/June). Students who have successfully completed 30 ECTS (60 CATS) or 60 ECTS (120 CATS) at the level of the award may exit with a Postgraduate Certificate or Postgraduate Diploma, respectively.

The following is the normal pattern of study for a full-time student, completing the programme within 12 calendar months.

Semester 1:

Four modules, including two compulsory and two optional modules. Examinations are held in January.

Semester 2:

Four modules, including Project Preparation and three optional modules. Examinations are held in May/June.

Summer/Semester 3:

You will undertake a research project lasting 3 to 4 months, which is assessed by a 15,000 word dissertation.

The programme structure, including the compulsory and optional modules for each semester, is summarised below. Semester 2 modules may have a semester 1 pre-requisite, which can be checked in the module specifications, hence the choice of semester 1 options can affect the options available in semester 2.

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SEMESTER 1 - select two optional modules

COMP6204 - compulsory

COMP6226 - compulsory

COMP6203 - optional

COMP6205 - optional

COMP6218 - optional

COMP6219 - optional

COMP6230 - optional

COMP6236 - optional

COMP6244 - optional

COMP6246 - optional

SEMESTER 2 - select two optional modules

ELEC6211 - compulsory

COMP6201 - optional

COMP6207 - optional

COMP6209 - optional

COMP6214 - optional
COMP6215 - optional
COMP6237 - optional
COMP6239 - optional
COMP6241 - optional
ELEC6242 - optional

SUMMER

COMP6200 - core

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Part I Compulsory

Code	Module Title	ECTS	Type
ELEC6211	Project Preparation	7.5	Compulsory
COMP6226	Software Modelling Tools and Techniques for Critical Systems	7.5	Compulsory
COMP6204	Software Project Management and Secure Development	7.5	Compulsory

Part I Core

Code	Module Title	ECTS	Type
COMP6200	MSc Project	30	Core

Part I Optional

Select two semester 1 modules (15 ECTS/30 CATS) and three semester 2 modules (22.5 ECTS/45 CATS) from the following:

Code	Module Title	ECTS	Type
COMP6241	Advanced Topics in Human-Systems Interaction	7.5	Optional
COMP6207	Algorithmic Game Theory	7.5	Optional
COMP6209	Automated Code Generation	7.5	Optional
COMP6244	Cloud Applications	7.5	Optional
ELEC6242	Cryptography	7.5	Optional

COMP6237	Data Mining	7.5	Optional
COMP6219	Designing Usable and Accessible Technologies	7.5	Optional
COMP6201	E-Business Strategy	7.5	Optional
COMP6203	Intelligent Agents	7.5	Optional
COMP6246	Machine Learning Technologies (MSc)	7.5	Optional
COMP6239	Mobile Applications Development	7.5	Optional
COMP6230	Network and Web Based Security	7.5	Optional
COMP6214	Open Data Innovation	7.5	Optional
COMP6215	Semantic Web Technologies	7.5	Optional
COMP6236	Software Security	7.5	Optional
COMP6218	Web Architecture	7.5	Optional
COMP6205	Web Development	7.5	Optional

Progression Requirements

The programme follows the University's regulations for *Progression, Determination and Classification of Results : Undergraduate and Integrated Masters Programmes* and *Progression, Determination and Classification of Results: Postgraduate Master's Programmes* as set out 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 – you will have a personal tutor whom you can meet on request for advice on your programme and choice of options, or for pastoral support
- ☐ The ECS Student Advisory Team who provide additional pastoral support
- ☐ ECS computer workstations, with a range of manuals and books
- ☐ Specialist project laboratories
- ☐ Personal email account and web access, including use of on-line collaboration tools
- ☐ Helpdesk (programming advisory)
- ☐ Post-graduate demonstrators who provide additional support for your design projects
- ☐ A web-site for each taught module, typically with teaching materials – these are also available, where appropriate, off-line on CD- ROM or as printed notes

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:

- Completing student evaluation questionnaires for each module of the programme.
- 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 Facultyv 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 that are monitored by the Faculty.
- Programme validation, normally every five years.
- External examiners, who produce an annual report.
- Professional body accreditation/inspection.
- A national evaluation of research – which is relevant since 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](#).

Career Opportunities

Graduates from our MSc programme are employed worldwide in development and consultancy roles in a number of leading companies at the forefront of information technology; and 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 like IBM, ARM, Microsoft Research, Imagination Technologies, Nvidia, Samsung and Google to name a few. Visit our careers hub for more information.

External Examiner(s) for the programme

Name: Professor Russell Beale - University of Birmingham

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	<p>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.</p> <p>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.</p>
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.