UNIVERSITY OF LEICESTER

Programme Specification (Postgraduate)
For students entering in 2021/22
Date amended: August 2020

1. Programme Title(s):

Two-year MSc (incl Postgraduate Diploma and Postgraduate Certificate as exit awards) in

- Advanced Computer Science (ACS)
- Advanced Computer Science (ACS) with Industry

2. Awarding body or institution:

University of Leicester

a) Mode of study

The taught modules would all be taken in the first four semesters. This is followed by the industrial placement, which is between 3 and 12 months long. This is followed by the in-house project, taking 10 weeks.

b) Type of study

The taught modules and project are campus based. The industrial placement is off campus, on the site of the Placement Provider.

4. Registration periods:

a) MSc October Intake

The normal period of registration is 24 months
The maximum period of registration is 36 months

b) MSc (with industry)

The normal period of registration is 36 months

The maximum period of registration is 48 months

5. Typical entry requirements:

These programmes will only be open to students who have passed an equivalent of the second year of our BSc Computer Science at an institution that the College of Science & Engineering has a collaborative agreement with: such an agreement will typically take one of two forms.

(i) A general agreement where students that have passed an equivalent year to the Leicester second year can apply for admission to the proposed two-year MSc at Leicester. In this case, the admissions team in cooperation with the programme leader will evaluate if the applicant's prior achievements cover the learning outcomes required as prerequisites for the third, final year, of the UoL BSc Computer Science programme.

(ii) In a more specific arrangement, some of the partner Bachelor programmes are considered and at the agreement discussion stage and are listed in the collaboration documents. Module content details and learning outcomes will already have been reviewed. In this case an individual assessment of modules for each application will follow a more light touch approach to ensure the applicant has taken the required modules and achieved the necessary marks/CGPAs.

We will require a level of prior achievement equivalent to an average of 60% or higher at Leicester, suitably translated into the corresponding score for candidates' home institution. In particular candidates need to be fluent in object-oriented programming, particularly Java and Python, common software engineering methods, processes and practices, basic statistics and discrete mathematics.

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 aims of the programme 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.
- To 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.
- 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.

The 'year in industry' variant of this programme is offered in accordance with the University's standard specification for year in industry programme variants.

For the with industry variant only, these additional programme aims apply:

- Prepare students for career and training opportunities which relates to their degree – in both the private and public sectors, and voluntary organisations.
- Construct effective applications for placement opportunities
- Provide students the opportunity to recognise suitable plans for transitioning into the workplace

8. Reference points used to inform the programme specification:

- QAA Benchmark Computing (Masters) 2019)
- PDR report (February 2019)
  University Learning Strategy
- University Employability Strategy
- External Examiner's Reports

Programme Outcomes:

In the table below will indicate the LOs, methods and demonstrations for the programme.

Learning Outcomes	Teaching Methods Subject and Professional Skills	How Demonstrated
Knowledge		
Demonstrate knowledge and mastery of a range of advanced computer science subjects and the way they relate to IT practice. Integration of knowledge across subjects.	Independent research, 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.
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 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. As above.	Written examinations, assessed coursework, group essays, oral presentations, dissertation and reports. As above.

Learning Outcomes	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.	Personal and Group Skills module, and individual project.	Individual project components; group discussions and essays.
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. As above.	Oral presentations, participation in group discussions, essays/demos, project plan, dissertation, 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.	Lectures, seminars, group discussions. Personal and Group Skills module. Work placement.	Oral presentations, participation in group discussions, essays/demos, project plan, and dissertation.
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 and sustain 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.

Learning Outcomes	Teaching Methods	How Demonstrated
Transferable skills		
Communication skills		
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. Workshops delivered by Student Learning Development.	Group discussions and individual project presentations, individual project oral examinations, 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 Student Learning Development. Individual project supervision.	Written examinations, assessed coursework, group essay, intermediate individual project reports and dissertation.
Produce properly structured, clear, advanced technical reports or dissertations.	As above.	Group essay. Intermediate individual project reports and dissertation.
Data presentation		
Organise and present information gathered through research clearly and effectively using appropriate IT resources.	Independent research. Lectures. Workshops delivered by Student Learning Development.	Oral presentations, essays/demos, work placement report, and dissertation.
Working relationships		
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.	Oral presentations, participation in group discussions, work placement report.
Research skills		
Conduct significant background research and literature surveys, organise and marshal evidence, report on findings, analyse complex ideas and construct sophisticated critical arguments.	Project supervision. Seminars, group discussions, collective essay, and specific workshops delivered by Student Learning Development.	Collective essay, group discussions, and individual project reports and dissertation.
Managing learning		
Demonstrate independence and time management skills.	Tutor system. Career development workshop delivered by the Student Learning Development.	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.	Project supervision.	Individual project topic choice and plan, intermediate reports and dissertation.

For the with Industry variant of the programme, the following apply

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
Placement Preparation 1 and 2		
1. Select appropriate resources for researching/securing placement opportunities 2. Explain the process for applying for and securing a relevant placement 3. Construct effective applications for placement opportunities 4. Recognise suitable plans for transitioning into a placement	Students are provided with dedicated and timetabled sessions to prepare to search and secure an industrial placement. Problem solving classes, Masterclasses, Career development programmes, Independent research.	Formative module feedback through session tasks and exercises
On Placement		
1. Apply the theoretical and practical aspects of the material studied at the University and demonstrate the personal and professional skills necessary for your role within the organisation. 2. Compose a Professional Development Plan considering your strengths, development areas and motivations for your next step 3. Modify your CV to include the skills and experience you have gained through your significant experience gained in the past 12 months.	Students undertake a minimum of 3 months experience in the workplace. Project supervision, independent research	Completion of Monthly Reflective Journals to record skills development, major achievements, key areas of work, learning points and challenges overcome. Assessed by a Placement Portfolio, comprising of a Reflective Summary, Professional Development Plan, and Updated CV (excluded from word count) to formally assess on a pass or fail basis. Formative feedback during a Placement Visit (in person or via Skype) from Placement Provider and Placement Tutor regarding reflection on skills development, areas of strength and weakness and contribution to the workplace.

10. Special features:

The MSc part of the course contains the compulsory Personal and Group Skills 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 Student Learning Development. This module provides a platform to both support the development of transferable skills (such as groupwork, communication, academic writing and presentation) and allow students to address research questions in the context of their own nationality, ethnicity and culture, supporting inclusivity.

The other part of the programme providing a great level of flexibility is the individual project, which can be research related, entrepreneurial, involve industry partners or follow the student's own interests. The department has close links with industry partners, is an active contributor to both the Leicester Innovation Hub and the Space Park development, and is research active in all areas covered by the programmes. Students benefit from these links and activities both in their projects and through special lectures, tutorials and discussions with national and international collaborators.

For the with Industry variant of the degree, the following apply:

i. After completing the eight taught modules and exams in the first year of the course, students will carry out between 3 and 12 months employment in an industrial placement. Students will be encouraged to undertake the maximum period of employment possible, to gain the full benefit of experience in industry.

ii. On the return from an industrial placement, the Placement Student will carry out an in-house project in the School or Department, as per the normal non-Industry MSc. The project will be supervised and assessed within the Department. The project title will be decided, in conjunction with the Placement Student, while they are on placement.

iii. During the industrial placement, appropriate support will be provided by the School or Department as defined in the Code of Practice.

iv. Placement Students will be expected to complete a Monthly Reflective Journal to record their training. This will support the Placement Student to complete the Placement Portfolio which is assessed on a pass/fail basis, and will have no credit weighting in the MSc

v. Placement Students who do not pass the assessment or meet the minimum duration of an industrial placement will receive the standard MSc degree.

11. Indications of programme quality:

QAA subject review, external examiners reports, periodic developmental reviews, module review process including student surveys are all used to reflect on and improve the curriculum design and the methods and quality of delivery . The BSc component has been accredited by the British Computer Society (BCS). It requires that individual projects be passed at the first attempt.

For the with Industry variant of the degree, the following apply:

It is the student's responsibility to secure an industrial placement. Students are invited to attended Placement Preparation modules, additional support workshops and 1-2-1 appointments with the

Career Development Service. Employer led activities provide a platform for students to engage with organisations who are recruiting students for year in industry roles.

The 'with Industry' MSc relies on the Placement Provider to provide work suitable for an MSc student. To ensure the role is relevant, the School or Department assesses the industrial placement through the University's Placement Approval Process. The Placement Provider will be asked to provider:

- An indication of the area of the organisation where the Placement Student will work.
- An indication of the area of expertise that the Placement Student should have or will gain.
- Whether the work is suitable only for a UK national, for and EU national or for an overseas student.
- The resources available to the Placement Student. For example, design software, textbooks, laboratory equipment, product specimens, access to facilities in the organisation.
- Identification of a suitable industrial mentor (i.e. a graduate with knowledge of the area and at least a couple of years of experience in the field).

When a Placement Student starts an industrial placement, they will be required to complete health and safety documents and confirm they have completed a formal induction process no later than the 2nd week of placement. A Placement Student on an industrial placement will also gain from being able to:

1. Apply the theoretical and practical aspects of the material studied at the University and demonstrate the personal and professional skills necessary for your role within the organisation.
2. Compose a Professional Development Plan considering your strengths, development areas and motivations for your next step
3. Modify your CV to include the skills and experience you have gained through your significant experience gained in the past 12 months

Placement Students will be provided with a Study Guide for their industrial placement and support them to complete the assessment. The School or Department will undertake a placement start check, regular communications, visits to the workplace (physical and/or virtual) and evaluation. Communication and contact between the Placement Student, Placement Provider and University provides support should issues arise.

12. Scheme of Assessment

The first year of this programme follows the undergraduate scheme of assessment and classification as set out in Senate Regulation 5. The second year follows the assessment and awards procedures for postgraduate programmes in Regulation 6.

Students who have passed the first year of the program, but have not met the Learning Outcomes for the award of an MSc, can be awarded a postgraduate diploma or postgraduate certificate as an exit award according to the rules set out for these awards in the Regulation 6 (Criteria for and classification of awards).

13. Progression points

To progress from the 1st to the 2nd year of the programme, students normally have to achieve a credit weighted average of 60%, with the option to consider borderline cases and special circumstances.

Before starting to study the Leicester first year modules, the student and home institution agree the study programme (including any option module selections). After completing their first year at Leicester, students will receive a Leicester transcript in the normal way. This transcript will then be submitted by the student to the student's home university for consideration as part (the final year) of the home university Bachelor degree programme.

Candidates entitled to proceed to a full MSc degree undertake, after examinations, an individual project.

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 or exit award where appropriate.

A Placement Student will revert back to the degree without Year in Industry if:

1. They do not achieve an overall merit level or fail exams at the end of their first taught semester they will normally revert to the degree without industry or fail to satisfactorily perform (attend, participate and complete set tasks) in the employability programme (modules ADCO7221 and ADCO7222)
2. They fail to secure an industrial placement role.
3. They fail to pass the assessment related to the industrial placement.
4. The industrial placement ends early due to the behaviour of the Placement Student not being in accordance with the University's Regulations for Students, Student Responsibilities. The Placement Student will need to return to the University and carry out an in-house project in the School or Department, as per the normal non-Industry MSc. To prevent such an incident from happening, processes are in place to identify any possible issues or concerns early in the industrial placement role. This includes a start check, regular communications, visits to the workplace (physical and/or virtual) and evaluation. Communication and contact between the Placement Student, Placement Provider and University provides support should issues arise.
5. They discontinue their industrial placement and carry out an in-house project in the School or Department, as per the normal non-Industry MSc.

In the event that a Placement Student is moved to the standard campus-based MSc, the Placement Provider will be notified immediately. For overseas students, the UKBA will also be informed immediately. Placement Provider's will be made that any contract of employment shall be made subject to satisfactory completion of the taught part of the MSc.

Three months is the minimum time required for an industrial placement to be formally recognised. If the industrial placement is terminated earlier than 3 months as a result of event outside of the Placement Students control (for example redundancy, or company liquidation), the following process will be adopted:

1. If the Placement Student has completed less than 2 months, they will be supported to search for another placement to take them up to the required minimum of 3 months for the industrial placement to be formally recognised. If the Placement Student does not find a placement to meet this criteria they will be required to suspend and transferred onto the degree without industry.
2. If the Placement Student has completed 2 months, they will be supported to search for another placement to take them up to the 3 months required for the industrial placement to be formally recognised. If the Placement Student cannot source an additional placement to take them to 3 months, assessments related to the industrial placement will be set for the

student to make it possible for the individual learning objectives for the industrial placement to be met. This will allow with industry to be recognised in the degree certificate.

3. The duration of time between the two Placement Providers to meet the minimum 3 months of an industrial placement must not exceed the period of time required to comply with visa requirements.
4. A Placement Student is permitted to undertake an industrial placement which runs across two academic years.

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

The first year of the programme will follow the rules for resits and resubmissions for undergraduate degrees as defined in Senate Regulation 5. The second year follows the rules and procedures for postgraduate programmes in Regulation 6.

Resits may only be taken when the exam for the module to be resat is offered again.

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

Admissions are in October into the final year of the BSc in Computer Science. After completing this, their 1st year with us, students will progress to the MSc in Advanced Computer Science or MSc in Advanced Computer Science (with Industry) as their 2nd year. In the first case, they will undertake their MSc individual project during the summer of their second year and submit their dissertation in September (24 months in total). In the second case, the project will be undertaken during the term following their return from placement.

Examinations are taken in January for first semester modules and in May for second semester modules. Additionally, the "With Industry" programme will be longer, as the placement, which can be of 3, 6, 9 or 12 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 a 12-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.

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)

The programme is composed of the 3rd year of the BSc in Computer Science and an MSc in Advanced Computer Science, with optional Industry placement.

BSc COMPUTER SCIENCE THIRD YEAR MODULES

SEMESTER 1

Core Modules		**Credits**
CO3201	COMPUTER SCIENCE PROJECT [PART I]	15
CO3101	COMPUTERS, SOCIETY & PROFESSIONALISM	15

Optional Modules		**Credits**
30 credits selected from:		
CO3091	COMPUTATIONAL INTELLIGENCE AND SOFTWARE ENGINEERING	15
CO3095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO3102	MOBILE AND WEB APPLICATIONS	15
CO3105	C++ PROGRAMMING	15
CO3107	EMERGING TECHNOLOGIES	15
	Semester Total	**60**

SEMESTER 2

Core Modules		**Credits**
CO3201	COMPUTER SCIENCE PROJECT [PART II]	30

Optional Modules		**Credits**
30 credits of options selected from:		
CO3002	ANALYSIS AND DESIGN OF ALGORITHMS	15
CO3093	BIG DATA AND PREDICTIVE ANALYTICS	15
CO3099	FOUNDATIONS OF CYBER SECURITY	15
CO3103	TECHNOLOGY MANAGEMENT	15
CO3108	AI TECHNOLOGIES	15
CO3109	HEALTH COMPUTING	15
CO3xxx	FUNCTIONAL PROGRAMMING	15
	Semester Total	**60**

In line with the other MSc offerings in the Department of Informatics, in the MSc year there are three kinds of modules in the MSc programmes. Details of the modules, including the semesters when they are delivered are shown in the module listing below.

Personal and Group Skills (PGS) (15 credits)

This module is offered in both semesters and provides students with skills supporting their employability. 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 of optional modules as indicated in the module listing below.

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.

Students are not allowed to take MSc level variants of modules that they have already taken at 3rd year level. In particular, this includes

- CO7002 as a variant of CO3002
- CO7091 as a variant of CO3091
- CO7093 as a variant of CO3093
- CO7095 as a variant of CO3095
- CO7099 as a variant of CO3099
- CO7102 as a variant of CO3102
- CO7105 as a variant of CO3105

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 the with Industry variant of the programme 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. ADCO7221 and ADCO7222 are compulsory for 'with industry' students.

Programme Regulations (Programme Structure)

MSc in Advanced Computer Science

SEMESTER 1

Optional Modules		**Credits**
60 credits selected from:		
CO7210	PERSONAL AND GROUP SKILLS*	15
CO7091	COMPUTATIONAL INTELLIGENCE AND SOFTWARE ENGINEERING	15
CO7095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO7102	MOBILE AND WEB APPLICATIONS	15
CO7105	ADVANCED C++ PROGRAMMING	15
CO7215	ADVANCED WEB TECHNOLOGIES	15
CO7217	AGILE CLOUD AUTOMATION	15
CO7219	INTERNET AND CLOUD COMPUTING	15
CO7223	USER EXPERIENCE AND INTERACTION DESIGN**	15
CO7224	MOBILE AND UBIQUITOUS COMPUTING**	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 OF ALGORITHMS		15
CO7093	BIG DATA AND PREDICTIVE ANALYSIS		15
CO7099	FOUNDATIONS OF CYBERSECURITY		15
CO7200	ALGORITHMS FOR BIOINFORMATICS		15
CO7207	GENERATIVE DEVELOPMENT		15
CO7214	SERVICE ORIENTED ARCHITECTURES		15
CO7225	SERVICE DESIGN		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

** students cannot choose both CO7223 and CO7224, they can only choose one or the other.

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 core modules of:

Semester 1		
ADCO7221	Placement Preparation 1	0
Semester 2		
ADCO7222	Placement Preparation 2	0

All students on the 'with Industry' variant will undertake a 3, 6, 8 or 12 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