Programme Specification

MSc Internet of Things (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	None
Final award	Master of Science (MSc)
Name of award	Internet of Things
Interim Exit awards	Postgraduate Certificate in Higher Education
	Postgraduate Diploma in Higher Education
FHEQ level of final award	Level 7
UCAS code	N/A
Programme code	8310
QAA Subject Benchmark or other external reference	Master's Degree Characteristics 2016
Programme Lead	Basel Halak (bh1m10)

Programme Overview

Brief outline 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 IoT systems and related aspects of electronic engineering and computer science
2) Integrate knowledge and handle complexity in this area of computer science and electronic engineering, 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

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

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Assessment

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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

Programme Learning Outcomes

Knowledge and Understanding

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

A1. The scientific and engineering principles underpinning embedded IoT systems, including embedded software development, networking, security, and system architecture/design

A2. Advanced concepts in specialist areas of IoT, such as wireless communications, applications development, embedded systems, data science, and signal processing

A3. Techniques, technologies and tools used in these areas

A4. Methods of design, analysis, realisation and evaluation used in these areas

A5. Applicable methods of research and enquiry

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 programme 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.ts.

Subject Specific Intellectual and Research Skills

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

B1. Specify, design and realise embedded IoT computing systems with attention to a wide range of outcomes, including technical, practical, efficiency and security

B2. Test and evaluate the performance of such systems

B3. Analyse IoT requirements to determine appropriate methods of design, testing and evaluation

B4. Find, read, understand and explain literature related to advanced and specialised areas of embedded IoT systems, including scientific publications, industrial documentation, standards, ethical, legal and environmental guidance

B5. Plan and manage a research project involving an advanced and specialised IoT systems, using appropriate state of the art techniques, technologies and/or tools.

Teaching and Learning Methods

B1-B4: Most modules consist of a combination of lectures, small group teaching, and practical work including advanced design and analysis tools, directed reading and coursework assignments, which can include a literature review. B4, B5: 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 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, and follow relevant guidelines to address these issues

Teaching and Learning Methods

A number of modules have a significant coursework element. This can range from design work through to presentations resulting from directed reading. The individual project includes independent research, project management and report writing.
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 Project Preparation module.

Assessment Methods

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 tools for the design, realisation and analysis of embedded IoT systems

Teaching and Learning Methods

Most modules include practical work, involving use of industry-standard specialised tools for the design, realisation and analysis of electronic systems and devices.

Assessment Methods

Assessment is based on coursework in the form of technical reports, device designs and realisation, 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

This programme consists of eight taught modules, each worth 7.5 ECTS (15 CATS) credit points and an individual research project worth 30 ECTS (60 CATS) credit points. In semester 1, three compulsory modules cover core material for Internet of Things. In the compulsory semester 2 module Project Preparation you will undertake appropriate preparatory study for your research project, and you will also examine ethical and legal issues around professional practice. Four optional modules can be selected to tailor the programme to your interests.

You will be given generic and individual advice to help you make an appropriate selection of optional modules, based on your background and interests. You can take optional modules in any combination but you should seek advice from the programme leader to identify modules that suit your academic background. Your contact hours will vary depending on your module/option choices. Full information about contact hours is provided in individual module profiles.

Most of the modules are shared with our Master of Engineering programmes in Electronics and in Computer Science. 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 MEng and MSc cohorts; the class size depends on cohort size, which varies from year to year.

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 those specified as compulsory for the MSc programme. Examinations are held in January.

Semester 2:
Four modules, including those specified as compulsory for the MSc programme. Examinations are held in May/June.

Summer/Semester 3:
You will undertake a research project lasting 14 weeks, which is assessed by a 15,000 word dissertation.

The programme structure, including the compulsory and optional modules for each semester, is summarised below.

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SEMESTER 1 - select one optional module

ELEC6237 - compulsory
ELEC6254 - compulsory
ELEC6255 - compulsory
ELEC6203 - optional
COMP6235 - optional

SEMESTER 2 - select three optional modules

ELEC6211 - compulsory
ELEC6212 - optional
ELEC6234 - optional
ELEC6242 - optional
ELEC6253 - optional
COMP6211 - optional
COMP6214 - optional
COMP6239 - optional

SUMMER

COMP6200 - core
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Part I Compulsory

Code	Module Title	ECTS	Type
ELEC6254	Foundations of Embedded IoT Systems	7.5	Compulsory
ELEC6255	IoT Networks	7.5	Compulsory
ELEC6211	Project Preparation	7.5	Compulsory
ELEC6237	Secure Hardware and Embedded Devices	7.5	Compulsory

Part I Core

Code	Module Title	ECTS	Type
COMP6200	MSc Project	30	Core

Part I Optional

Code	Module Title	ECTS	Type
ELEC6212	Biologically Inspired Robotics	7.5	Optional
COMP6211	Biometrics	7.5	Optional
ELEC6242	Cryptography	7.5	Optional
ELEC6234	Embedded Processors	7.5	Optional
COMP6235	Foundations of Data Science	7.5	Optional
ELEC6253	Machine Learning for Wireless Communications	7.5	Optional
ELEC6203	Microsensor Technologies	7.5	Optional
COMP6239	Mobile Applications Development	7.5	Optional
COMP6214	Open Data Innovation	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.

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:

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 leading companies at the forefront of technology; indeed large electronics companies such as Samsung, Panasonic and Sony have moved into healthcare markets. 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

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.