Programme Specification

MSc Data Science (2017-18)

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	Electronics and Computer Science
	University of Southampton
	Highfield Campus
Mode of Study	Full Time
Duration in Years	1 Year
Accreditation details	N/A
Final award	Master of Science (MSc)
Name of award	Data Science
Interim Exit awards	Postgraduate Diploma (PgDip)
	Postgraduate Certificate (PgCert)
FHEQ level of final award	Level 7
UCAS code	N/A
QAA Subject Benchmark or other external reference	The UK Quality Assurance Agency's Framework for Higher Education Qualifications (FHEQ) and Subject Benchmark Statement (Computing Masters)
	The BCS Accreditation Guidelines
	The IET Learning Outcomes Handbook
	The Engineering Council UK-SPEC
Programme Lead	Elena Simperl
Date specification was written	10/06/2015
Date Specification last updated	07/12/2017

Programme Overview

Brief Outline of the Programme

This programme prepares students to become data scientists. It gives them the opportunity to further their specialist knowledge in those subjects of Computer Science and Engineering that are crucial for mastering the vast and ever-so-complex information landscape that is characteristic to modern, digitally empowered organizations. This is typically linked to a number of core areas of expertise, from the ability to operate high-performance computing clusters and cloud-based infrastructures, to the know-how that is required to devise and apply sophisticated Big Data analytics techniques, and the creativity involved in designing powerful visualizations. The programme targets primarily students with a first degree in computing (or a closely related degree covering fundamental notions of programming or data analysis) and builds on successful pre-existing specialist masters at ECS. The modules cover state-of-the-art techniques, technologies, and supporting tools, and expose students to their applications in meeting emerging business needs and ambitious societal problems. Application areas include: data journalism, open government, finances, and social media. The programme will offer a range of options for students to choose from across these areas in order to allow them to build their own degree in a flexible way and to best match their strengths and interests. Given the broad and evolving nature of the Data Science field we may consider expanding the current scope of the programme into specialist methods and application scenarios in collaboration with colleagues from the Southampton Business School,Mathematics, or Computational Modelling

There are three compulsory modules in the first semester and one in the second semester, as well as a well-balanced selection of optional modules for both semesters.

In the first semester we start with a review of key topics in Data Science designed to resolve the inevitable variety of background knowledge and to build a cohort with a strong ethos of collaborative working. The course will

introduce the core theoretical and technology components required to design and use a Data Science application, using open-source tools and openly accessible data sets. A second compulsory module in the first semester will cover the most important machine learning techniques, which are at the core of any attempt to analyse and reason about data. Finally, a new module on Data Visualization will introduce the most common types of visualization techniques and state-of-the-art technology used to build graphic elements into Data Science applications to present analytics results. Together this set of three compulsory modules in the first semester will ensure that students will be familiarized with methods, techniques, and tools that cover the entire data management lifecycle, from the collection and manipulation of the data to its analysis and use. This will also allow students to take an informed decision about their MSc project dissertation as by the beginning of the second semester they have already acquired the set of essential skills and knowledge that is needed to understand the full range of Data Science topics.

In the second semester the focus will be on the preparation of the student project, aiming to enhance their dissertation writing skills through the creation of a rigorous and peer reviewed project proposal. This is the forth compulsory module of the programme.

Finally, during the summer the MSc project enables gives students the chance 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.

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.

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

Educational Aims of the Programme

The aims of the programme are to:

a) Provide you with advanced knowledge of data science topics and specialist areas such as data mining, machine learning, and data visualization, including state of the art techniques, programming toolkit, and industrial and societal application scenarios.
b) Develop your research and design skills applicable to a career as a data scientist in industry or academia.
c) Stimulate your interest in the numerous applications of data science, including social media, business intelligence, Big Data, Open Government Data, financial management, and data journalism, and develop your ability to act as an ambassador for the subject.

Programme Learning Outcomes

Knowledge and Understanding

Having successfully completed this programme you will be able to demonstrate knowledge and understanding of:

- A1: Key concepts of data science
- A2: Advanced concepts in specialist areas of data science, including data manipulation and analysis, as well as data visualization and use.
- A3: State of the art techniques, technologies, and tools used in these areas, including a core data scientist programming toolkit
- A4: Methods of software design, development and testing used in the specialist areas mentioned under A2
- A5: Applicable methods of research and enquiry within the discipline

Teaching and Learning Methods

- A1 to 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 in ECS. Small group teaching, including all practical work and the individual project accommodate different learning styles.

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 and programming exercises, and individual and small-group projects.

Subject Specific Intellectual and Research Skills

Having successfully completed this programme you will be able to:
- B1: Conceptualize and design advanced and specialized data science solutions using the methods and tools taught in the program
- B2: Test, evaluate, and maintain such solutions
- B3; Analyse problems to determine appropriate algorithms, methods, techniques, and software tools which could be used to solve them.
- B4: Find, understand, and explain literature related to the main areas of the data science, including textbooks, scientific publications, software documentation and industry white papers, standards, as well as ethical, legal, and environmental guidance.
- B5: Formulate, implement, and evaluate a research project expanding on the methods, techniques, programming tools, and application scenarios taught in the program.

Teaching and Learning Methods

- B1 to B4: 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 in ECS. Small group teaching, including all practical work and the individual project accommodate different learning styles. One-on-one tutorial can support full-class lectures, when required.
- B4: The project preparation module and the MSc dissertation include a strong literature and peer review component.
- B5: The project dissertation will be supervised by a primary and a secondary supervisor from ECS, using similar methods as for MSc Computer Science.

Assessment Methods

- B1 to 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 and programming exercises, and individual and small-group projects.
- In addition, B4 will be assessed as part of the project preparation module, using assessment criteria related specifically to literature survey and peer review skills.
- B5 focuses on assessing research, method design, as well as programming skills.

Transferable and Generic Skills

Having successfully completed 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 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

- A number of courses have a significant coursework element. This can range from method design work through to presentations resulting from directed reading. The individual project includes independent research, project management, including time and risk management, literature search and review, and report writing.
- C1 to C3: Most modules include small group teaching, practical work with lab partners, directed reading and coursework that requires literature review. 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 MSc project, as well as some coursework includes independent research and report writing.
- C5: These skills will be covered in the compulsory taught modules.

Assessment Methods

- Coursework is generally assessed through written reports or computer code. The individual project is assessed by a dissertation of 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 (optional)

Having successfully completed this programme you will be able to:

- D1: Use specialist software tools for data storage, analysis and visualization

Teaching and Learning Methods

- D1: Practical work involving the use of such tools and programming exercises

Assessment Methods

- D1: Coursework in form of reports and programmed code, as well as MSc dissertation

Disciplinary Specific Learning Outcomes (optional)

n/a

Graduate Attributes (not required for PG programmes)

n/a

Programme Structure

Typical Course Content

The program consists of four compulsory modules spread across two semesters, each worth 7.5 ECTS, and an individual project worth 30 ECTS. The compulsory modules cover data analysis and use, as well as project preparation; they add up to 30 ECTS. You can also choose from a wide range of optional topics, including advanced topics of data processing and manipulation, data mining, and data use, and applications, allowing you to structure the program according to your strengths and preferences. These optional modules should add up to a minimum of 30 ECTS. 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.

Special Features of the Programme

This is one of the few programmes in the UK that teaches the full spectrum of topics required to become a skilled data scientist in industry, academia, or government. Southampton is recognised to be internationally

leading in many topics that are part of the curriculum, and specialist modules will be taught by staff involved in cutting-edge research. Students will be exposed to the most up to date insights and achievements in the field, while becoming acquiring solid knowledge and skills in understanding, using, and further developing state-of-the-art techniques and tools of industrial relevance. The students will be familiarized with a fully-fledged Data Science toolkit that will allow them to run projects and design applications in this space.

Programme Details

The programme consists of compulsory and optional modules from ECS (see table below). Most modules are shared with existing MSc programs. All compulsory modules are at Level 7 (Masters). Two optional modules are at Level 6. MSc students are already registered to these modules and assessment methods have been adjusted accordingly. As there are a large number of optional topics, students will be given generic and bespoke advice to help them make an appropriate selection, based on their background and interests.

The following describes the regular pattern of study of a full-time student, completing the programme within 12 calendar months:

- Semester 1: 3 compulsory modules, as well as an optional module. Examinations are held in January. Exit: Postgraduate certificate.
- Semester 2: 1 compulsory module, plus other optional modules in the three categories mentioned in the table below. Examinations are held in May/June. Exit: Postgraduate diploma
- Summer: MSc project lasting 14 weeks, assessed by a 15,000 words dissertation. Pass: MSc Data Science

The table below gives an overview of the structure of the foreseen programme, distinguishing between compulsory and optional courses. The great majority of the modules are already available.

There are two new modules, on 'Foundations of data science' and 'Data visualization', respectively. The first will introduce students to the data scientist toolkit and the underlying core concepts. It will cover the full technical pipeline from data collection (sampling methods, crawling) to processing and basic notions of statistical analysis and visualization. The module will also include advanced topics in high-performance computing, including non-relational databases and MapReduce. By taking this course the students will be provided with the basic toolkit to work with data (CSV, R, MongoDB, D3). To support these learning objectives, the coursework will include exercises and a group project in which students will use existing open data sets and build their own application. This teaching concept has been successfully used at the Web Science summer school organized by WAIS in July 2014. The programme can be found at http://www.summerschool.websci.net/. As part of the summer school, which was taught by WAIS staff and external tutors, we produced learning materials (slides, video tutorials, exercises) which could be used for the development of the two new modules.

The second module is about visualization design and technology. It will teach students the different strategies for visual design, as well as techniques they can apply to create their own visualizations given particular constraints and requirements imposed by the type of audience, task, and data. Given the popularity of Data Science and visualization among scientists and practitioners, both courses might be interesting and useful additions to existing undergraduate and MSc programmes.

Course development will also be supported through the European research project EDSA 'European Data Science Academy (2.7 million € funding, start in February 2015), in which WAIS has a leading role. The aim of this project is to implement high-quality courses about Data Science and its application to several verticals. While the MSc program has been designed to run independently, the results of the EDSA project will be used to further the student experience.

Compulsory modules			
Module number	Module title	Semester	ECTS
COMP6235	Foundations of data science	1	7.5
COMP6229	Machine learning (MSc)	1	7.5
COMP6234	Data visualization	1	7.5
			22.5
ELEC6211	Project preparation	2	7.5
			7.5
COMP6200 (Core)	MSc project		30
			30

Optional modules

COMP3211	Advanced databases	2	7.5
COMP6215	Semantic Web technologies	2	7.5
COMP6237	Data Mining	2	7.5
COMP3212	Computational biology	2	7.5
COMP3207	Cloud application development	1	7.5
COMP6208	Advanced machine learning	2	7.5
COMP6216	Simulation modeling for Computer Science	2	7.5
COMP6231	Foundations of artificial intelligence	1	7.5
COMP6202	Evolution of complexity	1	7.5
COMP6203	Intelligent agents	1	7.5
COMP6207	Advanced intelligent agents	2	7.5
WEBS6201	Foundations of Web Science	1	7.5
COMP6212	Computational finance	2	7.5
COMP6217	The science of online social networks	2	7.5
COMP6214	Open data innovation	2	7.5
MATH6157	Applied statistical modeling	2	7.5
FEEG6003	Advanced computational modelling II	2	7.5

Additional Costs

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. Costs that students registered for this programme typically also have to pay for are included in Appendix 2:

Progression Requirements

The programme follows the University's regulations for *Progression, Determination and Classification of Results: Undergraduate and Integrated Masters Programmes* as set out in the University Calendar, and the ECS specific regulations which supplement these. The pass mark for MSc modules is 50%, and the regulations cover the progression criteria, referral, repeat, and resubmission arrangements, together with degree classification.

Intermediate Exit Points (where available)

You will be eligible for an interim exit award if you complete part of the programme but not all of it, as follows:

Qualification	Minimum overall credit in ECTS credits	Minimum ECTS Credits required at level of award
Postgraduate Diploma	at least 60 ECTS	at least 45 ECTS
Postgraduate Certificate	at least 30 ECTS	at least 20 ECTS

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. Students can also access SVE (Southampton Virtual Environment), a virtual Windows University of Southampton desktop that can be accessed from personal devices such as PCs, Macs, tablets and smartphones from any location.
- 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.
- Central IT support is provided through a comprehensive website, telephone and online ticketed support and a dedicated helpdesk in the Hartley Library foyer
- Enabling Services offering assessment and support (including specialist IT support) facilities if you have a disability, dyslexia, mental health issue or specific learning difficulties
- 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 Destinations, 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
- a range of personal support services : mentoring, counselling, residence support service, chaplaincy, health service
- 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, including infrastructure for large-scale data analysis
- Personal email account and Web access, including the use of online collaboration tools
- Helpdesk (programming advisory)
- Post-graduate demonstrators who provide additional support for your design projects
- A Web site for each taught module, including a summary of the learning objectives, teaching materials and related reading.

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 feedback 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:

- Module and programme reports which are monitored by the Faculty according to university guidelines
- Programme validation, normally every five years.
- External examiners, who produce an annual report
- A national Research Assessment Exercise (our research activity contributes directly to the quality of your learning experience)
- Institutional Review by the Quality Assurance Agency

Criteria for Admission

The University's Admissions Policy applies equally to all programmes of study. The following are the typical entry criteria to be used for selecting candidates for admission. The University's approved equivalencies for the requirements listed below will also be acceptable.

Undergraduate programmes

Qualification	Grades	Subjects required	Subjects not accepted	EPQ Alternative offer (if applicable)	Contextual Alternative offer (if applicable)
GCE A level					
GCSE					
BTEC					
International Baccalaureate					
European Baccalaureate					

Postgraduate programmes

Qualification	Grade/GPA	Subjects requirements	Specific requirements
Bachelor's degree	2:1 Honours	Good base of computing modules at 2.1 level ideal, programming languages, databases, artificial intelligence, Web technologies, machine learning, statistics	
Master's degree			

Mature applicants
Applications from mature students (over 21 years in the October of the year of entry) are welcome. Applications will be considered on an individual basis.

English Language Proficiency

Overall 6.5	Reading 6.0	Writing 6.0	Speaking 6.0	Listening6.0

Career Opportunities

What is a 'Data Scientist'?

Data scientists help organisations handle and manage the large amounts of data being produced, released and opened up online thanks to digital technologies. With the ability to generate insights from huge datasets, data scientists can discover stories and phenomena that may otherwise remain hidden, potentially creating opportunities for an organisation to improve, economise or investigate further. Harvard Business Review described the role as 'The Sexiest Job of the 21st Century" due to the rare combination of qualities and skills that a trained data scientist possesses.

What jobs does a data scientist do?

Data science has seen an unparalleled expansion in virtually every sector of the economy. As the data-driven economy continues to grow, increasing numbers of organisations require skilled professionals who are capable of handling large datasets to produce valuable insights. Additionally, positions requiring managers who can utilise the resulting analysis to make impactful decisions are becoming increasingly common.

From analysing social data at top companies like Facebook and LinkedIn, to working in areas such as financial services, clinical trials and climate change, there is a wide range of potential jobs available. Graduates from our MSc program are employed worldwide in development, analyst, and consultancy roles in leading companies at the forefront of information technology as well as in many data intensive industries. The program provides an excellent opportunity for entry into the data sciences or similar fields – such as big data, open data, and careers in the following industries would all be suitable:

- Established companies with large quantities of organisational or customer-oriented data looking to spot trends in sales, marketing or operations.
- Start-up companies based around new opportunities to take advantage of the booming data-driven economy;
- Government departments looking to utilise increased amounts of open data to gain crucial insights that can affect policy at the highest levels;
- Research and consultancy companies looking to analyse data and feed these discoveries back to the wider community, as well as to provide training and specialist services to clients.

A data scientist's prospects

The demand for staff working with big data is predicted to rise by 92% over the 5 years from January 2013[1], with the positions advertised in 2013 seeking developers (43%), architects (10%), consultants (10%), analysts (7%) and administrators (5%)[2]. In the UK, big data positions offer a median salary of £55,000 – 24% higher than that for IT staff in general[3]. There are also academic possibilities for doctoral study and academic careers, as there are for entrepreneurial careers.

ECS runs a dedicated careers hub with is affiliated with more than 100 renowned companies such as IBM, ARM, Microsoft, Samsung, and Google. Visit our careers hub for more information.

External Examiners(s) for the Programme

Name Professor John Domingue
Institution. Open 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:

[1] http://www.sas.com/reg/gen/uk/eskills-big-data-report
[2] http://www.e-skills.com/research/research-themes/big-data-analytics/
[3] http://www.e-skills.com/research/research-themes/big-data-analytics/

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 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 (or other appropriate guide) or online at http://www.fpse.soton.ac.uk/student_handbook
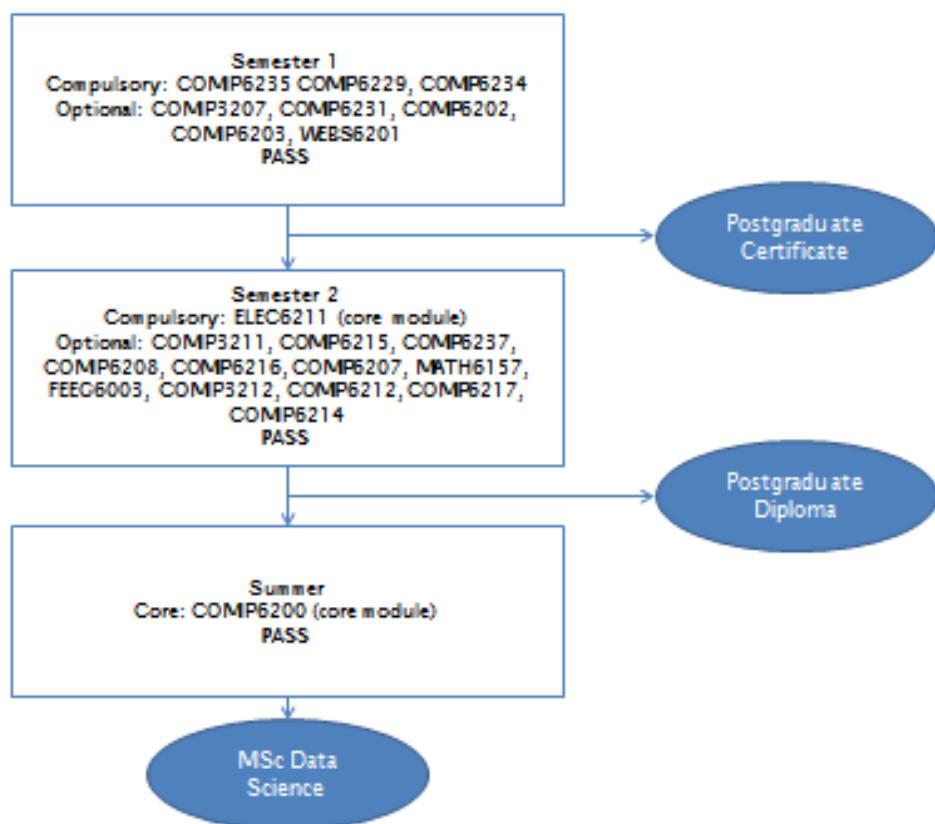
Appendix: 1

Learning Outcomes

Module code	Module title	Knowledge & understanding					Intellectual skills					Transferable & practical skills					Subject specific skills
		A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1
Compulsory modules																	
Semester 1																	
COMP6235	Foundations of data science	X	X	X	X		X	X	X			X	X	X			X
COMP6229	Machine learning	X	X	X	X		X	X	X								X
COMP6234	Data visualization	X	X	X	X		X	X	X			X	X				X
Semester 2																	
ELEC6211	Project preparation (core module)	X				X		X	X	X		X	X		X	X	
Summer																	
COMP6200	MSc project (core module)	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
Optional modules																	
Data processing and manipulation			X	X	X		X	X	X								X
COMP3211	Advanced databases																
COMP6215	Semantic Web technologies		X	X	X		X	X	X								X
COMP3207	Cloud application development		X	X	X		X	X	X					X			X
Data analysis																	
COMP6XXX	Data mining	X	X	X	X		X	X	X					X			X
COMP6208	Advanced machine learning		X	X	X		X	X	X			X					X
COMP6216	Simulation modeling for Computer Science		X	X	X		X	X	X								
COMP6231	Foundations of artificial intelligence		X	X			X		X	X		X	X	X			
COMP6202	Evolution of complexity		X	X	X		X	X	X	X							X
COMP6203	Intelligent agents		X	X	X		X	X	X	X		X	X	X			X
COMP6207	Advanced intelligent agents		X	X	X		X	X	X	X		X	X	X			X
MATH6157	Applied statistical modeling	X	X	X	X		X	X	X	X			X				X
FEEG6003	Advanced computational modelling II		X	X	X		X	X	X	X			X				X
Data use and applications																	
COMP3212	Computational biology		X	X	X		X	X	X				X				X
WEBS6201	Foundations of Web Science		X	X			X		X	X			X				
COMP6212	Computational finance		X	X	X		X	X	X								X
COMP6217	The science of online social networks		X	X	X		X		X			X	X	X		X	
COMP6214	Open data innovation		X	X	X		X	X	X	X		X	X	X		X	X

Assessment Methods

Compulsory modules		Assessment methods			
		Coursework 1	Coursework 2	Coursework 3	Exam/Final
Module code	Module title				
Semester 1					
COMP6235	Foundations of data science	Exercises 30%	Group project and presentation 70%		
COMP6229	Machine learning	Exercises 30%	Exercises 20%		2 hours 50%
COMP6234	Data visualization	Individual project 100%			
Semester 2					
ELEC6211	Project preparation (core module)	Literature review 40%	Project plan 30%	Poster 30%	
Summer					
COMP6200	MSc project (core module)	Dissertation 100%			
Optional modules					
Data processing and manipulation					
COMP3211	Advanced databases	DB programming exercise 25%			2 hours 75%
COMP6215	Semantic Web technologies	Ontology design 25%			2 hours 75%
COMP3207	Cloud application development	Individual assignment 33%	Group assignment 67%		
Data analysis					
COMP6237	Data mining	Group project 30%	Application 20%		2 hours 50%
COMP6208	Advanced machine learning	Report 33%			2 hours 67%
COMP6216	Simulation modeling for Computer Science	Modeling project 75%	Individual project 15%		
COMP6231	Foundations of artificial intelligence	Search methods 35%	Group presentation 15%		1.5 hours 50%

COMP6202	Evolution of complexity	Reimplementation of algorithm from literature 50%			1.5 hours 50%
COMP6203	Intelligent agents	Trading agents competition 40%			1.5 hours 60%
COMP6207	Advanced intelligent agents	TBD, 25%			75%
MATH6157	Applied statistical modeling	TBD, 50%	TBD, 50%		
FEEG6003	Advanced computational modelling II	Computing exercises, 35%	Computing exercises, 35%	Presentation 30%	
Data use and applications					
COMP3212	Computational biology	Short assignment, 30%	Major assignment, 40%	Three quizzes, 30%	
WEBS6201	Foundations of Web Science	Essay 50%	Blog 50%		
COMP6212	Computational finance	Labs 100%			
COMP6217	The science of online social networks	Group project 40%			2 hours 60%
COMP6214	Open data innovation	Infographics and interaction 20%	Innovation pitch 30%	Application 30%	

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│                 Semester 1                    │
│  Compulsory: COMP6235 COMP6229, COMP6234      │
│  Optional: COMP3207, COMP6231, COMP6202,      │
│           COMP6203, WEBS6201                   │
│                   PASS                         │
└─────────────────────────────────────────────┘
                    │
                    │──────────────────────────────→  ( Postgraduate Certificate )
                    ↓
┌─────────────────────────────────────────────┐
│                 Semester 2                    │
│      Compulsory: ELEC6211 (core module)       │
│  Optional: COMP3211, COMP6215, COMP6237,      │
│  COMP6208, COMP6216, COMP6207, MATH6157,      │
│  FEEG6003, COMP3212, COMP6212, COMP6217,      │
│           COMP6214                             │
│                   PASS                         │
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                    │──────────────────────────────→  ( Postgraduate Diploma )
                    ↓
┌─────────────────────────────────────────────┐
│                   Summer                      │
│       Core: COMP6200 (core module)            │
│                   PASS                         │
└─────────────────────────────────────────────┘
                    │
                    ↓
            ( MSc Data Science )
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Appendix 2:

Additional Costs

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 typically also have to pay for the items listed in the table below.

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.

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
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.
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.
T**extbooks**		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.
Equipment and Materials Equipment	Art Equipment and Materials: Drawing paper; painting materials; sketchbooks	
	Art Equipment and Materials: Fabric, Thread, Wool	
	Design equipment and materials:	
	Excavation equipment and materials:	
	Field Equipment and Materials:	
	Laboratory Equipment and Materials:	
	Medical Equipment and Materials: Fobwatch; stethoscopes;	

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
	Music Equipment and Materials	
	Photography:	
	Recording Equipment:	
IT	Computer Discs	
	Software Licenses	
	Hardware	
Clothing	Lab Coats	
	Protective Clothing: Hard hat; safety boots; hi-viz vest/jackets;	
	Fieldcourse clothing:	
	Wet Suits?	
	Uniforms?	
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.
Fieldwork: logistical costs	Accommodation:	
	Insurance	
	Travel costs	
	Immunisation/vaccination costs	
	Other:	
Placements (including Study Abroad Programmes)	Accommodation	
	Insurance	
	Medical Insurance	
	Travel costs	
	Immunisation/vaccination costs	
	Disclosure and Barring Certificates or Clearance	
	Translation of birth certificates	
	Other	
Conference expenses	Accommodation	
	Travel	
Optional Visits (e.g. museums, galleries)		
Professional Exams		
Parking Costs		
Anything else not covered elsewhere		

Revision History

1. Update to Support and Student Learning, IT Services - June 2015
2. Update to Language Requirements - June 2015
3. Approved by ECS Education Committee - 10 June 2015
4. Update to Programme Overview (CMA Changes) – 24 August 2015
5. Update to Programme Overview (CMA Changes) – 14 September 2015
6. 2016-17 FPC Approval – 24 February 2016
7. Optional Module Viability added – 07 December 2016
8. FPC approval for 2017/18 – 08 March 2017
9. FPC approval of optional module size caveat – CQA team, 07 December 2017