

MSc Computing (Visual Computing and Robotics)

This document provides a definitive record of the main features of the programme and the learning outcomes that a typical student may reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities provided. This programme specification is intended as a reference point for prospective students, current students, external examiners and academic and support staff involved in delivering the programme and enabling student development and achievement.

Programme Information

Programme Title	Computing (Visual Computing and Robotics)			
Award(s)	MSc			
Programme Code	G5U13			
Awarding Institution	Imperial College London			
Teaching Institution	Imperial College London			
Faculty	Faculty of Engineering			
Department	Department of Computing			
Main Location of Study	South Kensington Campus			
Mode and Period of Study	1 academic year (12 months), full-time			
Cohort Entry Points	Annually in October			
Relevant QAA Benchmark Statement(s) and/or other external reference points	Master's Degrees in Computing			
Total Credits	ECTS:	90	CATS:	180
FHEQ Level	Level 7			
EHEA Level	2 nd cycle			
External Accreditor(s)	BCS - The Chartered Institute for IT The IET (The Institution of Engineering and Technology)			
Specification Details				
Student cohorts covered by specification	2019/20 entry			
Person responsible for the specification	Dr Damian Cerase, teaching Quality Officer			
Date of introduction of programme				
Date of programme specification/revision	March 2019			

Programme Overview

This specialism focuses on the study of vision, graphics, intelligent behaviour and biomedical image computing.

This taught postgraduate course is aimed at students who may not have studied computing exclusively but who have studied a considerable amount of computing already.

If you want to become a specialist in a particular area of computing, this course will provide a first crucial step towards that goal.

This specialism focuses on the study of vision, graphics, intelligent behaviour and biomedical image computing. We also offer specialisms in:

- Artificial Intelligence and Machine Learning
- Computational Management
- Security and Reliability
- Software Engineering

Each specialism has a flexible mix of breadth and depth, consisting of two or three compulsory modules as well as choices from a selection of core and optional modules.

Learning Outcomes

The Imperial Graduate Attributes are a set of core competencies which we expect students to achieve through completion of any Imperial College degree programme. The Graduate Attributes are available at: www.imperial.ac.uk/students/academic-support/graduate-attributes

Knowledge and Understanding of:

- Practical programming skills;
- The detail and essential topics relevant to the students' chosen option and project areas, such as Software Engineering;
- Communication skills, including project design, teamwork, written and oral reports and presentations and literature search, both web-based and hard copy;
- Emerging trends in Computing and an awareness of how these techniques can be adapted in industrial applications;
- Practical programming skills in Prolog and Matlab;
- Research skills, including time management, research effectiveness, personal effectiveness, writing skills, presentation and communication skills, technical presentation and critical reading of literature.

Intellectual Skills:

- Match problems to tools and techniques most suitable for solving them;
- Analyse computing and computing related problems and devise solutions to them;
- Develop an understanding and practice of more advanced computing topics, including databases, concurrent programming, artificial intelligence and distributed systems – in particular Architecture; Artificial Intelligence; Biomedical Applications; Computational Management Science; Creative Industries; Distributed Systems; Software Engineering and Visual Information Processing;
- Plan, conduct and write-up a programme of software development conducted in a team;

- Plan, conduct and write-up a programme of original research and software development.

Practical Skills:

- Design and develop programs of varying levels of complexity using Prolog, Matlab and other languages;
- Use computing tools and techniques, for instance software development tools;
- Analyse computing and computing related problems and devise solutions to them;
- Give technical presentations;
- Appreciate the needs of end-users and issues related to design, management and performance of large scale software;
- Prepare technical reports;
- Conduct detailed literature searches;
- Conduct in-depth research on tools and languages available on line.

Transferable Skills:

- Communicate effectively through oral presentations, computer presentations and written reports;
- Program in the major computer programming paradigms;
- Integrate and evaluate information from multiple and diverse sources;
- Work within and contribute to a team, apply management skills such as coordination, project design and evaluation and decision processes as applied in software engineering;
- Manage resources and time;
- Transfer techniques and solutions from one area to another;
- Learn independently with open mindedness and critical enquiry;
- Learn effectively for the purpose of continuing professional development.

Entry Requirements

Academic Requirement	Normally a 2.1 UK Bachelor’s Degree with Honours in a science or engineering discipline, including computing (or a comparable qualification recognised by the College).
Non-academic Requirements	<p>Applicants must provide Graduate Record Examination (GRE) scores for Quantitative Reasoning and Verbal Reasoning. As well as entering the scores on the application form, applicants must ask the GRE organisation to send validating certificates to the Department.</p> <p>Only the first scores submitted will be considered. While there is no minimum requirement for GRE scores, a strong application would include scores higher than 159 for Quantitative Reasoning and higher than 145 for Verbal Reasoning.</p> <p>Find out more about the GRE.</p>
English Language Requirement	Standard requirement

	IELTS 6.5 with a minimum of 6.0 in each element or equivalent.
Learning & Teaching Strategy	
Scheduled Learning & Teaching Methods	<ul style="list-style-type: none"> • Lectures • Tutorials • Practical work • Laboratory • Group work
Project and Placement Learning Methods	<ul style="list-style-type: none"> • Research project
Assessment Strategy	
Assessment Methods	<ul style="list-style-type: none"> • Written examinations • Coursework • Laboratory work • Presentations • Product demonstration • Technical report • Dissertation
Academic Feedback Policy	
<p>Feedback will be provided on coursework within two weeks of submission. This will be in the form of, for example:</p> <ul style="list-style-type: none"> • Personal discussion • Discussions in small-group tutorials • Marked-up coursework, laboratory exercises or tests • Verbal presentation, e.g. during or after lectures • Written class-wide summaries • Interactive problem solving sessions • Model answers to coursework <p>In lieu of feedback on examinations, selected examination questions are routinely set as unassessed problems in the following year, with model answers provided.</p>	
Re-sit Policy	
<p>In line with College policy, students who are unsuccessful in any of their examinations may usually be allowed an opportunity to re-sit at the discretion of the Board of Examiners.</p> <p>Specific information regarding re-sits for Taught Master's degrees can be found in the relevant Academic Regulations available at: https://www.imperial.ac.uk/about/governance/academic-governance/regulations/</p>	
Mitigating Circumstances Policy	
Students may be eligible to apply for mitigation if they have suffered from serious and unforeseen	

circumstances during the course of their studies that have adversely affected their ability to complete an assessment task and/or their performance in a piece of assessment.

The College's Policy on Mitigating Circumstances is available at:

<https://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/>

Assessment Structure

Marking Scheme

In order to PASS the MSc students have to satisfy all of the following requirements:

1. An aggregated mark of at least 50% on 9 components which must be made up as follows:
 - a. The assessments of 6 taught courses. The taught courses must be from the specified list for the specialism, and must include all that are compulsory.
 - b. The assessments of either a further 3 taught courses freely selected from any of the courses offered to the specialism, or 2 such taught courses and 1 ISO, which can be, but need not be, in the area of the specialism.
2. Normally, a mark of at least 50% on each of the 9 components. No mark below 40% is accepted as a condoned pass mark.
3. A mark of at least 51% on the individual project.

In order to be considered for the MSc with MERIT students have to satisfy all of the following requirements:

1. Pass the MSc, but without DISTINCTION;
2. An aggregated mark of at least 60% on the 9 components;
3. A mark of at least 61% on the individual project.

In order to be considered for the MSc with DISTINCTION students have to satisfy all of the following requirements:

1. Pass the MSc;
2. An aggregated mark of at least 70% on the 9 components;
3. A mark of at least 71% on the individual project.

Indicative Module List								
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	FHEQ Level	ECTS
CO542	MSc Computing Science (Specialist) Individual Project	CORE	See module leader			1125	7	45
CO316	Computer Vision	ELECTIVE (A)	See module leader			125	6	5
CO417	Advanced Computer Graphics	ELECTIVE (A)	See module leader			125	7	5
CO433	Advanced Robotics	ELECTIVE (A)	See module leader			125	7	5
CO496	Mathematics for Machine Learning	ELECTIVE (A)	See module leader			125	7	5
CO304	Logic-Based Learning	ELECTIVE (B)	See module leader			125	6	5
CO404	Separation Logic: Local Reasoning about Programs	ELECTIVE (B)	See module leader			125	7	5
CO408	Privacy Engineering	ELECTIVE (B)	See module leader			125	7	5
CO416	Machine Learning for Imaging	ELECTIVE (B)	See module leader			125	7	5
CO447	Advanced Security in Smartphone and IoT Systems	ELECTIVE (B)	See module leader			125	7	5
CO460	Deep Learning	ELECTIVE (B)	See module leader			125	7	5
CO490	Natural Language Processing	ELECTIVE (B)	See module leader			125	7	5
CO339	Performance Engineering	ELECTIVE (B)	See module leader			125	7	5

Indicative Module List								
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	FHEQ Level	ECTS
CO317	Graphics	ELECTIVE (B)	See module leader			125	6	5
CO331	Network and Web Security	ELECTIVE (B)	See module leader			125	6	5
CO338	Pervasive Computing	ELECTIVE (B)	See module leader			125	6	5
CO343	Operations Research	ELECTIVE (B)	See module leader			125	6	5
CO347	Distributed Algorithms	ELECTIVE (B)	See module leader			125	6	5
CO349	Information and Coding Theory	ELECTIVE (B)	See module leader			125	6	5
CO382	Type Systems for Programming Languages	ELECTIVE (B)	See module leader			125	6	5
CO409	Cryptography Engineering	ELECTIVE (B)	See module leader			125	7	5
CO422	Computational Finance	ELECTIVE (B)	See module leader			125	7	5
CO438	Complexity	ELECTIVE (B)	See module leader			125	7	5
CO467	Principles of Distributed Ledgers	ELECTIVE (B)	See module leader			125	7	5
CO469	Probabilistic Model Checking and Analysis	ELECTIVE (B)	See module leader			125	7	5
CO471	Advanced Issues in Object Oriented Programming	ELECTIVE (B)	See module leader			125	7	5
CO474	Machine Arguing	ELECTIVE (B)	See module leader			125	7	5

Indicative Module List								
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	FHEQ Level	ECTS
CO477	Computational Optimisation	ELECTIVE (B)	See module leader			125	7	5
CO484	Quantum Computing	ELECTIVE (B)	See module leader			125	7	5
CO512	Independent Study Option	ELECTIVE (B)	See module leader			125	7	5
CO531	Prolog	ELECTIVE (B)	See module leader			125	7	5
CO318	Custom Computing	ELECTIVE (C)	See module leader			125	6	5
CO332	Advanced Computer Architecture	ELECTIVE (C)	See module leader			125	6	5
CO333	Robotics	ELECTIVE (C)	See module leader			125	6	5
CO395	Introduction to Machine Learning	ELECTIVE (C)	See module leader			125	6	5
CO493	Probabilistic Inference	ELECTIVE (C)	See module leader			125	7	5
CO572	Advanced Databases	ELECTIVE (C)	See module leader			125	7	5

Supporting Information

The Programme Handbook is available at:

<http://www.imperial.ac.uk/computing/current-students/pg-info/mcs-vcr/>

The Module Handbook is available at:

<http://www.imperial.ac.uk/computing/current-students/pg-info/mcs-vcr/>

The College's entry requirements for postgraduate programmes can be found at:

www.imperial.ac.uk/study/pg/apply/requirements

The College's Quality & Enhancement Framework is available at:

www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance

The College's Academic and Examination Regulations can be found at:

<http://www.imperial.ac.uk/about/governance/academic-governance/regulations/>

Imperial College is an independent corporation whose legal status derives from a Royal Charter granted under Letters Patent in 1907. In 2007 a Supplemental Charter and Statutes was granted by HM Queen Elizabeth II. This Supplemental Charter, which came into force on the date of the College's Centenary, 8th July 2007, established the College as a University with the name and style of "The Imperial College of Science, Technology and Medicine".

<http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/charter-and-statutes/>

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<https://www.officeforstudents.org.uk/>