UNIVERSITY OF LEICESTER

Programme Specification (Postgraduate)

Date amended: March 2017

1. Programme Title(s):

MSc and Postgraduate Diploma and Postgraduate Certificate in

- Advanced Computer Science (ACS)

MSc and Postgraduate Diploma

- Advanced Computational Methods (ACM)
- Advanced Distributed Systems (ADS)
- Agile Software Engineering Techniques (SET)
- Web Applications and Services (WAS)
- Advanced Software Engineering (ASE)

MSc in:

- Advanced Computational Methods (ACM) with Industry
- Advanced Computer Science (ACS) with Industry
- Advanced Distributed Systems (ADS) with Industry
- Agile Software Engineering Techniques (SET) with Industry
- Web Applications and Services (WAS) with Industry
- Advanced Software Engineering (ASE) with Industry

2. Awarding body or institution:

University of Leicester

3. a) Mode of study

Full-time

b) Type of study

Campus Based

4. Registration periods:

a) MSc October Intake

The normal period of registration is 12 months

The maximum period of registration is 24 months

b) January Intake

The normal period of registration is 16 months

The maximum period of registration is 28 months

c) MSc with Industry October Intake

The normal period of registration is 21 months

The maximum period of registration is 33 months

d) MSc with Industry January Intake

The normal period of registration is 24 months

The maximum period of registration is 36 months

5. Typical entry requirements:

The same entry requirements that apply to all MSc programmes in Computer Science apply. Specifically, candidates should have, or expect to gain, at least a good second class honours BSc degree or qualification of equivalent standard recognised by the University in a subject with a substantial element of Computing. Applicants for the “with Industry” variant should have or expect

to gain at least a very good second class honours BSc degree or qualification of equivalent standard recognised by the University in a subject with a substantial element of Computing. Because applications are treated on an individual basis, alternative qualifications may be considered especially in the case of candidates with relevant work experience. Alternative qualifications are usually considered when a student holds an acceptable degree, but in a slightly different subject area and has through work experience moved into a field relevant for the programme they have applied for. In this case we would expect the experience to be significant (several years) and expect the candidate to provide details about this experience (e.g. details of the job they have been conducting in Industry) in addition to evaluating employer's statements for evaluation by the admissions team. Where English is not the first language of the candidate, the successful applicant must have IELTS 6.0.

6. Accreditation of Prior Learning:

n/a

7. Programme aims:

The general aims of the programme leading to a PG Cert in Advanced Computer Science are to:

- Develop a deep understanding of the nature and impact of current challenges faced by the IT industry, so that students know what is expected from them as mature professionals.
- Develop an awareness of the methodologies and technologies that are available within computer science to address these challenges, so that students can evaluate and analyse specific situations and make informed choices.
- Foster confidence, convey knowledge and develop practical skills in the use of some of these technologies, including both fundamental concepts and state-of-the-art support tools.
- Encourage students to develop their interpersonal, communication, decision-making, and problem-solving skills, and to use these in an imaginative way.

The programmes leading to an MSc have the following additional aims:

- Provide experience of both team-based and individual project work.
- Secure knowledge and research skills so that students are able to take their studies further to do a PhD, in case they complete the full MSc.

Further, each of the programmes (apart from ACS) has more focused specific aspects:

- ACM aims to train students in the design, analysis and engineering of algorithms, covering their use for modelling real-world problems in areas such as bioinformatics, networking or distributed computing.
- ADS aims to train students in new methods, architectures and design techniques for software systems able to operate, with guaranteed levels of quality of service, across heterogeneous and distributed platforms while relying on networks that cannot always be trusted.
- SET aims to train students in development methods, processes and technologies that support the development of software suitable for today's dynamic (business) environments.
- WAS aims to train students in the design, analysis and engineering of the new generation of web-based globally distributed systems.
- ASE aims to train students in development methods and processes that address key challenges that companies are facing for competing in the volatile markets of today: How to generate applications from high-level business models to reduce time-to-market and development costs? How to evolve legacy systems and promote business processes in an economy dominated by the need to offer and integrate, on demand, new services?

In addition to the aims above, the "with Industry" variant of the programme aims to:

- Enable first-hand experience of the requirements, opportunities and modes of operation of the programme related software engineering and computer industry;

- Place students on challenging and relevant industrial placements;
- Enable students to use and develop the knowledge and skills gained during the taught part of the programme;
- Develop students' career management and development skills.

8. Reference points used to inform the programme specification:

- QAA Benchmark Computing (2011)
- QAA Frameworks for Higher Education Qualifications in England Wales and Northern Ireland
- QAA Master's Degree Characteristics
- PDR report (January 2010)
- University Learning Strategy
- University Employability Strategy
- Graduate Survey (2014)
- First Destination Survey
- External Examiner's Reports

9. Programme Outcomes:

Students undertaking the MSc or PG Diploma will engage with a broader range of subjects than those studying towards the PG Cert. MSc students are undertaking an individual project, which will require much deeper exploration and application of the learned skills than they would demonstrate in the PG Cert or PG Diploma. (MSc) and (PGDip) in the table below will indicate the LOs, methods and demonstration for aspects specific to the MSc or PG Diploma Programmes.

Learning Outcomes	Teaching Methods Subject and Professional Skills	How Demonstrated
Knowledge		
Demonstrate knowledge and mastery of a [wide (MSc)(PGDip)] range of advanced computer science subjects and the way they relate to IT practice. Integration of knowledge across subjects.	Independent research (MSc), lectures, and the seminar/discussion groups that are part of the Personal and Group Skills module.	Written examinations, oral presentations, participation in group discussions, essays/demos, project planning and dissertation (MSc).
Demonstrate understanding of the core elements of industrial practice and organisation ("with Industry").	Work placement.	Work placement report.
Concepts		
Demonstrate enhanced grasp of principles of computer science methodology and technology.	Independent research, lectures, seminars, group-discussions.	Written examinations, assessed coursework, group essays, oral presentations, dissertation (MSc) and reports.

Techniques		
Master advanced modelling and design techniques for the development of distributed, software intensive, and web-based systems. Engineer and follow software development processes, make use of model-based techniques, target service-oriented architectures.	Independent research, lectures, seminars, group-discussions, along with laboratory work and individual project (MSc). As above.	Written examinations, assessed coursework, group essays, oral presentations, dissertation (MSc) and reports. As above.

Learning Outcomes	Learning and Teaching Methods	How Demonstrated
Techniques		
Use problem-solving techniques, and select and apply suitable technologies in different application areas. Apply current technologies in distributed systems engineering.	As above. As above.	As above. As Above.
Master research methods and project planning techniques (MSc). Work as a Computer Scientist and Computer Engineer in an industrial or commercial setting ("with Industry").	Personal and Group Skills module, and individual project (MSc). Work placement	Individual project components (MSc); group discussions and essays. Work placement report.
Critical analysis		
Apply understanding of concepts and techniques with independence, rigour & self-reflexivity. Critically appraise problem solutions, and project work. Demonstrate consideration of professional issues.	Independent research, lectures, Personal and Group Skills module, and individual project (MSc). As above.	Oral presentations, participation in group discussions, essays/demos, project plan, dissertation (MSc), and work placement report. As above.
Presentation		
Organise research material and/or technology demonstration; distinguish between relevant and non-relevant material; write-up and deliver oral reports on findings to a professional standard; engage in scientific discussion with peers. These aspects are explored in more depth and with greater rigour by students studying for the MSc or PGDip.	Lectures, seminars, group discussions. Personal and Group Skills module. Work placement.	Oral presentations, participation in group discussions, essays/demos, project plan, and dissertation (MSc).
Appraisal of evidence		
Analyse and assess a variety of requirements for system development and/or engineering. Assess the relevance and quality of proposed methods, techniques and technologies. Mount (PGDip, MSc) and sustain (MSc) an independent level of inquiry at an advanced level.	Independent research, lectures, seminars, group-discussion, and the Personal and Group Skills module.	Oral presentations, participation in group discussions, essays/demos, project plan, and dissertation (MSc).

Learning Outcomes	Learning and Teaching Methods	How Demonstrated
Transferable		
Communication		
Respond to scientific questions with accurate and concise answers. Demonstrate fluent and sustained scientific and technical communication.	Lectures, seminars, moderated group discussions, and individual project supervision (MSc). Workshops delivered by the Student Learning Centre. Work placement.	Group discussions and individual project presentations, individual project oral examinations (MSc), work placement presentation.
Write concise and accurate summaries of scientific knowledge, and solutions to problems, in a variety of different formats.	Lectures. Detailed solutions provided in problem classes. Workshops delivered by the Student Learning Centre. Individual project supervision (MSc).	Written examinations, assessed coursework, group essay, intermediate individual project reports (MSc) and dissertation (MSc).
Produce properly structured, clear, advanced technical reports or dissertations (MSc).	As above.	Group essay. Intermediate individual project reports and dissertation (MSc).
Data		
Organise and present information gathered through research clearly and effectively using appropriate IT resources.	Independent research. Lectures. Workshops delivered by the Student Learning Centre. Work placement.	Oral presentations, essays/demos, work placement report, and dissertation (MSc).
Working		
Know how and when to draw on the knowledge & expertise of others; contribute and comment on ideas in syndicate groups.	Lectures. Group discussions and collective essay. Work placement.	Oral presentations, participation in group discussions, work placement report.
Research		
Conduct [significant (MSc, PGDip)] background research and literature surveys, organise and marshal evidence, report on findings, analyse complex ideas and construct [sophisticated (MSc)] critical arguments.	Project supervision (MSc). Seminars, group discussions, collective essay, and specific workshops delivered by the Student Learning Centre.	Collective essay, group discussions, and individual project reports and dissertation (MSc).
Managing		
Demonstrate independence and time management skills.	Tutor system. Career development workshop delivered by the Student Learning Centre.	Meeting coursework deadlines. Collective essay.
Identifying a credible research project, drawing up a realistic research time-table, reflecting on and 'writing up' results. Design a long-term personal career plan (MSc).	Project supervision (MSc).	Individual project topic choice and plan, intermediate reports and dissertation (MSc).

10. Special features:

Each course shares the compulsory Personal and Group Skills which combines attendance of seminars especially commissioned from speakers selected for their presentation skills and state-of- the-art research, group discussions and collective essay writing on topics selected for the seminars, as well as a series of workshops on transferable skills and career planning run by the Student Learning Centre of the university. This module forms a highly praised (by previous referees and the external examiners) component of the existing MSC offering in the department and is well liked by the students.

The department is research active in all areas covered by the programmes, which means that students will be able to benefit from the projects that are going on through special lectures, tutorials and discussions with national and international collaborators, as well as being able to conduct their projects in topics that are at the cutting edge of science and technology. The areas covered by the WAS and SET programmes are directly related to the specific research strength in the department, in the areas of Service Oriented Computing (Sensoria and in Context) and Agile Methods (Leg2Net, Segravis) where the department has a significant international recognition.

11. Indications of programme quality:

QAA subject review; external examiners report.

12. Scheme of Assessment

This programme follows the rules and procedures set by the University for postgraduate programmes. See: Senate Regulation 6 governing taught postgraduate programmes http://www2.le.ac.uk/offices/sas2/regulations/general-regulations-for-taught-programmes

Students on Advanced Computational Methods, Advanced Distributed Systems, Advanced Software Engineering, Agile Software Engineering Techniques or Web Applications and Service who only achieve sufficient credits for the award of a postgraduate certificate will not have met the Learning Outcomes for a PGCert in their named degree specialism and hence are only eligible for a PG Cert in Advanced Computer Science as an exit award.

13. Progression points

The programme will follow the standard University progression rules, as defined in the Scheme of Assessment. See: Senate Regulation 6 governing taught postgraduate programmes http://www2.le.ac.uk/offices/sas2/regulations/general-regulations-for-taught-programmes

In cases where a student has failed to meet a requirement to progress he or she will be required to withdraw from the course and a recommendation will be made to the Board of Examiners for an intermediate award where appropriate.

Additionally, students on the "with Industry" programme are subject to the following three rules:

1) If students do not achieve an overall merit level or fail exams at the end of their first taught semester they will revert to the degree without industry.
2) If students fail to acquire a placement they will revert to the degree without industry.
3) Failure to achieve satisfactory performance (attendance, participation and completion of set tasks) in the employability programme (modules CO7260 and CO7261) will lead to being moved to the degree without industry.

14. Rules relating to re-sits or re-submissions:

This programme follows the rules and procedures set by the University for postgraduate programmes. See Senate Regulation 6 governing taught postgraduate programmes http://www2.le.ac.uk/offices/sas2/regulations/general-regulations-for-taught-

programmes noting that resits may only be taken when the exam for the module to be resat is offered again. Resit examinations for modules examined in January are offered in the Midsummer exam period, and resit examinations for modules examined in the Midsummer exam period are offered in September.

15. Additional information [e.g. timetable for admissions]

Admissions are in September and January.

- Students admitted in September undertake their individual project during the summer of the following year and submit their dissertation in September (12 months in total).
- Students admitted in January start by following semester 2 modules and break during the summer; in September they follow semester 1 modules and start their project in the second half of February of the following year, submitting their dissertation at the end of May. Although this implies 16 months in total, only 12 are actually spent in the course.

Examinations are taken in January for first semester modules and in May/June for second semester ones. Additionally, "With Industry" programmes will be longer as the placement, which can be either of 3, 6 or 8 months length depending on the interest of the student and the placement that can be secured, is an integral part of the programme and hence adds the respective time to the programme length. Students will automatically be registered as if they were to take an 8 month placement and the length of study will be corrected when the placement is secured and the actual length of the placement is decided upon.

Students may transfer from this programme to other MSc programmes offered by the Department of Computer Science, with the permission of the programme director and under advice from their personal tutor until Week 2 of their first semester. Transfers should normally only take place when a student wishes to study modules that are not compatible with the specialisation chosen at registration or when the student wishes to take an individual project outside their specialization chosen at registration.

16. External Examiners

The details of the External Examiner(s) for this programme and the most recent External Examiners' reports can be found here.

Appendix 1: Programme structure (programme regulations)

In line with the other MSc offerings in the Department of Computer Science, there are three kinds of modules in the programmes. Details of the modules, including the semesters when they are delivered are shown in Table 1.

Personal and Group Skills (PGS) (15 credits)

This module is offered in both semesters and provides students with skills that are way up the value chain of any IT employer. Students attend a series of seminars given by researchers from universities or companies followed by group discussions moderated by a member of staff. Each group prepares a joint essay based on the seminar and the discussions. Students also attend workshops organised by the Student Learning Centre on topics like project planning, writing and presentation skills, as well as career management.

Taught Modules (105 credits)

Taught modules are taken to a total of 105 credits. The programme requires 60 credits of core modules, as indicated in Table 1 (with **C**). The remaining 45 credits are filled by selecting three more options from the remaining modules shown below, with up to 2 stemming from the Economics offering. This allows students to shape their profile to be either more management/ finance system oriented or be more technical – which in turn meets the spectrum of skills required in the market.

Optional modules are chosen, with the approval of the personal tutor, before the end of the second teaching week of each semester. Some optional modules may have pre-requisites (e.g. experience in certain programming languages or mathematical maturity) and, therefore, unadvisable to certain students. Any such pre-requisite will be explicitly stated in the corresponding module form available in the student's handbook.

Individual Project (60 credits)

Candidates entitled to proceed to a full MSc degree undertake, after examinations, an individual project on an approved topic according to the profile of each course, leading to the submission of a 15,000 word dissertation. The project is expected to contain some element of original work, and may involve informal collaboration with other organisations, subject to the previous approval of the project supervisor.

Employability Programme (with industry only, compulsory but non-credit bearing)
Candidates on with Industry variants of the programmes will be required to undertake study of two additional modules that equip them with skills and knowledge about the labour market and preparing them for applying for and undertaking placements. CO7260 and CO7261 are compulsory for 'with industry' students.

Table 1

Module Code	CO7002	CO7007	CO7090	CO7095	CO7096	CO7098	CO7099	CO7105	CO7200	CO7201	CO7205	CO7206	CO7220	CO7209	CO7210	CO7211	CO7212	CO7214	CO7215	CO7216	CO7217	CO7218	CO7219
Level	3	3	3	3	3	3	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
Credits	15	15	15	15	15	15	15	15	15	60	15	15	15	15	15	15	15	15	15	15	15	15	15
Semester offered	2	1	2	1	2	1	2	1	2		1	1	2	1	1+ 2	2	2	2	1	2	1	2	1
Module Title	Analysis and Design of Algorithms.	Communication and Concurrency.	Distributed Systems and Applications.	Software Measurements and Quality	Compression Methods for Multimedia	Web Technologies.	Cryptography and Information Security.	Advanced C++ Programming	Algorithms for Bioinformatics	Individual Project	Advanced System Design	System Re-engineering	Software Engineering for Sustainability	Software Reliability	Personal and Group Skills	Discrete Event Systems	Game Theory in Computer Science	Service-Oriented Architectures	Advanced Web Technologies	Semantic Web	Agile Cloud Automation	Financial Services Information Systems	Internet and Cloud Computing
ACM								**C**	**C**	✓					✓	**C**	**C**						**C**
ACS										✓					✓								
ADS										✓	**C**			**C**	✓	**C**		**C**					**C**
ASE				**C**						✓	**C**	**C**	**C**		✓			**C**					
SET										✓		**C**	**C**		✓			**C**			**C**		
WAS			**R**			**R**				✓	**C**				✓			**C**	**C**	**C**			

Programme Structure

MSc in Advanced Distributed Systems

September Entry:

SEMESTER 1

Core Modules		**Credits**
CO7205	ADVANCED SYSTEM DESIGN	15
CO7209	SOFTWARE RELIABILITY	15
CO7219	INTERNET AND CLOUD COMPUTING	15

Optional Modules

Either:

CO7210	PERSONAL AND GROUP SKILLS*	15

Or one selected from:

CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7007	COMMUNICATION AND CONCURRENCY	15
CO7098	WEB TECHNOLOGIES	15
CO7105	ADVANCED C++ PROGRAMMING	15
CO7206	SYSTEM RE-ENGINEERING	15
CO7215	ADVANCED WEB TECHNOLOGIES	15
CO7217	AGILE CLOUD AUTOMATION	15
MA7071	FINANCIAL MATHEMATICS 1	15
MA7077	OPERATIONAL RESEARCH	15
Semester total		**60**

SEMESTER 2

Core Modules		**Credits**
CO7211	DISCRETE EVENT SYSTEMS	15
CO7214	SERVICE ORIENTED ARCHITECTURES	15

Optional Modules

30 credits selected from

CO7210	PERSONAL AND GROUP SKILLS (if not selected in semester 1)	15
CO7002	ANALYSIS AND THE DESIGN OF ALGORITHMS	15
CO7096	COMPRESSION METHODS FOR MULTIMEDIA	15
CO7090	DISTRIBUTED SYSTEMS AND APPLICATIONS	15
CO7099	CRYPTOGRAPHY AND INTERNET SECURITY	15
CO7200	ALGORITHMS FOR BIOINFORMATICS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15
CO7216	SEMANTIC WEB	15
CO7218	FINANCIAL SERVICES INFORMATION SYSTEMS	15
CO7220	SOFTWARE ENGINEERING FOR SUSTAINABILITY	15
Semester total		60

SUMMER

Core Modules

CO7201	INDIVIDUAL PROJECT	60
Total credits		**180**

* All students are required to study CO7210, however may select to study it in either semester 1 or semester 2

January Entry

SEMESTER 2

Core Modules		**Credits**
CO7211	DISCRETE EVENT SYSTEMS	15
CO7214	SERVICE ORIENTED ARCHITECTURES	15

Optional Modules

30 credits selected from:

CO7210	PERSONAL AND GROUP SKILLS (if not selected in semester 1)	15
CO7002	ANALYSIS AND THE DESIGN OF ALGORITHMS	15
CO7096	COMPRESSION METHODS FOR MULTIMEDIA	15
CO7090	DISTRIBUTED SYSTEMS AND APPLICATIONS	15
CO7099	CRYPTOGRAPHY AND INTERNET SECURITY	15
CO7200	ALGORITHMS FOR BIOINFORMATICS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15
CO7216	SEMANTIC WEB	15
CO7218	FINANCIAL SERVICES INFORMATION SYSTEMS	15
CO7220	SOFTWARE ENGINEERING FOR SUSTAINABILITY	15
Semester Total		**60**

SEMESTER 1

Core Modules		**Credits**
CO7205	ADVANCED SYSTEM DESIGN	15
CO7209	SOFTWARE RELIABILITY	15
CO7219	INTERNET AND CLOUD COMPUTING	15

Optional Modules

Either:

CO7210	PERSONAL AND GROUP SKILLS*	15

Or one selected from:

CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7007	COMMUNICATION AND CONCURRENCY	15
CO7098	WEB TECHNOLOGIES	15
CO7105	ADVANCED C++ PROGRAMMING	15
CO7206	SYSTEM RE-ENGINEERING	15
CO7215	ADVANCED WEB TECHNOLOGIES	15
CO7217	AGILE CLOUD AUTOMATION	15
MA7071	FINANCIAL MATHEMATICS 1	15
MA7077	OPERATIONAL RESEARCH	15
Semester Total		**60**

JANUARY TO APRIL

Core Modules		**Credits**
CO7201	INDIVIDUAL PROJECT	60
Total Credits		**180**

* All students are required to study CO7210, however may select to study it in either semester 1 or semester 2.

MSc in Advanced Distributed Systems with Industry

The taught modules for the programme are as for those on the MSc in Advanced Distributed Systems degree programme, with the additional undertaking of:

October entry

Semester 1

CO7260	Employability – Core Skills	0

Semester 2

CO7261	Employability – Placement Preparations	0

January entry

Semester 2

CO7260	Employability – Core Skills	0

Semester 1

CO7261	Employability – Placement Preparations	0

All students on the 'with Industry' variant will undertake a 3, 6 or 8 month placement between completion of the taught element of the programme and commencement of the project. The placement will be assessed on a pass or fail basis according to the approved and published criteria. Students who are deemed to have passed the industrial placement and subsequently pass the individual project will be eligible to be considered for the award of an MSc in Advanced Distributed Systems with Industry. Students who fail to pass the industrial placement will revert to the non-industry variant of the programme.

MSc in Agile Software Engineering Techniques

SEPTEMBER ENTRY

SEMESTER 1

Core modules

CO7206	SYSTEM RE-ENGINEERING	15
CO7217	AGILE CLOUD AUTOMATION	15

Optional modules

CO7210	PERSONAL AND GROUP SKILLS*	15
CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7007	COMMUNICATION AND CONCURRENCY	15
CO7098	WEB TECHNOLOGIES	15
CO7105	ADVANCED C++ PROGRAMMING	15
CO7205	ADVANCED SYSTEM DESIGN	15
CO7219	INTERNET AND CLOUD COMPUTING	15
CO7215	ADVANCED WEB TECHNOLOGIES	15
MA7071	FINANCIAL MATHEMATICS 1	15
MA7077	OPERATIONAL RESEARCH	15
Semester total		**60**

SEMESTER 2

Core modules

CO7220	SOFTWARE ENGINEERING FOR SUSTAINABILITY	15
CO7214	SERVICE ORIENTED ARCHITECTURES	15

Optional Modules

30 Credits selected from

CO7210	PERSONAL AND GROUP SKILLS (if not selected in semester 1)	15
CO7002	ANALYSIS AND THE DESIGN OF ALGORITHMS	15
CO7096	COMPRESSION METHODS FOR MULTIMEDIA	15
CO7090	DISTRIBUTED SYSTEMS AND APPLICATIONS	15
CO7099	CRYPTOGRAPHY AND INTERNET SECURITY	15
CO7200	ALGORITHMS FOR BIOINFORMATICS	15
CO7211	DISCRETE EVENT SYSTEMS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15
CO7216	SEMANTIC WEB	15
CO7218	FINANCIAL SERVICES INFORMATION SYSTEMS	15
Semester total		**60**

SUMMER

Core modules		**Credits**
CO7201	INDIVIDUAL PROJECT	60

Total Credits **180**

* All students are required to study CO7210, however may select to study it in either semester 1 or semester 2

JANUARY ENTRY

SEMESTER 2

Core modules

CO7214	SERVICE ORIENTED ARCHITECTURES	15
CO7220	SOFTWARE ENGINEERING FOR SUSTAINABILITY	15

Optional Modules

30 credits selected from:

CO7210	PERSONAL AND GROUP SKILLS*	15
CO7002	ANALYSIS AND THE DESIGN OF ALGORITHMS	15

CO7096	COMPRESSION METHODS FOR MULTIMEDIA	15
CO7090	DISTRIBUTED SYSTEMS AND APPLICATIONS	15
CO7099	CRYPTOGRAPHY AND INTERNET SECURITY	15
CO7200	ALGORITHMS FOR BIOINFORMATICS	15
CO7211	DISCRETE EVENT SYSTEMS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15
CO7216	SEMANTIC WEB	15
CO7218	FINANCIAL SERVICES INFORMATION SYSTEMS	15
Semester total		**60**

SEMESTER 1

Core Modules

CO7206	SYSTEM RE-ENGINEERING	15
CO7217	AGILE CLOUD AUTOMATION	15

Optional Modules

30 credits selected from:

CO7210	PERSONAL AND GROUP SKILLS* (if not selected in semester 2)	15
CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7007	COMMUNICATION AND CONCURRENCY	15
CO7098	WEB TECHNOLOGIES	15
CO7105	ADVANCED C++ PROGRAMMING	15
CO7205	ADVANCED SYSTEM DESIGN	15
CO7219	INTERNET AND CLOUD COMPUTING	15
CO7215	ADVANCED WEB TECHNOLOGIES	15
MA7071	FINANCIAL MATHEMATICS 1	15
MA7077	OPERATIONAL RESEARCH	15
Semester Total		**60**

JANUARY TO APRIL

Core Modules		**Credits**
CO7201	INDIVIDUAL PROJECT	60
	Total Credits	**180**

* All students are required to study CO7210, however may select to study it in either semester 1 or semester 2

MSc in Agile Software Engineering Techniques with Industry

The taught modules for the programme are as for those on the MSc in Agile Software Engineering Techniques degree programme, with the additional undertaking of:

October entry

Semester 1

CO7260	Employability – Core Skills	0

Semester 2

CO7261	Employability – Placement Preparations	0

January entry

Semester 2

CO7260	Employability – Core Skills	0

Semester 1

CO7261	Employability – Placement Preparations	0

All students on the 'with Industry' variant will undertake a 3, 6 or 8 month placement between completion of the taught element of the programme and commencement of the project. The placement will be assessed on a pass or fail basis according to the approved and published criteria. Students who are deemed to have passed the industrial placement and subsequently pass the individual project will be eligible to be considered for the award of an MSc in Agile Software Engineering Techniques with Industry. Students who fail to pass the industrial placement will revert to the non-industry variant of the programme.

MSc in Advanced Computational Methods

SEPTEMBER ENTRY

SEMESTER 1

Core modules

CO7105	ADVANCED C++ PROGRAMMING	15
CO7219	INTERNET AND CLOUD COMPUTING	15

Optional Modules

30 credits selected from:

CO7210	PERSONAL AND GROUP SKILLS*	15
CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7007	COMMUNICATION AND CONCURRENCY	15
CO7098	WEB TECHNOLOGIES	15
CO7205	ADVANCED SYSTEM DESIGN	15
CO7206	SYSTEM RE-ENGINEERING	15
CO7209	SOFTWARE RELIABILITY	15
CO7215	ADVANCED WEB TECHNOLOGIES	15
CO7217	AGILE CLOUD AUTOMATION	15
MA7071	FINANCIAL MATHEMATICS 1	15
MA7077	OPERATIONAL RESEARCH	15
Semester Total		**60**

SEMESTER 2

Core Modules		**Credits**
CO7200	ALGORITHMS FOR BIOINFORMATICS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15
CO7211	DISCRETE EVENT SYSTEMS	15

Optional Modules

Either

CO7210	PERSONAL AND GROUP SKILLS* (if not selected in semester 1)	15

Or 15 credits selected from:

CO7002	ANALYSIS AND THE DESIGN OF ALGORITHMS	15
CO7096	COMPRESSION METHODS FOR MULTIMEDIA	15
CO7090	DISTRIBUTED SYSTEMS AND APPLICATIONS	15
CO7099	CRYPTOGRAPHY AND INTERNET SECURITY	15
CO7214	SERVICE ORIENTED ARCHITECTURES	15
CO7216	SEMANTIC WEB	15
CO7218	FINANCIAL SERVICES INFORMATION SYSTEMS	15
CO7220	SOFTWARE ENGINEERING FOR SUSTAINABILITY	15
Semester Total		**60**

SUMMER

Core Modules		**Credits**
CO7201	INDIVIDUAL PROJECT	60
Total Credits		**180**

* All students are required to study CO7210, however may select to study it in either semester 1 or semester 2

JANUARY ENTRY

SEMESTER 2

Core modules

CO7200	ALGORITHMS FOR BIOINFORMATICS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15

CO7211	DISCRETE EVENT SYSTEMS	15

Optional Modules

Either

CO7210	PERSONAL AND GROUP SKILLS*	15

Or 15 credits selected from:

CO7002	ANALYSIS AND THE DESIGN OF ALGORITHMS	15
CO7096	COMPRESSION METHODS FOR MULTIMEDIA	15
CO7090	DISTRIBUTED SYSTEMS AND APPLICATIONS	15
CO7099	CRYPTOGRAPHY AND INTERNET SECURITY	15
CO7200	ALGORITHMS FOR BIOINFORMATICS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15
CO7216	SEMANTIC WEB	15
CO7218	FINANCIAL SERVICES INFORMATION SYSTEMS	15
CO7220	SOFTWARE ENGINEERING FOR SUSTAINABILITY	15
Semester Total		**60**

SEMESTER 1

Core Modules	**Credits**	
CO7105	ADVANCED C++ PROGRAMMING	15
CO7219	INTERNET AND CLOUD COMPUTING	15

Optional Modules

30 credits selected from:

CO7210	PERSONAL AND GROUP SKILLS* (if not selected in semester 2)	15
CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7007	COMMUNICATION AND CONCURRENCY	15
CO7098	WEB TECHNOLOGIES	15
CO7205	ADVANCED SYSTEM DESIGN	15
CO7206	SYSTEM RE-ENGINEERING	15
CO7209	SOFTWARE RELIABILITY	15
CO7215	ADVANCED WEB TECHNOLOGIES	15
CO7217	AGILE CLOUD AUTOMATION	15
MA7071	FINANCIAL MATHEMATICS 1	15
MA7077	OPERATIONAL RESEARCH	15
Semester Total		**60**

JANUARY TO APRIL

Core Modules		**Credits**
CO7201	INDIVIDUAL PROJECT	60
Total Credits		**180**

* All students are required to study CO7210, however may select to study it in either semester 1 or semester 2

MSc in Advanced Computational Methods with Industry

The taught modules for the programme are as for those on the MSc in Advanced Computational Methods degree programme with the additional undertaking of:

October entry

Semester 1

CO7260	Employability – Core Skills	0

Semester 2

CO7261	Employability – Placement Preparations	0

January entry

Semester 2

CO7260	Employability – Core Skills	0

Semester 1

CO7261	Employability – Placement Preparations	0

All students on the 'with Industry' variant will undertake a 3, 6 or 8 month placement between completion of the taught element of the programme and commencement of the project. The placement will be assessed on a pass or fail basis according to the approved and published criteria. Students who are deemed to have passed the industrial placement and subsequently pass the individual project will be eligible to be considered for the award of an MSc in Advanced Computational Methods with Industry. Students who fail to pass the industrial placement will revert to the non-industry variant of the programme.

MSc in Advanced Software Engineering

September Entry:

SEMESTER 1

Core Modules		**Credits**
CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7205	ADVANCED SYSTEM DESIGN	15
CO7206	SYSTEM RE-ENGINEERING	15

Optional Modules

Either:

CO7210	PERSONAL AND GROUP SKILLS*	15

Or one selected from:

CO7007	COMMUNICATION AND CONCURRENCY	15
CO7098	WEB TECHNOLOGIES	15
CO7105	ADVANCED C++ PROGRAMMING	15
CO7209	SOFTWARE RELIABILITY	15
CO7219	INTERNET AND CLOUD COMPUTING	15
CO7215	ADVANCED WEB TECHNOLOGIES	15
CO7217	AGILE CLOUD AUTOMATION	15
MA7071	FINANCIAL MATHEMATICS 1	15
MA7077	OPERATIONAL RESEARCH	15
Semester Total		**60**

SEMESTER 2

Core Modules		**Credits**
CO7214	SERVICE ORIENTED ARCHITECTURES	15
CO7220	SOFTWARE ENGINEERING FOR SUSTAINABILITY	15

Optional Modules

30 credits selected from:

CO7210	PERSONAL AND GROUP SKILLS* (if not selected in semester 1)	15
CO7002	ANALYSIS AND THE DESIGN OF ALGORITHMS	15
CO7096	COMPRESSION METHODS FOR MULTIMEDIA	15
CO7090	DISTRIBUTED SYSTEMS AND APPLICATIONS	15
CO7099	CRYPTOGRAPHY AND INTERNET SECURITY	15
CO7200	ALGORITHMS FOR BIOINFORMATICS	15
CO7211	DISCRETE EVENT SYSTEMS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15
CO7216	SEMANTIC WEB	15
CO7218	FINANCIAL SERVICES INFORMATION SYSTEMS	15
Semester Total		**60**

SUMMER

Core Modules		**Credits**
CO7201	INDIVIDUAL PROJECT	60
Total Credits		**180**

* All students are required to study CO7210, however may select to study it in either semester 1 or semester 2.

JANUARY ENTRY

SEMESTER 2

Core modules		**Credits**
CO7214	SERVICE ORIENTED ARCHITECTURES	15
CO7220	SOFTWARE ENGINEERING FOR SUSTAINABILITY	15

Optional Modules

30 credits selected from:

CO7210	PERSONAL AND GROUP SKILLS*	15
CO7002	ANALYSIS AND THE DESIGN OF ALGORITHMS	15
CO7096	COMPRESSION METHODS FOR MULTIMEDIA	15
CO7090	DISTRIBUTED SYSTEMS AND APPLICATIONS	15
CO7099	CRYPTOGRAPHY AND INTERNET SECURITY	15
CO7200	ALGORITHMS FOR BIOINFORMATICS	15
CO7211	DISCRETE EVENT SYSTEMS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15
CO7216	SEMANTIC WEB	15
CO7218	FINANCIAL SERVICES INFORMATION SYSTEMS	15
Semester Total		**60**

SEMESTER 1

Core Modules		**Credits**
CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7205	ADVANCED SYSTEM DESIGN	15
CO7206	SYSTEM RE-ENGINEERING	15

Optional Modules

Either:

CO7210	PERSONAL AND GROUP SKILLS* (if not selected in semester 2)	15

Or one selected from:

CO7007	COMMUNICATION AND CONCURRENCY	15
CO7098	WEB TECHNOLOGIES	15
CO7105	ADVANCED C++ PROGRAMMING	15
CO7209	SOFTWARE RELIABILITY	15
CO7219	INTERNET AND CLOUD COMPUTING	15
CO7215	ADVANCED WEB TECHNOLOGIES	15
CO7217	AGILE CLOUD AUTOMATION	15
MA7077	OPERATIONAL RESEARCH	15
MA7071	FINANCIAL MATHEMATICS 1	15
Semester Total		**60**

JANUARY TO APRIL

Core Modules		**Credits**
CO7201	INDIVIDUAL PROJECT	60
Total Credits		**180**

* All students are required to study CO7210, however may select to study it in either semester 1 or semester 2

MSc in Advanced Software Engineering with Industry

The taught modules for the programme are as for those on the MSc in Advanced Software Engineering degree programme, with the additional undertaking of:

October entry

Semester 1

CO7260	Employability – Core Skills	0

Semester 2

CO7261	Employability – Placement Preparations	0

January entry

Semester 2

CO7260	Employability – Core Skills	0

Semester 1

CO7261	Employability – Placement Preparations	0

All students on the 'with Industry' variant will undertake a 3, 6 or 8 month placement between completion of the taught element of the programme and commencement of the project. The placement will be assessed on a pass or fail basis according to the approved and published criteria. Students who are deemed to have passed the industrial placement and subsequently pass the individual project will be eligible to be considered for the award of an MSc in Advanced Software Engineering with Industry. Students who fail to pass the industrial placement will revert to the non-industry variant of the programme.

MSc in Web Applications and Services

September Entry

SEMESTER 1

Core Modules		**Credits**
CO7205	ADVANCED SYSTEM DESIGN	15
CO7215	ADVANCED WEB TECHNOLOGIES	15

Optional Modules

30 credits selected from:

CO7210	PERSONAL AND GROUP SKILLS*	15
CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7007	COMMUNICATION AND CONCURRENCY	15
CO7098	WEB TECHNOLOGIES	15
CO7105	ADVANCED C++ PROGRAMMING	15
CO7206	SYSTEM RE-ENGINEERING	15
CO7209	SOFTWARE RELIABILITY	15
CO7219	INTERNET AND CLOUD COMPUTING	15
CO7217	AGILE CLOUD AUTOMATION	15
MA7071	FINANCIAL MATHEMATICS 1	15
MA7077	OPERATIONAL RESEARCH	15
Semester Total		**60**

SEMESTER 2

Core Modules		**Credits**
CO7214	SERVICE ORIENTED ARCHITECTURES	15
CO7216	SEMANTIC WEB	15

Optional Modules

30 credits selected from:

CO7210	PERSONAL AND GROUP SKILLS* (if not selected in semester 1)	15
CO7002	ANALYSIS AND THE DESIGN OF ALGORITHMS	15
CO7096	COMPRESSION METHODS FOR MULTIMEDIA	15
CO7090	DISTRIBUTED SYSTEMS AND APPLICATIONS	15
CO7099	CRYPTOGRAPHY AND INTERNET SECURITY	15
CO7200	ALGORITHMS FOR BIOINFORMATICS	15
CO7211	DISCRETE EVENT SYSTEMS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15
CO7218	FINANCIAL SERVICES INFORMATION SYSTEMS	15
CO7220	SOFTWARE ENGINEERING FOR SUSTAINABILITY	15
Semester Total		**60**

SUMMER

Core Modules		**Credits**
CO7201	INDIVIDUAL PROJECT	60
	Total Credits	**180**

* All students are required to study CO7210, however may select to study it in either semester 1 or semester 2

January Entry

SEMESTER 2

Core Modules Credits		
CO7214	SERVICE ORIENTED ARCHITECTURES	15
CO7216	SEMANTIC WEB	15

Optional Modules

30 credits selected from:

CO7210	PERSONAL AND GROUP SKILLS*	15
CO7002	ANALYSIS AND THE DESIGN OF ALGORITHMS	15
CO7096	COMPRESSION METHODS FOR MULTIMEDIA	15
CO7090	DISTRIBUTED SYSTEMS AND APPLICATIONS	15
CO7099	CRYPTOGRAPHY AND INTERNET SECURITY	15
CO7200	ALGORITHMS FOR BIOINFORMATICS	15

CO7211	DISCRETE EVENT SYSTEMS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15
CO7218	FINANCIAL SERVICES INFORMATION SYSTEMS	15
CO7220	SOFTWARE ENGINEERING FOR SUSTAINABILITY	15
Semester Total		**60**

SEMESTER 1

Core Modules		**Credits**
CO7205	ADVANCED SYSTEM DESIGN	15
CO7215	ADVANCED WEB TECHNOLOGIES	15

Optional Modules

30 credits selected from:

CO7210	PERSONAL AND GROUP SKILLS* (if not selected in semester 2)	15
CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7007	COMMUNICATION AND CONCURRENCY	15
CO7098	WEB TECHNOLOGIES	15
CO7105	ADVANCED C++ PROGRAMMING	15
CO7206	SYSTEM RE-ENGINEERING	15
CO7209	SOFTWARE RELIABILITY	15
CO7219	INTERNET AND CLOUD COMPUTING	15
CO7217	AGILE CLOUD AUTOMATION	15
MA7071	FINANCIAL MATHEMATICS 1	15
MA7077	OPERATIONAL RESEARCH	15
Semester Total		**60**

JANUARY TO APRIL

Core Modules		**Credits**
CO7201	INDIVIDUAL PROJECT	60
Total Credits		**180**

* All students are required to study CO7210, however may select to study it in either semester 1 or semester 2

MSc in Web Applications and Services with Industry

The taught modules for the programme are as for those on the MSc in Web Applications and Services degree programme, with the additional undertaking of:

October entry

Semester 1

CO7260	Employability – Core Skills	0

Semester 2

CO7261	Employability – Placement Preparations	0

January entry

Semester 2

CO7260	Employability – Core Skills	0

Semester 1

CO7261	Employability – Placement Preparations	0

All students on the 'with Industry' variant will undertake a 3, 6 or 8 month placement between completion of the taught element of the programme and commencement of the project. The placement will be assessed on a pass or fail basis according to the approved and published criteria. Students who are deemed to have passed the industrial placement and subsequently pass the individual project will be eligible to be considered for the award of an MSc in Web Applications and Services with Industry. Students who fail to pass the industrial placement will revert to the non- industry variant of the programme.

MSc in Advanced Computer Science

September Entry

SEMESTER 1

Optional Modules		**Credits**
60 credits selected from:		
CO7210	PERSONAL AND GROUP SKILLS*	15
CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7007	COMMUNICATION AND CONCURRENCY	15
CO7098	WEB TECHNOLOGIES	15
CO7105	ADVANCED C++ PROGRAMMING	15
CO7205	ADVANCED SYSTEM DESIGN	15
CO7206	SYSTEM RE-ENGINEERING	15
CO7209	SOFTWARE RELIABILITY	15
CO7219	INTERNET AND CLOUD COMPUTING	15
CO7215	ADVANCED WEB TECHNOLOGIES	15
CO7217	AGILE CLOUD AUTOMATION	15
MA7071	FINANCIAL MATHEMATICS 1	15
MA7077	OPERATIONAL RESEARCH	15
Semester Total		**60**

SEMESTER 2

Optional Modules		**Credits**
60 credits selected from:		
CO7210	PERSONAL AND GROUP SKILLS* (if not selected in semester 1)	15
CO7002	ANALYSIS AND THE DESIGN OF ALGORITHMS	15
CO7096	COMPRESSION METHODS FOR MULTIMEDIA	15
CO7090	DISTRIBUTED SYSTEMS AND APPLICATIONS	15
CO7099	CRYPTOGRAPHY AND INTERNET SECURITY	15
CO7200	ALGORITHMS FOR BIOINFORMATICS	15
CO7211	DISCRETE EVENT SYSTEMS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15
CO7214	SERVICE ORIENTED ARCHITECTURES	15
CO7216	SEMANTIC WEB	15
CO7218	FINANCIAL SERVICES INFORMATION SYSTEMS	15
CO7220	SOFTWARE ENGINEERING FOR SUSTAINABILITY	15
Semester Total		**60**

SUMMER

Core Modules		**Credits**
CO7201	INDIVIDUAL PROJECT	60
Total Credits		**180**

* All students are required to study CO7210, however may select to study it in either semester 1 or semester 2

January Entry

SEMESTER 2

Optional Modules		**Credits**
60 credits selected from:		
CO7210	PERSONAL AND GROUP SKILLS*	15
CO7002	ANALYSIS AND THE DESIGN OF ALGORITHMS	15
CO7096	COMPRESSION METHODS FOR MULTIMEDIA	15
CO7090	DISTRIBUTED SYSTEMS AND APPLICATIONS	15
CO7099	CRYPTOGRAPHY AND INTERNET SECURITY	15
CO7200	ALGORITHMS FOR BIOINFORMATICS	15
CO7211	DISCRETE EVENT SYSTEMS	15
CO7212	GAME THEORY IN COMPUTER SCIENCE	15
CO7214	SERVICE ORIENTED ARCHITECTURES	15
CO7216	SEMANTIC WEB	15

CO7218	FINANCIAL SERVICES INFORMATION SYSTEMS	15
CO7220	SOFTWARE ENGINEERING FOR SUSTAINABILITY	15
Semester Total		**60**

SEMESTER 1

Optional Modules		**Credits**
60 credits selected from:		
CO7210	PERSONAL AND GROUP SKILLS* (if not selected in semester 2)	15
CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7007	COMMUNICATION AND CONCURRENCY	15
CO7098	WEB TECHNOLOGIES	15
CO7105	ADVANCED C++ PROGRAMMING	15
CO7205	ADVANCED SYSTEM DESIGN	15
CO7206	SYSTEM RE-ENGINEERING	15
CO7209	SOFTWARE RELIABILITY	15
CO7219	INTERNET AND CLOUD COMPUTING	15
CO7215	ADVANCED WEB TECHNOLOGIES	15
CO7217	AGILE CLOUD AUTOMATION	15
MA7071	FINANCIAL MATHEMATICS 1	15
MA7077	OPERATIONAL RESEARCH	15
Semester Total		**60**

JANUARY TO APRIL

Core Modules		**Credits**
CO7201	INDIVIDUAL PROJECT	60
Total Credits		**180**

* All students are required to study CO7210, however may select to study it in either semester 1 or semester 2

MSc in Advanced Computer Science with Industry

The taught modules for the programme are as for those on the MSc in Advanced Computer Science degree programme, with the additional undertaking of:

October entry

Semester 1

CO7260	Employability – Core Skills	0

Semester 2

CO7261	Employability – Placement Preparations	0

January entry

Semester 2

CO7260	Employability – Core Skills	0

Semester 1

CO7261	Employability – Placement Preparations	0

All students on the 'with Industry' variant will undertake a 3, 6 or 8 month placement between completion of the taught element of the programme and commencement of the project. The placement will be assessed on a pass or fail basis according to the approved and published criteria. Students who are deemed to have passed the industrial placement and subsequently pass the individual project will be eligible to be considered for the award of an MSc in Advanced Computer Science with Industry. Students who fail to pass the industrial placement will revert to the non- industry variant of the programme.

Appendix 2: Module Specifications

See module specification database http://www.le.ac.uk/sas/courses/documentation