

**MSc Advanced Computing**

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	Advanced Computing		
Award(s)	MSc		
Programme Code	G5U0		
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 <a href="#">QAA Benchmark Statement(s)</a> and/or other external reference points	<a href="#">Master's Degrees in Computing</a>		
Total Credits	ECTS:	90	CATS: 180
<a href="#">FHEQ Level</a>	Level 7		
<a href="#">EHEA Level</a>	2 <sup>nd</sup> cycle		
External Accreditor(s)	<a href="#">Institute of Engineering and Technology (IET)</a>		

**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 course is aimed at students who have a substantial background in computing and want to study advanced computing concepts and technologies in more depth.

This taught postgraduate course offers you the opportunity to study a wide variety of topics in depth with dedicated experts.

It is aimed at students who have a substantial background in computing and who want to study advanced computing concepts and technologies in more depth.

The programme is suitable for students who are primarily interested in a career orientated towards development and applications in industry.

## 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](http://www.imperial.ac.uk/students/academic-support/graduate-attributes)

### Knowledge and Understanding of:

- Up-to-date techniques in Computing and Software Engineering;
- Emerging trends in Computing and an awareness of how these techniques can be adapted in industrial applications;
- The Prolog programming paradigm ;
- Practical programming skills in one or more of Prolog or Software Engineering for Industry;
- Communication and practical skills, including report writing, literature search, project design, oral presentations;
- Research skills, including time management, research effectiveness, personal effectiveness, writing skills, presentation and communication skills, technical presentation and critical reading of literature.

### Intellectual Skills:

- Have a critical understanding of emerging trends and research in Computing;
- Develop an understanding and practice of advanced computing topics, drawn from the areas of Parallel and Distributed Systems, High Performance Computing, Software Engineering, Logic and Artificial Intelligence, Computational Management and Mathematical Foundations;
- Develop an awareness of how up-to-date techniques can be adapted in industrial applications;
- 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 and other languages;
- Use computing tools and techniques, for instance software development tools;
- Analyse computing and computing-related problems and devise solutions to them;
- Appreciate the needs of end-users and issues related to design, management and performance of large scale software. 5. Give technical presentations.
- 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;
- 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 with a substantial Computing component (or a comparable qualification recognised by the College).
English Language Requirement	<a href="#">Standard requirement</a> 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"> <li>• Lectures</li> <li>• Tutorials</li> <li>• Practical work</li> <li>• Private study</li> <li>• Presentations</li> <li>• Lab work</li> </ul>
Project and Placement Learning Methods	<ul style="list-style-type: none"> <li>• Supervised, individual project work</li> <li>• Dissertation</li> </ul>

**Assessment Strategy**

Assessment Methods	<ul style="list-style-type: none"> <li>• Written examinations</li> <li>• Laboratory assignments</li> <li>• Practical</li> <li>• Coursework</li> </ul>
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**Academic Feedback Policy**

Feedback will be provided on coursework within two weeks of submission. This will be in the form of, for example:

- 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

In lieu of feedback on examinations, selected examination questions are routinely set as unassessed problems in the following year, with model answers provided.

#### Re-sit Policy

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.

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/>

#### 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:**

An aggregated mark of at least 50% in 9 components which must be made up in one of the following ways:

1. 8 taught modules and one practical component (Prolog or Software Engineering for Industry);
2. 7 taught modules and two practical components (Prolog and Software Engineering for Industry);
3. 8 taught modules and one practical component (Prolog or Software Engineering for Industry) with 1 taught modules replaced by an ISO;
4. 7 taught modules and two practical components (Prolog and Software Engineering for Industry), with 1 taught modules replaced by an ISO;
5. Normally, a mark of at least 50% on each of the 9 components. No mark below 40% is accepted as a condoned pass mark.
6. A mark of at least 51% on the individual project.

**Coursework contribution:**

Coursework associated with a course normally contributes 10% to the assessment of the course. The exceptions are:

- 33% for Machine Learning
- 20% for Prolog
- 100% for Software Engineering for Industry

**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.

**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.

Indicative Module List								
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	FHEQ Level	ECTS
CO523	MAC Individual Project	Core	See module leader			1125	7	45
CO404	Separation Logic: Local Reasoning about Programs	Elective (A)	See module leader			125	7	5
CO406	Concurrent Processes	Elective (A)	See module leader			125	7	5
CO416	Machine Learning for Imaging	Elective (A)	See module leader			125	7	5
CO447	Advanced Security in Smartphone and IoT Systems	Elective (A)	See module leader			125	7	5
CO460	Deep Learning	Elective (A)	See module leader			125	7	5
CO490	Natural Language Processing	Elective (A)	See module leader			125	7	5
CO408	Privacy Engineering	Elective (A)	See module leader			125	7	5
CO409	Cryptography Engineering	Elective (A)	See module leader			125	7	5
CO410	Scalable Systems for the Cloud	Elective (A)	See module leader			125	7	5
CO417	Advanced Computer Graphics	Elective (A)	See module leader			125	7	5
CO422	Computational Finance	Elective (A)	See module leader			125	7	5
CO433	Advanced Robotics	Elective (A)	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
CO339	Performance Engineering	Elective (A)	See module leader			125	7	5
CO438	Complexity	Elective (A)	See module leader			125	7	5
CO440	Software Reliability	Elective (A)	See module leader			125	7	5
CO450	Dynamical Systems and Deep Learning	Elective (A)	See module leader			125	7	5
CO467	Principles of Distributed Ledgers	Elective (A)	See module leader			125	7	5
CO469	Probabilistic Model Checking and Analysis	Elective (A)	See module leader			125	7	5
CO471	Advanced Issues in Object Oriented Programming	Elective (A)	See module leader			125	7	5
CO474	Machine Arguing	Elective (A)	See module leader			125	7	5
CO477	Computational Optimisation	Elective (A)	See module leader			125	7	5
CO484	Quantum Computing	Elective (A)	See module leader			125	7	5
CO491	Knowledge Representation	Elective (A)	See module leader			125	7	5
CO493	Probabilistic Inference	Elective (A)	See module leader			125	7	5
CO495	Advanced Statistical Machine Learning and Pattern Recognition	Elective (A)	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
CO496	Mathematics for Machine Learning	Elective (A)	See module leader			125	7	5
CO512	Independent Study Option	Elective (A)	See module leader			125	7	5
CO475	Software Engineering for Industry	Elective (B)	See module leader			125	7	5
CO531	Prolog	Elective (B)	See module leader			125	7	5
CO303	Systems Verification	Elective (C)	See module leader			125	6	5
CO304	Logic-Based Learning	Elective (C)	See module leader			125	6	5
CO316	Computer Vision	Elective (C)	See module leader			125	6	5
CO318	Custom Computing	Elective (C)	See module leader			125	6	5
CO331	Network and Web Security	Elective (C)	See module leader			125	6	5
CO332	Advanced Computer Architecture	Elective (C)	See module leader			125	6	5
CO347	Distributed Algorithms	Elective (C)	See module leader			125	6	5
CO349	Information and Coding Theory	Elective (C)	See module leader			125	6	5
CO382	Type Systems for Programming Languages	Elective (C)	See module leader			125	6	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/>

The Module Handbook is available at: <http://www.imperial.ac.uk/computing/current-students/>

The College's entry requirements for postgraduate programmes can be found at: [www.imperial.ac.uk/study/pg/apply/requirements](http://www.imperial.ac.uk/study/pg/apply/requirements)

The College's Quality & Enhancement Framework is available at: [www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance](http://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/>