

Programme Information		
Programme Title	Programme Code	HECoS Code
Artificial Intelligence	G5T1	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
MSc	1 Calendar Year (12 months)	Full-Time	Annually in October	90	180
PG Diploma	N/A*	N/A	N/A*	60	120
PG Certificate	N/A*	N/A	N/A*	30	60

*The PG Diploma and PG Certificate are exit awards and are not available for entry. All students must apply to and join the MSc.

Ownership			
Awarding Institution	Imperial College London	Faculty	Faculty of Engineering
Teaching Institution	Imperial College London	Department	Computing
Associateship	N/A	Main Location(s) of Study	South Kensington Campus

External Reference	
Relevant QAA Benchmark Statement(s) and/or other external reference points	Master's awards in computing, www.qaa.ac.uk/quality-code/subject-benchmark-statements/computing
FHEQ Level	Level 7 – Master's
EHEA Level	2nd cycle

External Accreditor(s) (if applicable)			
External Accreditor 1:	N/A		
Accreditation received:	N/A	Accreditation renewal:	N/A

Collaborative Provision			
Collaborative partner	Collaboration type	Agreement effective date	Agreement expiry date
N/A	N/A	N/A	N/A

Specification Details

Programme Lead	Dr Anandha Gopalan
Student cohorts covered by specification	2023-24 entry
Date of introduction of programme	October 2019
Date of programme specification/revision	February 2023

Programme Overview
<p>This is an MSc degree for graduates of disciplines with a large mathematics component, such as degrees in Mathematics, Physics, some branches of Engineering, and mathematical Economics. The programme includes intensive training in programming and fundamentals of AI and machine learning, with a number of bespoke modules, a module in the ethics of AI and fairness in machine learning, together with specialised elective modules, and a specialised group project allowing students to develop realistic applications, possibly with industrial input. The programme ends with a large specialised individual project that can be done a variety of ways: as a project supervised in our or any other department at Imperial, or as an internship working on AI. The MSc AI was introduced in 2019 to serve the need for more highly qualified AI-specialist graduates. This is still the purpose of the degree, and with a growing need for such graduates, the degree continues to occupy a valuable place in allowing STEM graduates from non-computer science backgrounds to transition into AI and machine learning.</p> <p>The programme is full-time and is taken over 12 months, with a single entry point per year in October. In the Autumn term (October–December), you will follow three compulsory modules—two, on a variety of foundational themes in AI and machine learning, and an intensive, practical module on Python. You also choose, alongside these, elective modules to begin extending your knowledge to more specialised areas of AI. More electives are undertaken in the Spring term (January–March), allowing you to specialise further in different directions of interest. Also in Spring term is a practical group project and associated software engineering lectures, on which you work together with peers to create a substantial piece of AI software. A number of these group projects are proposed by, and conducted in collaboration with, companies in the AI and machine learning industry. The group project culminates in a demonstration and oral presentation at the start of Summer term. Also at the start of the Summer term, you finish a module, started in the previous term, on fairness in machine learning, ethics in AI, and explanation. The remainder of the degree, from May to September, is devoted to a major individual project or an internship, resulting in a written dissertation and oral presentation.</p> <p>The elective modules offer a range of different kinds of specialism. Naturally, there are modules which focus on the practical implementation and underlying theory of state-of-the-art techniques in machine learning. With other elective modules the focus is more on specific application areas in which current methods are applied—for example, in vision or in natural language processing. The degree also includes electives on symbolic methods in AI, and there is an opportunity to hone entrepreneurial skills, focused on AI, in a module shared with Imperial College’s Business School. Finally, students may, if they desire, broaden their knowledge by taking one module outside of topics related to AI and machine learning—this is currently chosen from a selection devoted to applications of computer science in finance. Pre-sessional materials are sent out to you several months before the beginning of the degree, to ease your transition into computer scientists and AI experts.</p> <p>You will be taught by leading academic staff who are experts in their fields, and whose research has been recognised to be at the forefront of current advances in AI and machine learning. The teaching is also well-recognised to be informed by this research. The programme is delivered in the world-leading Department of Computing at Imperial College London. The Department has active research groups in Artificial Intelligence, Data Science, Visual Computing, and Robotics. Many other groups and members of our research staff also work on the theory, methods and applications of artificial intelligence and machine learning, and there are many collaborations with other departments at Imperial, as well as with industry. We also house dedicated research centres, including the Dyson Robotics Lab, the Data Science Institute, the Centre for Integrative Systems Biology and Bioinformatics, the Hamlyn Centre for Medical Image Computing and Robotics, and more.</p> <p>Graduates of the MSc in Artificial Intelligence have progressed to PhD positions in the UK and internationally (including in the US and Europe), as well as to positions as machine-learning engineers for tech companies working in fields such as autonomous driving, applications of reinforcement learning, and AI in healthcare. Some are working with the large tech companies, and others in prominent startups. Other graduates are applying AI and machine learning in the financial sector. We keep good connections with our graduates, and run a</p>

successful mentoring scheme to connect incoming students with previous years' cohorts—for advice on the degree and on careers in AI and machine learning. The *Applications of Computing in Industry* seminars, run during lunchtimes during term, help to highlight the industrial relevance of AI and ML to students, and can be attended by MSc AI students; these are a good way for you to connect with people working in the AI industry.

Usually, software packages required to undertake this degree programme are accessible to all students through the department's laboratories and College's Software Hub. However, you may need to purchase personalised hardware/software tools to cater for your individual preferences and project(s). 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

Upon successful completion of the programme a typical student will have acquired the following abilities.

On achieving the PG Certificate:

- 1 To formulate the principles of selected areas in which AI and machine learning are applied.
- 2 To determine which of a range of approaches to AI are appropriate for solving a given problem.
- 3 To compute widely used algorithms for solving problems in a range of application areas of AI and machine learning.

On achieving the PG Diploma, Learning Outcomes 1–3 above, and:

- 4 To formalise problems in AI and machine learning and employ an appropriate approach to solving them, involving techniques such as reinforcement learning, deep learning, logic-based reasoning, etc.
- 5 To work in-depth and independently on substantial AI and machine learning projects.
- 6 To evaluate the effectiveness of a given proposed solution to problems in AI and machine learning.

On achieving the MSc, Learning Outcomes 1–6 above, and:

- 7 To implement sound principles of software engineering and follow widely used software development methodologies.
- 8 To consider ethical and social issues related to current research and applications of AI, and in the context of your own project work.
- 9 To program in Python to a high standard, and apply it in a variety of areas of machine learning.
- 10 To develop the organisational skills necessary for working on software projects in AI and machine learning as part of a team or a research group.
- 11 To conduct independent research into state-of-the-art methods in AI and machine learning, and employ these in their own work.

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.

Entry Requirements

Academic Requirement	1st class honours in mathematics, physics, engineering, mathematical economics, or other degree with substantial mathematics content. (The high level of mathematical expertise required is aimed at ensuring an ideal amount of preparedness for the MSc.)
Non-academic Requirements	N/A
English Language Requirement	Higher requirement (PG) Please check for other Accepted English Qualifications
Admissions Test/Interview	N/A

The programme's competency standards documents can be found at:
www.imperial.ac.uk/computing/prospective-students/courses/competence/

Learning & Teaching Approach

Teaching

You will be taught through a combination of interactive sessions, lectures, team-based learning, tutorials, computer laboratory sessions, guest lectures, and individual project meetings.

Module lecturers employ a variety of these teaching methods, depending on the content of the module. A typical module might combine teaching by lectures, with tutorial sessions supported by the lecturer and their tutorial assistants. Tutorial sessions can involve practical coding tasks (run in our extensive computer laboratories), written exercises, or discussion groups.

Assessed coursework

Most modules set assessed coursework. This is sometimes to be completed in groups, and sometimes individual. It may consist of practical coding tasks, or written exercises, or a combination of the two. The portion of a module's final grade which is determined by assessed coursework is normally 20% but can be up to 100%, depending on the assessment strategy employed.

Individual project or internship

The degree includes a substantial individual research project or internship, which runs from mid-May to mid-September. The research project can be conducted with academics in the Department of Computing, or within other departments at Imperial College. Some students also elect to do a research project in collaboration with industry, jointly supervised by an academic in the Department of Computing. The internship is with a company or university department (at Imperial or elsewhere), working on AI and machine learning. Both are evaluated with a final report and presentation.

Independent learning

Students are expected to spend significant time on independent study outside of face-to-face contact time. This will typically include accessing resources online, reading journal articles and books, undertaking research in the library, reviewing lecture notes and watching lecture recordings, working on individual and group projects, working on coursework assignments and revising for exams.

Overall Workload

Your overall workload consists of face-to-face sessions and independent learning. While your actual contact hours may vary according to the optional modules you choose to study, the following gives an indication of how much time you will need to allocate to different activities at each level of the programme. At Imperial, each ECTS credit taken equates to an expected total study time of 25 hours. Therefore, the expected total study time is 2250 hours.

Typically, you will spend in the order of 12.5% of your time on lectures, tutorials, and similar; and in the order of 87.5% of their time on independent study.

Assessment Strategy

Assessment Methods

You can expect a variety of different types of assessment methods.

Written assessment

- Coursework exercises
- Reports on practical coding
- Short-form written answers
- Essays
- Written examinations
- Report writing
- Peer assessment reports

Programming

- Programming coursework (for taught modules)
- Programming examination

- Code repositories (for group project)

Oral assessment

- Oral presentations

The programme allows you to test your understanding of the subject informally—through formative tutorial exercises, coding tasks, quizzes, in-class discussion, and so on—before you complete the formal summative assessments that count towards your final mark. These summative assessments allow you to demonstrate that you have met the intended learning outcomes for each module and contribute towards your achievement of the programme learning outcomes, detailed above. There is formal summative assessment during and/or at the end of each module.

Balance of assessment:

The percentages below are based on a typical pathway through the course and have been rounded to the nearest whole number.

Assessed coursework	20%
Examinations (practical and written)	30%
Group and individual project / internship	50%

Academic Feedback Policy

The department operates in accordance with the College policy on academic feedback, and procedures are consistent across all postgraduate taught Computing programmes.

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

- 1 Marked-up coursework, laboratory exercises or tests
- 2 Personal discussion
- 3 Discussions in small-group tutorials
- 4 Verbal presentation, e.g., during or after lectures
- 5 Written class-wide summaries

Feedback on exams is provided in two forms: (i) numerically, as individual interim marks subject to ratification (approval) by the Board of Examiners; and (ii) in written form, as non-individual summary feedback on individual questions. In July you will also receive feedback on which degree grade (Pass, Merit, Distinction) you are on track for. Further, selected examination questions are routinely set as unassessed or assessed problems in later years, with model answers provided. Feedback on formative exercises may be given verbally during tutorial classes, or in lectures as worked-through exercises or comments.

The College's Policy on Academic Feedback and guidance on issuing provisional marks to students is available at: www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/

Re-sit Policy

One resit is allowed per module, usually in the next instance when that module is examined. Determinations of results and mitigations will follow college policies and the academic regulations.

The College's Policy on Re-sits is available at: www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/

Mitigating Circumstances Policy

The College's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/

Additional Programme Costs		
This section should outline any additional costs relevant to this programme which are not included in students' tuition fees.		
Description	Mandatory/Optional	Approximate cost
Personalised hardware/software tools to cater for individual preferences and project(s).	Optional	N/A

Important notice: The Programme Specifications are the result of a large curriculum and pedagogy reform implemented by the Department and supported by the Learning and Teaching Strategy of Imperial College London. The modules, structure and assessments presented in this Programme Specification are correct at time of publication but might change as a result of student and staff feedback and the introduction of new or innovative approaches to teaching and learning. You will be consulted and notified in a timely manner of any changes to this document.

Programme Structure ¹					
FHEQ Level 7					
In addition to the Core and Compulsory modules, you must choose 5 elective modules. Between 4 and 5 of the electives can be from Group S (Selective) and at most 1 can be from Group O (Optional).					
Code	Module Title	Core/ Compulsory/ Elective	Group	Term	Credits
COMP70081 (CO70047)	Individual Project	Core		3	35
COMP70053 (CO70053)	Python Programming	Compulsory		1	5
COMP70077 (CO70051)	Introduction to Symbolic Artificial Intelligence	Compulsory		1	5
COMP70050 (CO70050)	Introduction to Machine Learning	Compulsory		1	5
COMP70076 (CO70052)	Ethics, Fairness, and Explanation in AI	Compulsory		2,3	5
COMP70079 (CO70048)	MSc AI Software Engineering Group Project	Compulsory		1,2,3	10
COMP70089 (CO70058)	Computer Vision	Elective	S	1	5
COMP70084 (CO60019)	Robotics	Elective	S	2	5
COMP70028 (CO70028)	Reinforcement Learning	Elective	S	1	5
COMP70007 (CO70007)	Computational Optimisation	Elective	S	2	5
COMP70015 (CO70015)	Mathematics for Machine Learning	Elective	S	1	5
COMP70031 (CO70031)	Modal Logic for Strategic Reasoning in AI	Elective	S	2	5
COMP70093 (CO60013)	Logic-Based Learning	Elective	S	2	5
COMP70010 (CO70010)	Deep Learning	Elective	S	2	5
COMP70030 (CO70030)	Knowledge Representation	Elective	S	2	5
COMP70019 (CO70019)	Probabilistic Inference	Elective	S	2	5

¹ **Core** modules are those which serve a fundamental role within the curriculum, and for which achievement of the credits for that module is essential for the achievement of the target award. Core modules must therefore be taken and passed in order to achieve that named award. **Compulsory** modules are those which are designated as necessary to be taken as part of the programme syllabus. Compulsory modules can be compensated. **Elective** modules are those which are in the same subject area as the field of study and are offered to students in order to offer an element of choice in the curriculum and from which students are able to select. Elective modules can be compensated.

COMP70014 (CO70014)	Machine Learning for Imaging	Elective	S	2	5
COMP70016 (CO70016)	Natural Language Processing	Elective	S	2	5
COMP70067 (CO70067)	Robot Learning	Elective	S	2	5
BUSI70233	AI Ventures	Elective	S	2	5
COMP70006 (CO70016)	Computational Finance	Elective	O	1	5
COMP70017 (CO70017)	Principles of Distributed Ledgers	Elective	O	2	5
COMP70021	Quantum Computing	Elective	O	1	5
Credit Total					90

Progression and Classification

Award of a Postgraduate Certificate (PG Cert)

To qualify for the award of a postgraduate certificate a student must have:

1. accumulated credit to the value of no fewer than 30 ECTS credits at Level 7 or above.

Award of a Postgraduate Diploma (PG Dip)

To qualify for the award of a postgraduate diploma a student must have:

1. accumulated credit to the value of no fewer than 60 ECTS credits at Level 7 or above;
2. no more than 10 credits as a result of compensated passes.

Award of a Postgraduate Degree

To qualify for the award of a postgraduate degree a student must have:

1. accumulated credit to the value of no fewer than 90 ECTS credits at level 7 or above;
2. no more than 15 credits as a result of compensated passes;
3. met any specific requirements for an award as outlined in the approved programme specification for that award.

Classification of Postgraduate Taught Awards

The College sets the class of Degree that may be awarded as follows:

- Distinction: The student has achieved an overall weighted average of 70.00% or above across the programme.
- Merit: the student has achieved an overall weighted average of above 60.00% but less than 70.00%.
- Pass: the student has achieved an overall weighted average of 50.00% but less than 60.00%.

For a Master's, students must normally achieve a distinction (70.00%) mark in the dissertation or designated final major project (as designated in the programme specification) in order to be awarded a distinction; and a minimum of a merit (60.00%) mark in the dissertation or designated final major project (as designated in the programme specification) in order to be awarded a merit.

Programme Specific Regulations

N/A

Supporting Information

The Programme Handbook is available at: TBC

The Module Handbook is available at: TBC

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

The College's Academic and Examination Regulations can be found at:
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".
www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/

Imperial College London is regulated by the Office for Students (OfS)
www.officeforstudents.org.uk/advice-and-guidance/the-register/

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 primarily intended as a reference point for prospective and current students, academic and support staff involved in delivering the programme and enabling student development and achievement, for its assessment by internal and external examiners, and in subsequent monitoring and review.

Modifications

Description	Approved	Date	Paper Reference
Curriculum Review	Programmes Committee/QAEC	29/11/2022	PC.2022.13