UNIVERSITY OF LEICESTER

1. Programme Title(s):

MSc, PGCert, or simple certificate of completion of individual modules (CPD mode) by Distance Learning in:
- Advanced Computer Science (ACS)
- Advanced Software Engineering (ASE)

2. Awarding body or institution:

University of Leicester

3. a) Mode of study:

Part-time

b) Type of study:

Distance Learning

4. Registration periods:

The course is delivered in several ways than can affect the normal period of registration. If you are taking the MSc, you will be given the option in the first two weeks of the course regarding whether you would like to study 2 or 3 modules at a time.

MSc 'Relaxed Route' (studying two taught modules per teaching session for three teaching sessions, before taking the Final Project)

Normal period of registration is 24 months (includes a summer break) and the maximum period of registration is 48 months.

MSc 'Fast-track Route' (studying three taught modules per teaching session for two teaching sessions before taking the Final Project)

Normal period of registration is 16 months and the maximum period of registration is 48 months.

PG Cert
Normal period of registration is 9 months and the maximum period of registration is 24 months.

CPD
Normal period of registration is 5 months and the maximum period of registration is 12 months.

5. Typical entry requirements:

The same entry requirements apply to all streams. 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 or Mathematics. Because applications are treated on an individual basis, alternative qualifications may be considered, especially in the case of candidates with relevant work experience. Where English is not the first language of the candidate, the successful applicant must have IELTS 6.0 or equivalent.

6. Accreditation of Prior Learning:

Students undertaking CPD modules (assuming that they take the exam in those modules) will be eligible for later accreditation of the credits gained towards a PG Cert or MSc. As it is not sensible to allow for students to carry past credits into programmes after too long a time period, we will only allow students to include credits of modules that they have gained in the last two years before formally applying for a PG Cert or MSc. The "credit transfer" is only applicable to CPD modules that students undertook with us and that form part of the PG Cert or MSc programme for which they are applying.

7. Programme aims:

The general aims of the programme leading to PG Cert 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 programme leading to an MSc has the following additional aims:

- Provide experience of 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.

In addition, 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?

The programme also aims to respond to the e-skills gap that has been identified specifically in the UK and, in general, the lack of opportunities (in the UK and abroad) for IT professionals to acquire PG qualifications in advanced topics.

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 will engage with a broader range of subjects than those studying towards the PG Cert. For the 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. (MSc) in the table below will indicate the LOs, methods and demonstration for aspects specific to the MSc Programmes.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
(a) Subject and Professional skills		
Knowledge		
Demonstrate knowledge and mastery of a [wide (MSc)] range of advanced computer science subjects and the way they relate to IT practice. Integration of knowledge across subjects.	Independent research (MSc), learning materials, face-to-face tutorials, electronic tutorials and forums.	Written examinations; project planning, presentations, reports and dissertation (MSc); regular assessment, and contribution to electronic forums.
Concepts		
Demonstrate enhanced grasp of principles of computer science methodology and technology.	Independent research, learning materials, face-to-face tutorials, electronic tutorials and forums. Individual project.	Written examinations, assessed coursework, regular assessment, contribution to electronic forums, dissertation (MSc) and reports.
Techniques		
Master advanced modelling and design techniques for the development of software intensive, and Net-based systems.	Independent research, learning materials, face-to-face tutorials, electronic tutorials and forums. Individual project (MSc).	Written examinations, assessed coursework, regular assessment, contribution to electronic forums, dissertation (MSc) and reports.
Engineer and follow software development processes, make use of re-engineering and generative techniques, target service-oriented architectures, and ensure quality.	As above.	As above.
Use problem-solving techniques, and select and apply computational methods to obtain software solutions in different areas.	As above	As above.
Master research methods and project planning techniques (MSc).	Electronic tutorials and forums. Individual project (MSc).	Contributions to electronic forums. Individual project components (MSc).
Critical analysis		
Apply understanding of concepts and techniques with independence, rigour & self-reflexivity.	Independent research, learning materials, face-to-face tutorials, electronic tutorials and forums. Individual project (MSc).	Regular assessment, contribution to electronic forums, essays/demos, project plan, and dissertation (MSc).
Critically appraise problem solutions and project work. Demonstrate consideration of professional issues.	As above.	As above.

Presentation		
Organise research material and or technology demonstration in a manner appropriate to the medium that is to be assessed; distinguish between relevant and non-relevant material; write-up and deliver 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.	Learning materials, face-to-face tutorials, electronic tutorials and forums. Individual project (MSc).	Regular assessment, contributions to electronic forums, essays/demos, project plan, and dissertation (MSc).

Appraisal of evidence		
Analyse and assess a variety of requirements for system development or re-engineering. Assess the relevance and quality of proposed methods and techniques. Mount and sustain an independent level of inquiry at an advanced level (MSc).	Independent research, learning materials, face-to-face tutorials, electronic tutorials and forums. Individual project (MSc).	Regular assessment, contributions to electronic forums, essays/demos, project plan, and dissertation (MSc).

Intended Learning Outcomes	Teaching and Learning Methods **(b) Transferable skills**	How Demonstrated?
Research skills		
Conduct [significant (MSc)] background research and literature surveys, organise and marshal evidence, report on findings, analyse complex ideas and construct [sophisticated (MSc)] critical arguments.	Project supervision (MSc). Learning materials, face-to-face tutorials, electronic tutorials and forums.	Interaction with tutors, contributions to electronic forums, and individual project reports (MSc) and dissertation (MSc).
Communication skills		
Respond to scientific questions with accurate and concise answers. Demonstrate fluent and sustained scientific and technical communication.	Tutorials, individual project supervision (MSc).	Regular assessment, interaction with tutors, contributions to electronic forums, individual project oral examinations (MSc).
Write concise and accurate summaries of scientific knowledge, and solutions to problems, in a variety of different formats.	Learning materials. Detailed solutions provided in problem classes. Individual project supervision (MSc).	Written examinations, assessed coursework, intermediate individual project reports (MSc) and dissertation (MSc).
Produce properly structured, clear, advanced technical reports or dissertations (MSc).	As above.	Intermediate individual project reports and dissertation (MSc).
Data presentation		
Organise and present information gathered through research clearly and effectively using appropriate IT resources.	Independent research. Learning materials.	Regular assessment, interaction with tutors, essays/demos, and dissertation (MSc).

Working relationships		
Know how and when to draw on the knowledge & expertise of others; contribute and comment on ideas in syndicate groups.*	Learning materials, face-to-face tutorials, electronic tutorials and forums.	Contributions to electronic forums.
Managing learning		
Demonstrate independence and time management skills. Identifying a credible research project, drawing up a realistic research timetable, reflecting on and 'writing up' results (MSc).	Tutor system. Project supervision (MSc).	Meeting coursework deadlines. Individual project topic choice and plan, intermediate reports (MSc) and dissertation (MSc).
Career management		
Design a long-term personal career plan.	Career development electronic tutorials delivered by the Student Learning Centre.	Interaction with tutors. Personal development plan.

10. Special features:

Supported distance learning using Blackboard. The technical content of the modules to be offered will be the same as those of our campus-based MSc programmes. This will ensure that the contents of DL modules are updated at the same time as the campus-based versions and, therefore, will be at the same level of quality. The modules will be delivered simultaneously with the campus-based programmes so that students in the DL programme can also interact with those on campus. For IT professionals, the individual project can be related to their work and co-supervised with a senior person from the company.

11. Indications of programme quality:

QAA subject review; external examiners report. Accreditation with the British Computer Society will be sought.

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

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

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

Resit examinations follow the standard University rules. See: Senate Regulation 6 governing taught postgraduate programmes http://www2.le.ac.uk/offices/sas2/regulations/general-regulations-for-taught-programmes

Resits may only be taken once a student has reached their progression point, as outlined in Senate Regulation 6. Exams and Resit examinations are offered in January and May/June. However, some resit assignments may be set over the summer break period. The exact details of resits or resubmissions will be communicated to students after a progression point.

Following the submission of the final report of the Individual Project a candidate may:
- be awarded the MSc degree.
- be referred for presentational reasons, which usually means that, when any recommended changes are completed to the satisfaction of the Board of Examiners, the MSc is conferred.
- be failed and invited to redo a project in the following year with substantial revision or, more likely, a complete change of topic.
- be awarded a PG Cert on the basis of credits achieved.

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

Admissions are in September/October of every academic year.

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)

There are no dependencies between the modules meaning that the programme is truly modular. This allows for students to discuss and agree their individual target schedule with their personal tutor on registration. Detailed information regarding suitable study plans and time commitments with respect to individual modules will be made available in course handbooks. The department will monitor student progression and ask personal tutors to review target schedules with students in case of any slippage.

Three modes of study will be offered:
1. **MSc** — students will study six 15 credit taught modules (90 credits in total) and undertake a 90 credit project.
2. **PG Cert** — students will study four 15-credit modules of their choice (60 credits in total).
3. **CPD** — students would be allowed to take an individual module and complete assessment for those modules. We will allow students to include credits of modules taken during a two year period preceding a registration onto a full PG Cert or MSc if they pass the module overall.

In the MSc mode, there are two kinds of modules:

Taught Modules (90 credits)
Taught modules are taken to a total of 90 credits. ASE requires 45 credits of core modules, marked in full on the matrix. The 45 remaining credits are chosen among the whole menu of modules. Students on the Advanced Computer Science course can compose their own pathway.

Individual Project (90 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

Code	Modules	ACS Core/Option	ASE Core/Option	Semester
CO7515	Advanced Web Technologies	O	O	1
CO7517	Agile Cloud Automation	O	O	1
CO7507	Generative Development	O	O	2
CO7514	Service-oriented Architectures	O	C	2
CO7508	Software Measurements and Quality Assurance	O	C	1
CO7091	Computational Intelligence for Software Engineering	O	O	1
CO7093	Big Data and Predictive Analysis	O	O	2

Programme Structure

Semester 1 begins in September while Semester 2 begins in January. All the taught modules are completed during either Semester 1 or Semester 2. Students begin their Individual Project either in June or in February, depending on when they have completed 90 credits worth of taught modules.

There are two routes of study for the MSc that students can select to study within the first two weeks of the course. Course fees will not be affected by whichever route is chosen.

'Relaxed' Study Route (24 months to complete)

This route of study allows students to study the six taught modules across 18 months followed by the dissertation/project. This is structured as two modules a semester for three semesters with a final six months being devoted to the research project.

Intensive Study Route (16-20 months to complete)

This route of study can be selected by those students who wish to complete the course in a slightly quicker timescale, but it should be noted that this does increase workload. Students will be required to undertake three modules a semester for two semesters followed by a final semester devoted to the research project.

MSc in Advanced Computer Science

Semester 1   **Credits**

Optional Modules

Relaxed Route: 30 credits selected from:

Intensive Route: 45 credits selected from:

CO7091	COMPUTATIONAL INTELLIGENCE FOR SOFTWARE ENGINEERING	15
CO7515	ADVANCED WEB TECHNOLOGIES	15
CO7517	AGILE CLOUD AUTOMATION	15
CO7508	SOFTWARE MEASUREMENTS AND QUALITY ASSURANCE	15

Semester 2   **Credits**

Optional Modules

Relaxed Route: 30 credits selected from the list below.

Intensive Route:

CO7093	BIG DATA AND PREDICTIVE ANALYSIS	15

CO7514	SERVICE ORIENTED ARCHITECTURES	15
CO7507	GENERATIVE DEVELOPMENT	15

Students on the 'Intensive' Study Route will have completed 90 credits worth of taught modules at this point. This means that they will go on to complete their Individual Project:

June	Credits

Core Module

CO7501	INDIVIDUAL PROJECT	90

Students on the 'Relaxed' Study Route will have completed 60 credits worth of taught modules at this point. This means that they will need to complete one more semester of taught modules.

Semester 1	Credits

Optional Modules
30 credits selected from:*

CO7091	COMPUTATIONAL INTELLIGENCE FOR SOFTWARE ENGINEERING	15
CO7515	ADVANCED WEB TECHNOLOGIES	15
CO7517	AGILE CLOUD AUTOMATION	15
CO7508	SOFTWARE MEASUREMENTS AND QUALITY ASSURANCE	15

*Students cannot complete a module more than once and will need to complete the two modules they did not complete previously.

February	Credits

Core Module

CO7501	INDIVIDUAL PROJECT	90

Postgraduate Certificate in Advanced Computer Science

Semester 1	Credits

Optional Modules
30 credits selected from:

CO7091	COMPUTATIONAL INTELLIGENCE FOR SOFTWARE ENGINEERING	15
CO7515	ADVANCED WEB TECHNOLOGIES	15
CO7517	AGILE CLOUD AUTOMATION	15
CO7508	SOFTWARE MEASUREMENTS AND QUALITY ASSURANCE	15

Semester 2	Credits

Optional Modules
30 credits selected from:

CO7093	BIG DATA AND PREDICTIVE ANALYSIS	15
CO7514	SERVICE ORIENTED ARCHITECTURES	15
CO7507	GENERATIVE DEVELOPMENT	15

MSc in Advanced Software Engineering

Semester 1		**Credits**

Core Modules

CO7508	SOFTWARE MEASUREMENTS AND QUALITY ASSURANCE	15

Optional Modules

Relaxed Route: 15 credits selected from the list below.

Intensive Route: 30 credits selected from:

CO7091	COMPUTATIONAL INTELLIGENCE FOR SOFTWARE ENGINEERING	15
CO7515	ADVANCED WEB TECHNOLOGIES	15
CO7517	AGILE CLOUD AUTOMATION	15

Semester 2		**Credits**

Core Modules

CO7514	SERVICE ORIENTED ARCHITECTURES	15

Optional Modules

Relaxed Route: 15 credits selected from the list below

Intensive Route:

CO7093	BIG DATA AND PREDICTIVE ANALYSIS	15
CO7507	GENERATIVE DEVELOPMENT	15

Students on the 'Intensive' Study Route will have completed 90 credits worth of taught modules at this point. This means that they will go on to complete their Individual Project:

June		**Credits**

Core Module

CO7501	INDIVIDUAL PROJECT	90

Students on the 'Relaxed' Study Route will have completed 60 credits worth of taught modules at this point. This means that they will need to complete one more semester of taught modules.

Semester 1		**Credits**

Optional Modules

30 credits selected from:

CO7091	COMPUTATIONAL INTELLIGENCE FOR SOFTWARE ENGINEERING	15
CO7515	ADVANCED WEB TECHNOLOGIES	15
CO7517	AGILE CLOUD AUTOMATION	15

*Students cannot complete a module more than once and will need to complete the two modules they did not complete previously.

February	Credits
Core Module	
CO7501 INDIVIDUAL PROJECT	90

Postgraduate Certificate in Advanced Software Engineering

Semester 1	Credits
Core Modules	
CO7508 SOFTWARE MEASUREMENTS AND QUALITY ASSURANCE	15

Optional Modules
15 credits selected from:

CO7091	COMPUTATIONAL INTELLIGENCE FOR SOFTWARE ENGINEERING	15
CO7515	ADVANCED WEB TECHNOLOGIES	15
CO7517	AGILE CLOUD AUTOMATION	15

Semester 2	Credits
Core Modules	
CO7514 SERVICE ORIENTED ARCHITECTURES	15

Optional Modules
15 credits selected from:

CO7093	BIG DATA AND PREDICTIVE ANALYSIS	15
CO7507	GENERATIVE DEVELOPMENT	15

For the CPD course, students can choose to take any taught module mentioned in the above Programme Structures, however they should note that each module is only available in one teaching session, and so may wish to choose their intake based on when the module they wish to study is available.

Updates to the programme

Academic year affected	Module Code(s)	Update

Appendix 2: Module Specifications
See module specification database http://www.le.ac.uk/sas/courses/documentation