Programme Specification[1]

1. Programme Title(s) and Code(s):

Programme Title	*UCAS Code*	*GU Code*
MSci in Computing Science	G402	G402-2207
MSci in Computing Science (Faster Route)	G403-2207	

2. Academic Session:

2018-19

3. SCQF Level (see Scottish Credit and Qualifications Framework Levels):

11

4. Credits:

600

5. Entrance Requirements:

Please refer to the current undergraduate prospectus at:
http://www.gla.ac.uk/undergraduate/

6. ATAS Certificate Requirement (see Academic Technology Approval Scheme):

ATAS Certificate not required

7. Attendance Type:

Full Time

8. Programme Aims:

This degree programme aims to:

- provide students with a deep understanding of the state of the art in specific computing science topics;
- provide students with a deep understanding of research methods and techniques required and used in computing science;
- give students the opportunity to study a broad range of core computing science topics through study of

[1] This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if full advantage is taken of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each course can be found in course handbooks and other programme documentation and online at www.gla.ac.uk/

The accuracy of the information in this document is reviewed periodically by the University and may be checked by the Quality Assurance Agency for Higher Education.

the literature in the field;

- encourage students to discover the connections among these topics and to understand their common theoretical foundations;
- produce graduates fit to occupy responsible positions in the information technology industry;
- give students the opportunity to choose selected topics to study in considerable depth thereby equipping the best graduates to enter research programmes;
- allow students to undertake independent research in a computing science topic of their choice, and contribute to the state of the art;
- encourage independent study habits that will stand graduates in good stead throughout their professional careers;
- enable students to enhance their transferable and interpersonal skills, particularly written and oral communication and team working;
- permit students to specialise in a chosen area.

In line with curricular recommendations from bodies such as the UK's QAA and the US's Association for Computing Machinery (ACM), this programme recognises that the body of knowledge in Computing Science has grown so extensively that it is impossible to cover everything in a single programme. Instead, the Benchmark and Body of Knowledge definitions from QAA and ACM respectively define key attributes of a CS graduate, specify a small core of knowledge that all graduates should know, and accept that institutions will define specialisms that enable to graduates to study at a deep level in specific areas. These specialisms match both to areas of strength within the School of Computing Science, but are also determined in discussion with our industry partners.

9. Intended Learning Outcomes of Programme:

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas:

Subject-Specific/Practical Skills:

At the end of the programme students will be able to demonstrate advanced **skills** dependent on the specialism chosen by the student, such as the ability to:

- program in several imperative, object-oriented, functional and concurrent programming languages; a thorough mastery of a least one of these languages;
- engineer substantial software systems through all stages of their life cycle, namely problem analysis, requirements, design, specification, construction, testing and modification;
- critically evaluate systems in terms of general quality attributes and possible trade-offs presented within the given problem;
- identify and critically appraise any risks or safety aspects that may be involved in the operation of computing equipment within a given context;
- specify, implement and evaluate concurrent and distributed computation;
- plan and execute a challenging and substantial Computing Science research project, evaluate the work done, and place that work in the context of other related work;
- summarise and review research papers in a variety of areas of Computing Science through the Project in Research Readings course.

Intellectual Skills:

At the end of the programme students will be able to demonstrate a deep understanding of advanced topics chosen by the student, which will lead to the ability to:

- debate strengths and weaknesses of different programming languages;
- distinguish social, professional and ethical implications of the use of computers and software development;
- model computer-based systems for the purpose of comprehension, communication, prediction and the understanding of trade-offs;
- critically evaluate and testing of the extent to which a computer-based system meets the criteria defined for its current use and future development;
- make and evaluate design decisions based on appropriate correctness and efficiency considerations;

- use formal and semi-formal methods in the analysis and verification of software;
- learn independently, solve challenging research problems and conduct independent research through the individual research project;
- critically review the research work of others through the Project in Research Readings course.

Transferable/Key Skills:

At the end of the programme students will be able to:

- work individually, including managing learning and development, making use of time management and organisational skills;
- work in teams, recognising the different roles team members adopt;
- present succinctly rational and reasoned arguments (orally or in writing);
- effectively perform information-retrieval skills (e.g. using search engines and catalogues);
- present cases involving a quantitative dimension thus demonstrating basic numeracy;
- effectively use general IT facilities;
- demonstrate highly developed oral and written communication skills through the assessed research proposal and project and project presentation.

10. Typical Learning and Teaching Approaches:

- **Knowledge and understanding**

  Contact with teaching staff is through lectures, large and small-group tutorials, workshop and laboratory sessions. The majority of staff provide handouts in lectures. Students are expected to augment these with their own notes, using these as a basis for further regular study during the course. Formatively assessed tutorial and laboratory exercises give students the opportunity to exercise their developing knowledge and understanding. Feedback on exercises is given individually or collectively.

- **Practical, discipline-specific, skills**

  Demonstrations are given and case-studies examined in lectures, workshops and tutorials.

  Extensive coursework exercises in the early years support the development of programming skills. Major team and individual project work develops particularly the ability to evaluate systems, recognise risks or safety aspects in the operation of computing equipment within a given context, and the ability to engineer substantial software systems through all stages of their life cycle. Subject coursework, in many different styles, often encourages development of all these skills.

- **Intellectual (thinking) skills**

  Lectures introduce these skills, which are developed using major project work, coursework, workshops. An awareness of social, professional and ethical implications of the use of computer applications and software development is developed using a series of group exercises, including debates, IT news analysis.

- **Transferable skills**

  Lectures and workshops introduce time management, reflection and communication, and organisation and planning, and these are developed extensively in major project work in particular. Numeracy in both understanding and presenting cases is developed as required in major and minor project work. Effective information retrieval skills are developed during major project work and coursework exercises. The effective use of IT facilities is developed as a side effect of all practical work.

- **Research skills**

  In the Research Proposal and Project, teaching and learning are by literature search, problem analysis, project planning, report writing, independent research and dissertation writing, under individual supervision.

11. Typical Assessment Methods:

- **Knowledge and understanding**

  Unseen examinations, consisting principally of short-answer questions with some essay-style questions. Assessed coursework in the form of tutorial exercises and reports of laboratory activity.

- **Practical, discipline-specific, skills**

  Practical seen examination. Assessed coursework exercises will each assess various subsets of these

skills. Major project work is assessed using a final written report, a demonstration and an oral presentation.

- **Intellectual (thinking) skills**

  Major project report assesses all skills. Assessed coursework may assess strengths and weakness of different programming paradigms, modelling computer based systems for the purposes of comprehension, communication, prediction and understanding trade-offs and risks. An awareness of social, professional and ethical implications of the use of computer applications and software development is assessed via individual performance in group work, and by unseen essay on topical issues.

- **Transferable skills**

  Major team and individual projects, as well as some coursework exercises, assess the ability to work individually or in teams, including managing learning and development, time management and organisation skills and the different roles team members adopt. The Professional Skills & Issues course assesses reflection and communication and effective information-retrieval skills. Scientific writing and presentation skills are assessed via written paper reviews, an annotated bibliography and oral presentations.

- **Research Skills**

  Assessed through the Research Proposal and Project by a project proposal, an oral presentation to the relevant research group and a final scientific paper.

12. Programme Structure and Features:

Structure

The MSci degree programme extends over five years of full-time study. A candidate for the MSci degree must obtain a minimum of 600 credits, 120 of which must be awarded at level M, and a further 240 at Level H.

Students who have not been admitted to the University on the MSci programme can apply to transfer to the programme at the end of semester two in level 4. Entry will be based on their academic performance.

Levels 1-4 follow the same structure as the BSc Honours programme.

Specialisms

In Levels 3 and 4, 110 of the 240 credits taken by a student are chosen from elective course lists. Students may choose any combination of courses, subject to pre-requisites and timetabling constraints. However, specific collections of courses across the elective pool, known as specialisms, are identified. Taken with a related 40 credit individual project, such a collection represents a coherent body of knowledge in a particular area. The programme offers a number of such specialisms, and if one is chosen then the specialism name appears on the students' degree parchment along with the programme title. Specialism details will be provided in the undergraduate course handbook each year, since we expect the specialisms to change year on year. We currently present the following specialisms: Parallel and Distributed Systems, Data Management, Human Computer Interaction, Theoretical Computing Science and Information Security.

MSci in Computing Science

Level 1

There are three sets of courses currently offered at level 1. Either set enables students to continue to Honours level:

Set 1: aimed at students with prior programming experience; 40 credits of CS out of 120.

Set 2: aimed at students with no prior programming experience; 40 credits of CS out of 120. A student who chooses set 2 in Level 1 will need to take Computing Science1F (COMPSCI1006) (10 credits) in Level 2.

Set 3: aimed at students with no prior programming experience; 50 credits of CS out of 120.

Students will be strongly encouraged to include 40 credits of Level 1 Mathematics in year 1 or 2.

Course Title	Course Code	Credits	Core	Optional	Semester(s) taught
SET 1 [40 credits]					
Computing Science 1P	COMPSCI1001	20	X		1 & 2
Computing Science 1F	COMPSCI1006	10	X		1
Computing Science 1S	COMPSCI1018	10	X		2
Other subjects (Level 1, 80 credits)					
SET 2 [40 credits]					
Computing Science 1CT	COMPSCI1016	20	X		1
Computing Science 1PX	COMPSCI1017	10	X		2
Computing Science 1S	COMPSCI1018	10	X		2
Other subjects (Level 1, 80 credits)					
SET 3 [50 credits]					
Computing Science 1CT	COMPSCI1016	20	X		1
Computing Science 1F	COMPSCI1006	10	X		1
Computing Science 1PX	COMPSCI1017	10	X		2
Computing Science 1S	COMPSCI1018	10	X		2
Other subjects (Level 1, 70 credits)					

Level 2

Level 2 entry is guaranteed to students who achieve an average grade of B3 or better in their Level 1 CS courses at first sitting. Entry is not guaranteed to students with an average grade of C3 or better in their Level 1 CS courses at first sitting, but may be permitted at the discretion of the School.

In either case, all grades must be at D3 or better – students who have gained a sufficient average grade at first sitting must resit to improve any grade below D3.

Students take 60 credits of CS out of 120:

Course Title	Course Code	Credits	Core	Optional	Semester(s) taught
Java Programming 2	COMPSCI2001	10	X		1
Object Oriented Software Engineering 2	COMPSCI2008	10	X		2
Algorithmic Foundations 2	COMPSCI2003	10	X		1
Networks & Operating Systems Essentials 2	COMPSCI2024	10	X		1
Algorithms & Data Structures 2	COMPSCI2007	10	X		2
Web Application Development 2	COMPSCI2021	10	X		2
Other subjects 60 credits					

Computing Science 1F (COMPSCI1006) (Level 1, 10 credits) (semester 1) is required to be taken by any student who has done set 2 in Level 1.

Level 3

Honours Entry Guaranteed: minimum average grade of B3 over all Level 2 Computing Science courses at first attempt. At School discretion: minimum average grade of C3 over all Level 2 Computing Science courses at first attempt. Entry to the SE3H class is competitive, and only a limited number of places are available for the best students.

Students who do not meet the requirements for entry to our Honours degree programmes may be eligible for entry to the Designated Degree in Computing Science (CS3). Such students must satisfy the progression requirements in Parts 10 and 11 of the Generic Undergraduate Regulations and the requirements of Part 3 of the Supplementary Regulations for the Degree of Bachelor of Science, as set out by the College of Science and Engineering, and must also meet the following additional requirement from the School of Computing Science.

Students in the first semester of Level 3 take a fixed curriculum designed to give breadth in the subject:

Course Title	Course Code	Credits	Core	Optional	Semester(s) taught
Algorithmics I (H)	COMPSCI4009	10	X		1
Data Fundamentals (H)	COMPSCI4073	10	X		1
Interactive Systems (H)	COMPSCI4014	10	X		1
Systems Programming (H)	COMPSCI4081	10	X		1
They also take the following compulsory courses:					
Professional Software Development (H)	COMPSCI4015	10	X		1 & 2
Team Project (H)	COMPSCI4047	30	X		1 & 2

Students at Level 3 must also take 4 courses from the current Level H and M Electives listed in the course catalogue, subject to meeting any pre-requisites:
http://www.gla.ac.uk/coursecatalogue/courselist/?code=REG30200000&name=School+of+Computing+Science

Level 4

Entry to Level 4 of the MSci programme is dependent on the student achieving an aggregate score of at least 9 (on the University 22 point scale) in Level 3, at the first attempt.

Students failing to achieve the minimal level for progression to level 4 of MSci programme will be assessed for the early exit qualification of BSc Designated Degree in Computing Science based on their results in Level 3, provided they meet the general regulations for a Designated degree.

Honours students in Level 4 take seven 10-credit subject courses chosen from a pool of at least sixteen electives. The electives on offer change from year to year depending on resources. These courses are designed to enable students to develop introductory, or in an appropriate sequence, deep understanding in a subject area. Students may choose courses to align with the stated specialisms. The list of electives is available in the course catalogue (see link above).

In addition, students must also take the following compulsory project which will be related to the specialism:

Course Title	CourseCode	Credits	Core	Optional	Semester(s) taught
Individual Project (H)	COMPSCI4025P	40	X		1 & 2
Students must also take the following compulsory course:					
Professional Skills and Issues (H)	COMPSCI4038	10	X		1

Level 5

To progress to Level 5 MSci, a student needs an average aggregate score of 12 (on University 22 point scale) from Level 4.

Students failing to achieve the minimum level for progression will be assessed as if they were BSc Computing Science students and will be awarded the appropriate BSc (Hons) qualification based on their results in Levels 3 and 4, using the normal weighting for the relevant BSc Computing Science degree (40/60).

At Level 5, students will be required to take the following courses:

Course Title	Course Code	Credits	Core	Optional	Semester(s)
Research Methods and Techniques (M)*	COMPSCI5025	10	X		1
Project Research Readings in CS	COMPSCI5003	10	X		2
MSci Research Proposal & Project	COMPSCI5073P	80	X		1 & 2
Two elective courses (20 credits)					

If the student has already taken Research Methods and Techniques (H) COMPSCI4065, then Research Methods and Techniques (M) (COMPSCI5025) should be replaced by one 10 credit Level M elective.

Please note that students must choose ONE security-related course from the following list between Levels 3-5:					
Cyber Security Fundamentals (H)	COMPSCI4062	10		X	2
Human Centred Security (M)	COMPSCI5060	10		X	2
Safety Critical Systems (H)	COMPSCI4045	10		X	2
Enterprise Cyber Security (M)	COMPSCI5077	10		X	1
Cyber System Forensics (M)	COMPSCI5080	10		X	2

Honours Assessment

Within each year, courses are weighted according to credits. The final Honours assessment combines the aggregated scores from levels 3, 4 and 5, in the ratio 24:36:40.

Faster Route in Computing Science

Students taking this route will come straight into level 2. Of their 120 credits, they will take the following courses totalling 80 credits in Computing Science:

Course Title	CourseCode	Credits	Core	Optional	Semester(s) taught
Computing Science 1F	COMPSCI1006	10	X		1
Computing Science 1S	COMPSCI1018	10	X		2
Java Programming 2	COMPSCI2001	10	X		1
Object Oriented Software Engineering 2	COMPSCI2008	10	X		2
Algorithmic Foundations 2	COMPSCI2003	10	X		1
Algorithms and Data Structures 2	COMPSCI2007	10	X		2
Networks and Operating Systems Essentials 2	COMPSCI2024	10	X		1
Web Application Development 2	COMPSCI2021	10	X		2

It is strongly recommended that 40 credits of level 1 Mathematics are taken, unless the student has an equivalent mathematics qualification on entry.

Faster Route entry to Honours/MSci

Entry requirements same as standard route. Note that from level 3 onwards, the Faster Route programme is exactly the same as the standard MSci programme.

BSc Designated Degree in Computing Science

BSc Designated Degree in Computing Science extends over 3 years of full-time study. Students must meet the general regulations for the award of a Designated degree. To guarantee entry to the Designated degree, students must achieve D3 average over all Level 2 Computing Science courses.

The curriculum for a Designated degree in Computing Science is:

Levels 1 & 2 same as BSc Honours (see above)

At Level 3, students must take the following courses:

Course Title	Course Code	Credits	Core	Optional	Semester(s) taught
Systems Programming (H)	COMPSCI4081	10	X		1
Interactive Systems (H)	COMPSCI4014	10	X		1
Database Systems (H)	COMPSCI4013	10	X		2
Professional Software Development (H)	COMPSCI4015	10	X		1 & 2
Data Fundamentals (H)	COMPSCI4073	10	X		1
Team Project 3	COMPSCI3004	30	X		1 & 2
In addition to 40 credits from other subject areas.					

For more information on courses see the University course catalogue:
http://www.gla.ac.uk/coursecatalogue/

Regulations

This programme will be governed by the relevant regulations published in the University Calendar. These regulations include the requirements in relation to:

(a) Award of the degree
(b) Progress
(c) Early exit awards
(d) (For undergraduate programmes, where appropriate) Entry to Honours

https://www.gla.ac.uk/myglasgow/senateoffice/policies/calendar/calendar2018-19/

13. Programme Accredited By:

BCS, The Chartered Institute for IT
IET

14. Location(s):

Glasgow

15. College:

College of Science and Engineering

16. Lead School/Institute:

Computing Science [REG30200000]

17. Is this programme collaborative with another institution:

No

18. Awarding Institution(s):

University of Glasgow

19. Teaching Institution(s):

University of Glasgow

20. Language of Instruction:

English

21. Language of Assessment:

English

22. Relevant QAA Subject Benchmark Statements (see Quality Assurance Agency for Higher Education) and Other External or Internal Reference Points:

The following web links introduce the benchmarks that are used to guide and assess our programmes. We monitor our courses against these on a regular basis, further information about this process and about recent developments in these benchmarks can be obtained direct from the school. http://www.qaa.ac.uk/docs/qaa/subject-benchmark-statements/sbs-computing-16.pdf?sfvrsn=26e1f781_12 http://www.theiet.org/careers/profreg/http://www.theiet.org/careers/profreg/ http://www.bcs.org/server.php?show=nav.7065

23. Additional Relevant Information (if applicable):

Support for students is provided by the Postgraduate/Undergraduate Adviser(s) of Studies supported by University resources such LEADS (www.gla.ac.uk/myglasgow/leads/), Counselling & Psychological Services (www.gla.ac.uk/services/counselling/), the Disability Service (www.gla.ac.uk/services/studentdisability/) and the Careers Service (www.gla.ac.uk/services/careers/).

24. Online Learning:

No

25. Date of approval:	09/08/2018