

**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 Accrator(s)	<a href="#">Institute of Engineering and Technology (IET)</a>		

**Specification Details**

Student cohorts covered by specification	2022-23 entry
Person responsible for the specification	Dr Anandha Gopalan Director of PG Studies
Date of introduction of programme	
Date of programme specification/revision	January 2023

## 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.

We use digital technology to bring further benefits to our education programmes, drawing from investments made and skills gained during the pandemic. We deliver our education as a useful blend of face-to-face and digital learning. This will also prepare our students well for a more hybrid work culture of the future.

## 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	Minimum requirement is a first-class degree in a subject with a substantial computing component.
English Language Requirement	<a href="#">Higher requirement</a> Please check for other <a href="#">Accepted English Qualifications</a>

**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>
--------------------	---

**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:**

1. An aggregated mark of at least 50% in 9 components which must be made up in one of the following ways: 9 taught modules;
2. 8 taught modules and an Independent Study Option ;
3. Normally, a mark of at least 50% on each of the 9 components. No mark below 40% is accepted as a condoned pass mark.
4. A mark of at least 50% on the individual project.

##### **Coursework contribution:**

Coursework associated with a course normally contributes 20% to the assessment of the course. The exceptions are:

- 30% for Introduction to Machine Learning
- 30% for Mathematics for Machine Learning

30% for Advanced Computer Graphics  
30% for Software Reliability  
30% for Robot Learning  
50% for Deep Learning  
50% for Reinforcement Learning  
100% for Independent Study Option (ISO)  
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 70% 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 60% on the individual project.

### Indicative Module List

**In addition to the Core module you must choose 9 elective modules in total. You can choose between 7 and 9 modules from elective group A, between 0 and 2 from elective group B**

Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	FHEQ Level	ECTS
COMP97077	MSc Advanced Computing Individual Project	Core	See module leader			1125	7	45
COMP97005	Scalable Software Verification	Elective (A)	See module leader			125	7	5
COMP97109	Advanced Computer Security	Elective (A)	See module leader			125	7	5
COMP97111	Deep Learning	Elective (A)	See module leader			125	7	5
COMP97115	Natural Language Processing	Elective (A)	See module leader			125	7	5
COMP97012	Privacy Engineering	Elective (A)	See module leader			125	7	5
COMP97016	Scalable Systems and Data	Elective (A)	See module leader			125	7	5
COMP97022	Advanced Computer Graphics	Elective (A)	See module leader			125	7	5
COMP97025	Computational Finance	Elective (A)	See module leader			125	7	5
COMP97143	Reinforcement Learning	Elective (A)	See module leader			125	7	5
COMP97035	Complexity	Elective (A)	See module leader			125	7	5
COMP97037	Software Reliability	Elective (A)	See module leader			125	7	5
COMP97045	Principles of Distributed Ledgers	Elective (A)	See module leader			125	7	5

### Indicative Module List

**In addition to the Core module you must choose 9 elective modules in total. You can choose between 7 and 9 modules from elective group A, between 0 and 2 from elective group B**

Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	FHEQ Level	ECTS
COMP97146	Program Analysis	Elective (A)	See module leader			125	7	5
COMP97055	Computational Optimisation	Elective (A)	See module leader			125	7	5
COMP97057	Quantum Computing	Elective (A)	See module leader			125	7	5
COMP97059	Knowledge Representation	Elective (A)	See module leader			125	7	5
COMP97061	Probabilistic Inference	Elective (A)	See module leader			125	7	5
COMP97065	Mathematics for Machine Learning	Elective (A)	See module leader			125	7	5
COMP97067	Modal Logic for Strategic Reasoning in AI	Elective (A)	See module leader			125	7	5
COMP97070	Independent Study Option	Elective (A)	See module leader			125	7	5
COMP97105	Machine Learning for Imaging	Elective (A)	See module leader			125	7	5
COMP97151	Introduction to Machine Learning	Elective (A)	See module leader			125	7	5
COMP97053	Software Engineering for Industry	Elective (A)	See module leader			125	7	5
COMP97083	Prolog	Elective (A)	See module leader			125	7	5
COMP97014	Cryptography Engineering	Elective (A)	See module leader			125	7	5

### Indicative Module List

**In addition to the Core module you must choose 9 elective modules in total. You can choose between 7 and 9 modules from elective group A, between 0 and 2 from elective group B**

Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	FHEQ Level	ECTS
COMP97157	Robot Learning	Elective (A)	See module leader			125	7	5
COMP97159	Scheduling and Resource Allocation	Elective (A)	See module leader			125	7	5
COMP96005	Logic-Based Learning	Elective (B)	See module leader			125	6	5
COMP96007	Computer Vision	Elective (B)	See module leader			125	6	5
COMP96009	Graphics	Elective (B)	See module leader			125	6	5
COMP96011	Custom Computing	Elective (B)	See module leader			125	6	5
COMP96015	Network and Web Security	Elective (B)	See module leader			125	6	5
COMP96017	Advanced Computer Architecture	Elective (B)	See module leader			125	6	5
COMP97103	System Performance Engineering	Elective (B)	See module leader			125	7	5
COMP96027	Distributed Algorithms	Elective (B)	See module leader			125	6	5
COMP96032	Type Systems for Programming Languages	Elective (B)	See module leader			125	6	5
TBC	Data Processing Systems	Elective (B)	See module leader			125	6	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/apply/postgraduate-taught/entry-requirements/](http://www.imperial.ac.uk/study/apply/postgraduate-taught/entry-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/>

Imperial College London is regulated by the Office for Students (OfS)  
<https://www.officeforstudents.org.uk/>