UNIVERSITY OF LEICESTER

Programme Specification (Undergraduate)

For students entering in 2020/21

Date amended: 30 Jan 2020

1. Programme Title(s) and UCAS code(s):

BSc Computer Science (G400)

BSc Computer Science with a Year Abroad (G401)

BSc Computer Science with a Year in Industry (G402)

2. Awarding body or institution:

University of Leicester

3. a) Mode of study:

Full-time

b) Type of Study:

Campus-based

4. Registration periods:

The normal period of registration is three years (four years for the "Year Abroad" and "Year in Industry" variants).

The maximum period of registration is five years (six years for the "Year Abroad" and "Year in Industry" variants).

For Foundation Year Variant:
The normal period of registration is four years (one year for the Foundation Year, with three years for the BSc). The maximum period of registration is six years (one year for the Foundation Year, and five years for the BSc)

5. Typical entry requirements:

A level: ABB or points equivalent from best three A levels. Computer Science or Mathematics preferred but not essential.

BTEC Diploma: D*D*D in appropriate subject area, plus a pass in a Departmental UCAS day test.

For Foundation Year Variant:

A level: BBB or points equivalent from best three A levels. Typically in subjects outside of the 'usual' A levels expected by the department.

BTEC Diploma: D*DD in appropriate subject area.

6. Accreditation of Prior Learning:

APL will not be accepted for exemptions from individual modules, however may be considered for direct entry to year 2, on a case by case basis and subject to the general provisions of the University APL policy.

For Foundation Year Variant:
n/a

7. Programme aims:

The programme aims to:

- Provide students with a state-of-the-art education in Computer Science that includes both theory and foundations (pure Computer Science), and practical applications (applied Computer Science).
- Provide opportunities for students to learn a wide range of skills in the analysis, specification, design, implementation, testing, maintenance and documentation of computer software systems.
- Enable students to become proficient in a variety of modern programming languages, and the underlying principles of programming paradigms (concurrent, imperative, functional, logical, mobile, object oriented and so on).
- Enable students to explain core subjects such as advanced algorithms, computer architecture, operating systems and networks, foundations of computation, databases, web & mobile computing, together with a further range of advanced subjects such as data analytics, big data, and machine learning that reflect the research expertise of the Department.
- Enable students to develop skills such as Communication, Teamwork^, Leadership & Supervision, Researching & Analyzing^, Problem Solving & Decision Making^, Planning & Organization^; Learning, Improving & Achieving; Resilience, Adaptability & Drive; and Digital Skills^. Skills labelled ^ are taught to a high level of insight and complexity.
- Provide students with experience of both team-based and individual project work.
- To develop an appreciation for computational, mathematical and scientific thinking, along with an appreciation of the necessity for rigorous subject foundations, and the need for mathematical and logical arguments, which will provide a lifelong support for careers.
- Ensure students will have expertise and understanding at a level where they can embark upon a high quality taught Masters programme in Computer Science.

In addition to these aims, G401 BSc Computer Science with a Year Abroad aims to:

- Enable students to experience modern Computer Science from an international perspective.
- Develop students' working knowledge of a language other than English.
- Provide students with an environment that will encourage a thoughtful and mature approach to all aspects of study and life, creating graduates with broad experiences and horizons.

In addition to these aims, G402 BSc Computer Science with a Year in Industry aims to:

- Enable students to take up industrial placements where they can gain first-hand experience of the requirements, challenges and opportunities of the computing industry in the UK.
- Enable students to use and further develop the knowledge and skills gained during the first two years of the degree programme.

For Foundation Year variant, see Foundation Year Programme Specification

8. Reference points used to inform the programme specification:

- QAA Benchmarking Statement for Computing 2016.
- University of Leicester Learning Strategy 2016-2020.
- University of Leicester Periodic Developmental Review Report
- External Examiners' reports (annual).
- PDR report.

9. Programme Outcomes:

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
(a) Discipline specific knowledge and competencies		
(i) Mastery of an appropriate body of knowledge		
1. Explain and discuss both foundations and applications of Computer Science together with concomitant scientific knowledge and concepts from logic and mathematics.	Lectures, tutorials, computer laboratories, audios & videos, group discussions, project work, guided independent study. Also background reading and research.	Written examinations, summative and formative coursework, group and individual project presentations, individual project oral examinations and project dissertations.
2. Explain, discuss and apply engineering principles scientific principles and mathematical and logical theories in computing.	As above.	As above.
3. Demonstrate mastery of the core of an appropriate foreign language (G401)	Lectures, language laboratories and learning abroad.	Assessment at host institution.
4. Demonstrate understanding of the core elements of industrial practice and organisation (G402).	Work placement.	Placement Report; presentation.
Intended Learning Outcomes	**Teaching and Learning Methods**	**How Demonstrated?**
(ii) Understanding and application of key concepts and techniques		
Apply knowledge of Mathematics, Logic and Computer Science to solve individual problems, both seen and unseen.	Lectures, tutorials, computer laboratories, audios & videos, group discussions, project work, guided independent study. Also background reading and research.	Written examinations, summative and formative coursework, group and individual project presentations, individual project oral examinations and project dissertations.
Apply the concepts and techniques of abstraction, reification, logical structure and modelling, that pervade Computer Science and Software Engineering to specify, design, implement and test small to medium size computer systems.	As above.	As above.
Explain and apply the theoretical principles, and practical tools of Mathematics, Logic, Computer	As above, with emphasis on all forms of project work.	

Science, and Software Engineering, together with suitable processes and methodologies, to determine strategies for innovative solutions of large scale problems. not Logic.] Demonstrate ability to communicate some aspects of Computer Science in a foreign language. (G401) Work as a computer scientist and computing engineer in an industrial or commercial setting. (G402)	Lectures and language instruction.	As above, with emphasis on project assessments. As above University report.
Intended Learning Outcomes	**Teaching and Learning Methods**	**How Demonstrated?**
(iii) Critical analysis of key issues		
1. Analyse client/customer problems, requirements and criteria, and hence plan an appropriate yet innovative solution strategy. 2. Explain and analyse the constraints of budgets, data, time, staffing and resources in the practical computing domain, undertaking suitable research. Ensure software solutions are fit-for-purpose. Manage the complete engineering process and evaluate the end product, and to work with associated uncertainties. 3. Be able to recognise risks in the deployment and use of software systems.	Lectures, tutorials, computer laboratories, audios & videos, group discussions, project work, guided independent study. Also background reading and research. As above.	Written examinations, summative and formative coursework, group and individual project presentations, individual project oral examinations and project dissertations. As above.
(iv) Clear and concise presentation of material		
Present information in a variety of forms, chosen to maximise reader/audience impact and understanding, such as reports, dissertations, seminars, posters, blogs, podcasts, videos and other current media technologies.	Lectures, tutorials, computer laboratories, audios & videos, group discussions, project work, guided independent study. Also background reading and research.	Written examinations, summative and formative coursework, group and individual project presentations, individual project oral examinations and project dissertations.

(v) Critical appraisal of evidence with appropriate insight		
1. Evaluate and appraise software systems, in terms of attributes and tradeoffs. Identify risks and safety concerns. 2. Perform software testing, and critically evaluate and analyse test results. Evaluate whether a system meets requirements, for future and for current use. 3. Use relevant knowledge to appraise the commercial use and economic and long- term viability of computer systems.	Lectures, tutorials, computer laboratories, audios & videos, group discussions, project work, guided independent study. Also background reading and research.	Written examinations, summative and formative coursework, group and individual project presentations, individual project oral examinations and project dissertations.
(vi) Other discipline specific competencies		
1. Explain and discuss social, legal and ethical issues as required by computing professionals. Adopt and implement suitable professional and legal practice. 2. Explain and react to the rapidity of change in Computer Science. Formulate innovative and creative ideas for future advances. 3. Collect, work with and analyze all forms of data.	Lectures, tutorials, computer laboratories, audios & videos, group discussions, project work, guided independent study. Also background reading and research.	Written examinations, summative and formative coursework, group and individual project presentations, individual project oral examinations and project dissertations.

(b) Transferable skills		
(i) Oral communication		
1. Respond to technical questions with accurate and concise answers.	Lectures and tutorials. Project supervisions.	Group and individual project presentations, individual project oral examinations.
2. Demonstrate fluent and sustained scientific, technical and business communication.	As above.	As above.
3. Demonstrate core oral communication skills in a foreign language (G401).	Language tuition.	Host University assessment.
(ii) Written communication		
1. Write concise and accurate summaries of computing and scientific knowledge, and solutions to problems, in a variety of different formats.	Lectures, tutorials, computer laboratories, project work.	Written examinations, assessed coursework.
2. Produce properly structured, clear, advanced technical reports or dissertations.	Lectures and tutorials. Discussed in both group and individual project supervisions.	Group project assessed coursework and individual project reports.
3. Demonstrate core written communication skills in a foreign language (G401).	Lectures, tutorials, language laboratory work.	University report.
(iii) Information technology		
1. Use a very broad range of software and IT tools, and to choose these appropriately for uses throughout Computer Science.	Lectures, tutorials and laboratories.	Assessed (laboratory) coursework.
2. Adapt to future programming languages and paradigms, and all varieties of software tools and technology.	As above.	As above.

Intended Learning Outcomes	Teaching and Learning Methods	How Demonstrated?
(iv) Numeracy		
1. Demonstrate understanding of the concept of number. Solve numerical problems.	Lectures, tutorials, computer laboratories.	Written examinations, assessed coursework.
2. Use analytical, quantitative, and graphical methods, and deploy elementary statistics.	As above, together with project work.	As above, along with group and individual project presentations and reports.
(v) Team working		
1. Work effectively as part of a team, organise roles and manage time, undertake assigned tasks, and ensure final completion of a team project. Identify strengths and weaknesses of team members.	Lectures, tutorials and project supervision.	Group project assessed coursework and presentations. Mini projects.
(vi) Problem solving		
1. Solve a variety of short problems through the integration of knowledge of mathematics, logic, and Computer Science.	Lectures and tutorials. Also covered in project supervisions.	Written examinations, assessed coursework, and project reports.
2. Use systematic analysis and design methods, and appropriate algorithms, to solve medium scale problems.	As above.	As above.
3. Analyze large-scale problems to produce suitable solutions with sensible economic and commercial compromises. Apply management techniques to allocate resources to projects.	As above.	Group and individual project presentations and reports.

(vii) Information handling		
1. Conduct significant background research and literature surveys, and summarise content from information sources.	Taught in lectures. Also covered in project supervisions.	Individual project reports.
2. Demonstrate a broad understanding of problems and issues that arise in the location, organization, processing and evaluation of data.	As above.	Written examinations, assessed coursework, and project reports.
3. Recognize the need for information, and work with fuzzy, limited and possibly contradictory information.	As above.	As above.
(viii) Skills for lifelong learning		
1. Demonstrate knowledge and understanding of professional and ethical issues, and aspects of the law, in the context of Computing Professionals.	Lectures and tutorials. Also covered in project supervisions.	Written examinations, assessed coursework, and project reports.
2. Demonstrate independence and time management skills.	Project supervisions and research project work. Meeting coursework deadlines.	Project reports.
3. Design a personal work plan and be able to improve performance with a clear view of long-term professional development.	Project supervisions and research project work.	As above.

10. Progression points:
This programme follows the standard scheme of award and classification set out in Senate Regulation 5 modified as follows:

Regulation 5.10 applies absolutely to CO2201 Software Engineering Project and CO2103 Software Architecture and System Design.

For Foundation Year Variant:
Progression from Foundation Year to year 1: In cases where a student has failed to meet a requirement to progress he or she will be required to withdraw from the course.

Students will be required to pass Foundation Year in order to progress to Year 1 with an average module mark of at least 60%. Students are required to have a mark of at least 60% in FS0031 and FS0032 to progress onto the BSc Computer Science.

For the with industry variant:

- Students should normally pass the first year at the first attempt; and
- should normally pass the second year at first sitting in January/June, otherwise they will be transferred to the equivalent three year degree.

In year 1 and year 2, students normally need to achieve a CWA of 55%. Exceptional cases may be approved by the appropriate assessment boards.

British Computer Society Accreditation requires that individual projects be passed at the first attempt.

11. Scheme of Assessment

This programme follows the standard Scheme of award and classification set out in Senate Regulation 5.

If regulation 5.14(c) applies in relation to any of the modules CO1102, CO1105, CO1107 then failed marks must be no lower than 35% (rather than the normal 30%) in order for students to proceed and re-sit.

12. Special features:

Emphasis on blending long-term foundational knowledge with state-of-the-art technologies and current programming languages; a structured approach to teaching a wide range of programming paradigms; Software Engineering Projects involving an external client wherever possible; Individual Projects with a number of structured milestones.

13. Indications of programme quality

British Computer Society Accreditation will be sought, and requires that individual projects be passed at the first attempt.

14. External Examiner

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) overleaf

Appendix 2: Module specifications

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

Appendix 3: Skills matrix

See skills matrix

Appendix 4: Foundation Year Programme Specification

BSc COMPUTER SCIENCE;

FIRST YEAR MODULES **SEMESTER 1**

Core Modules			**Credits**
CO1101	COMPUTING FUNDAMENTALS		15
CO1102	PROGRAMMING FUNDAMENTALS		15
CO1103	MATHEMATICS FUNDAMENTALS		15
CO1104	COMPUTER ARCHITECTURE		15
		Semester Total	**60**

SEMESTER 2

Core Modules			**Credits**
CO1105	INTRODUCTION TO OBJECT ORIENTED PROGRAMMING		15
CO1106	REQUIREMENTS ENGINEERING AND PROFESSIONAL PRACTICE		15
CO1107	ALGORITHMS, DATA STRUCTURES AND ADVANCED PROGRAMMING		15
CO1108	FOUNDATIONS OF COMPUTATION		15
		Semester Total	**60**

SECOND YEAR MODULES **SEMESTER 1**

Core Modules			**Credits**
CO2101	OPERATING SYSTEMS AND NETWORKS		15
CO2103	SOFTWARE ARCHITECTURE AND SYSTEM DEVELOPMENT [PARTI]		15
CO2102	DATABASES AND DOMAIN MODELLING		15
CO2201	SOFTWARE ENGINEERING PROJECT [PART I]		15
		Semester Total	**60**

SEMESTER 2

Core Modules			**Credits**
CO2103	SOFTWARE ARCHITECTURE AND SYSTEM DEVELOPMENT [PART II]		15
CO2104	USER INTERFACES AND HCI		15
CO2201	SOFTWARE ENGINEERING PROJECT [PART II]		15

Optional Modules

15 credits of options selected from:

CO2106	DATA ANALYTICS		15
CO2107	FUNCTIONAL PROGRAMMING		15
CO2114	FOUNDATIONS OF ARTIFICIAL INTELLIGENCE		15
		Semester Total	**60**

THIRD YEAR MODULES **SEMESTER 1**

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

Optional Modules

30 credits of options selected from:

CO3007	COMMUNICATION AND CONCURRENCY	15
CO3091	COMPUTATIONAL INTELLIGENCE AND SOFTWARE ENGINEERING	15
CO3095	SOFTWARE MEASUREMENT AND QUALITY ASSURANCE	15
CO3102	MOBILE AND WEB APPLICATIONS	15
CO3105	C++ PROGRAMMING	15

CO3219	INTERNET AND CLOUD COMPUTING	15
	Semester Total	**60**

SEMESTER 2

Core Modules		**Credits**
CO3201	COMPUTER SCIENCE PROJECT [PART II]	30
Optional Modules		
30 credits of options selected from:		
CO3002	ANALYSIS OF ALGORITHMS	15
CO3093	BIG DATA AND PREDICTIVE ANALYTICS	15
CO3096	COMPRESSIONS METHODS FOR MULTIMEDIA	15
CO3099	FOUNDATIONS OF CYBER SECURITY	15
CO3103	TECHNOLOGY MANAGEMENT	15
	Semester Total	**60**

BSc COMPUTER SCIENCE WITH A YEAR ABROAD

First and Second Year Modules

As for the first- and second-year of the BSc degree in Computer Science.

Third Year Modules

The third year will be spent abroad taking approved courses either in an institution associated with the Computer Science Department via an ERASMUS bilateral agreement or in a university that has a Study Abroad exchange partnership agreement with the University of Leicester. Students will normally be required to complete the year and to reach a pass level of attainment in 60 credits of Computer Science modules Failure to do so will result in the student reverting to the three year BSc Computer Science degree. The marks awarded during the year abroad do not contribute to the final degree classification.

Note: Transfer will be confirmed only after successful completion of the first year.

Fourth Year Modules

As for the third-year of the BSc degree in Computer Science.

BSc COMPUTER SCIENCE WITH A YEAR IN INDUSTRY

First and Second Year Modules

As for the first- and second-year of the BSc degree in Computer Science.

Third Year Modules

1. Students will work within a sponsoring company for one year between 1 July of the second year of the course and the start of the following year.
2. During their one-year placement students will undertake a programme of training and work experience which will be agreed by the sponsoring company and the University.
3. Students will be expected to keep a logbook recording their training and experience that is to be presented for approval to the sponsoring company and the University.
4. Students will be issued with a *Certificate of Industrial Studies* indicating successful completion of their placement. Students who do not satisfactorily complete their industrial placement will be transferred to the B.Sc. Computer Science degree.

   The Year in Industry does not contribute to the final degree classification.

Fourth Year Modules

As for the third-year of the BSc degree in Computer Science.