Queen Mary University of London

Programme Specification (PG)

Awarding body / institution:	Queen Mary University of London
Teaching institution:	Queen Mary University of London
Name of final award and title:	MSc Artificial Intelligence
Name of interim award(s):	PGCert, PGDip
Duration of study / period of registration:	2 Years PT
Queen Mary programme code(s):	I4U2
QAA Benchmark Group:	Computing
FHEQ Level of Award:	Level 7
Programme accredited by:	BCTS and ITS
Date Programme Specification approved:	
Responsible School / Institute:	School of Electronic Engineering & Computer Science

Schools / Institutes which will also be involved in teaching part of the programme:
N/A

Collaborative institution(s) / organisation(s) involved in delivering the programme:
N/A

Programme outline

This MSc programme builds on the strengths of School of EECS, QMUL. These strengths collectively places it in an ideal yet unique position to offer an excellent MSc programme in AI: it is ideal since many of its research groups have already been long-established as leaders in their respective research fields (e.g., Game AI group, Vision Group, Computational Linguistics and Cognitive Science); it is unique because the school collectively covers almost all major topics on AI where external competition often lacks in part.

The programme is organised in two years. The first year has two semesters with 2 compulsory modules each. The second year repeats two teaching semesters, also with 2 compulsory modules each, plus a third semester consists of a research project. The MSc AI is organized in two different streams, which determine the modules that are to be taken during the course in the first two semesters. These streams are: 1) Language and Agents (default); 2) Multimodal AI. All streams cover fundamental aspects of Artificial Intelligence, including the background that underpins the different developments in the area and an overview on the ethical considerations of AI and decision making. Then, each stream is flavored with specific application areas of AI that showcase the capabilities of this field while covering the necessary materials for a future career either in research or in industry.

In the third semester of the second year, students carry out a large project on the AI topic that they want to specialize in, after agreeing on a specific topic with an academic supervisor in the first semester, and completing the preparation phase over the

second semester.

The programme brings together our teaching, research and industrial contacts to allow students to mix the different AI topics that best suits their personal requirements and future plans. Students will be offered lectures that explain the fundamental AI concepts, universal machine learning tools essential for any AI job profile, and specific practical and research skills on all our AI topics. Students will gain experience with cutting-edge tools such as Deep Neural Networks (DNN), Deep Reinforcement Learning (Deep RL) and Large Language Models (LLMs) via regular exercises and practical labs. Students will be taught by world-renowned academics in their specific subject areas, and have regular contacts with them throughout the duration of the programme.

Aims of the programme

This programme aims at training those who would like to pursue a career in the booming field of Artificial Intelligence (AI). It uniquely covers the hottest AI topics – games, vision and language – each backed up by a respective research group at QMUL that is world-leading. Practical machine learning skill development is at the core of this programme, which is specifically designed to maximise employment potential across a wide spectrum of industrial and academic posts related to AI.

AI is rapidly changing the way we live, work and learn. There is however a real shortage of AI talents worldwide, both to serve the industry and drive future research. AI jobs are amongst the best paid in industry nowadays – an AI Specialist typically earns among the highest salaries (New York Times, 22nd Oct 2017), while having a solid AI background is strongly desired in multiple research disciplines.

This MSc programme importantly recognises such need for training cutting-edge AI talents, and is specifically designed to maximise student employability on AI-specific jobs. It achieves that by putting together a programme that is:
- comprehensive, by covering the most popular AI topics
- up-to-date, where each topic backed up by a world-leading group with cutting edge research
- unique, by offering LLMs and Game AI that represents some of the most advanced AI to date
- practical, by focusing on developing practical machine learning skills across all topics.

More specifically, this programme aims to:
- enable students to acquire the essential knowledge, skills, competency, and scientific awareness necessary for a successful career in many AI-based industries.
- develop systematic awareness of the current development of AI, themed around all four AI topics
- master topic-specific expertise so that they develop expertise in applying scientific knowledge, mathematics and ingenuity to develop advanced solutions for technical, societal and commercial problems in selected AI areas
- equip students with practical machine learning programming skills universal to AI topics covered by this programme and beyond.

What will you be expected to achieve?

Students who successfully complete this programme will be able to understand:
- the principles underlying modern general AI
- the principles of AI in and decision making
- the principles of AI in computer vision and its applications in object recognition, tracking and re-identification
- the principles of AI in natural language processing, including language prediction, large language models, machine translation, and sentiment analysis
- the principles of Ethics and Responsible AI

Academic Content:	
A 1	A comprehensive knowledge and understanding of scientific principles and methodology necessary to underpin their education in AI, and an understanding and know-how of the scientific principles of related disciplines, to enable appreciation of the scientific and engineering context, and to support understanding of the relevant historical, current and future developments and technologies.

A 2	Knowledge and understanding of mathematical and statistical methods necessary to underpin their education and to enable them to apply a range of mathematical and statistical methods, tools and notations proficiently and critically in the analysis and solution of AI problems.
A 3	A comprehensive knowledge and understanding of mathematical and computational models relevant to all AI topics on offer, and an appreciation of their limitations.
A 4	Awareness of developing technologies related to own specialisation.

Disciplinary Skills - able to:	
B 1	Ability to apply and integrate knowledge and understanding of machine learning disciplines to support study of AI and the ability to evaluate them critically and to apply them effectively.
B 2	Ability to identify, classify and describe the performance of AI algorithms through the use of analytical methods and modelling techniques.
B 3	Ability to apply quantitative and computational methods, using alternative approaches and understanding their limitations, in order to solve AI problems and to implement appropriate action.
B 4	Ability to extract and evaluate pertinent data and to apply AI analysis techniques in the solution of unfamiliar problems.
B 5	Ability to investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards.

Attributes:	
C 1	Engage critically with AI knowledge and ethical principles
C 2	Have a global perspective of the value of AI, particularly with respect to its use and value in the big data era
C 3	Demonstrate rounded intellectual development
C 4	Be able to communicate their work to technical and non-technical audiences.
C 5	Develop research capacity and demonstrate information expertise: Work with information that may be incomplete or uncertain, quantify the effect of this on the AI design and, where appropriate, use theory or experimental research to mitigate deficiencies.

How will you learn?

By attendance at lectures (typically 16 hours per week), tutorials (typically 8 hours per week), and labs (typically 8 hours per Each non-project-based module involves lectures, problem solving coursework and practical sessions. Lectures are used to introduce principles and methods and also to illustrate how they can be applied in practice. Coursework allows students to develop their skills in problem solving and to gain practical experience. Practical sessions provide students with guidance and help while solving a problem. These lessons take the form of exercise classes and programming laboratories that allow the students to learn-by-doing in order to complement the lectures.

Individual projects are undertaken during the summer months under the supervision of an academic member of staff with whom there are weekly consultancy meetings. These are used for students to report on their progress, discuss research and design issues and plan their future work. This develops and reinforces students' ability to communicate technical ideas clearly and effectively. The Projects Coordinator also runs a thread of taught sessions to support the project module. A number of industrial-linked projects are offered each year, which students can apply for.

How will you be assessed?

The assessment of taught modules normally consists of a combination of written examination and coursework.

The project is examined on the basis of a written report, a formal oral presentation, and, where applicable, a demonstration of any software and/or hardware developed by the student.

How is the programme structured?

Please specify the structure of the programme diets for all variants of the programme (e.g. full-time, part-time - if applicable). The description should be sufficiently detailed to fully define the structure of the diet.

Students take 4 compulsory modules (15 credits each) on each of the first two semesters. A core research project is taken in semester 3 (60 credits).

The modules that conform the programme are, per stream:

Stream 1: Language and Agents (default)
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Sem 1:
- Machine Learning (YEAR 1)
- Artificial Intelligence (YEAR 1)
- Natural Language Processing (YEAR 2)
- Statistical Planning and Reinforcement Learning (YEAR 2)

Sem 2:
- Ethics, Regulation and Law in Advanced Digital Information Processing and Decision Making (YEAR 1)
- Information Retrieval (YEAR 1)
- Neural Networks and NLP (YEAR 2)
- Conversational Agents & Dialogue Systems (YEAR 2)

Stream 2: Multimodal AI
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Sem 1:
- Machine Learning (YEAR 1)
- Artificial Intelligence (YEAR 1)
- Natural Language Processing (YEAR 2)
- Introduction to Computer Vision (YEAR 2)

Sem 2:
- Ethics, Regulation and Law in Advanced Digital Information Processing and Decision Making (YEAR 1)
- Deep Learning for Audio and Music (YEAR 1)
- Deep Learning and Computer Vision (YEAR 2)
- Computational Creativity (YEAR 2)

Academic Year of Study PT - Year 1

Programme Title: MSc Artificial Intelligence

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Machine Learning	ECS708P	15	7	Compulsory	1	Semester 1
Artificial Intelligence	ECS759P	15	7	Compulsory	1	Semester 1
Information Retrieval	ECS736P	15	7	Elective	1	Semester 2
Deep Learning for Audio and Music	ECS7013P	15	7	Elective	1	Semester 2
Ethics, Regulation and Law in Advanced Digital Information Processing and Decision Making	ECS7025P	15	7	Compulsory	1	Semester 2

Academic Year of Study PT - Year 2

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Natural Language Processing	ECS763P	15	7	Compulsory	2	Semester 1
Statistical Planning and Reinforcement Learning	ECS7032P	15	7	Elective	2	Semester 1
Introduction to Computer Vision	ECS709P	15	7	Elective	2	Semester 1
Natural Networks and NLP	ECS7001P	15	7	Elective	2	Semester 2
Conversational Agents & Dialogue Systems	ECS7033P	15	7	Elective	2	Semester 2
Deep Learning and Computer Vision	ECS795P	15	7	Elective	2	Semester 2
Computational Creativity	ECS7022P	15	7	Elective	2	Semester 2
Final Project	ECS750P	60	7	Core	2	Semester 3

What are the entry requirements?

A 2:1 or above at undergraduate level in Electronic Engineering, Computer Science, Mathematics or a related discipline.

How will the quality of the programme be managed and enhanced? How do we listen to and act on your feedback?

The Student-Staff Liaison Committee (SSLC) provides a formal means of communication and discussion between the School and its students. The committee consists of student representatives from each cohort, together with appropriate representation from School staff. It is designed to respond to the needs of students, as well as act as a forum for discussing programme and module developments. The SSLC meet four times a year, twice in each teaching semester.

Each semester, students are invited to complete a web-based module questionnaire for each of their taught modules, and the results are fed back through the SSLC meetings. The results are also made available on the student intranet, as are the minutes of the SSLC meetings. Any actions necessary are taken forward by the relevant Senior Tutor, who chairs the SSLC, and general issues are discussed and actioned through the Curriculum and Delivery meetings at the school.

The School participates in the College's Annual Programme Review process, which supports strategic planning and operational issues for all undergraduate and taught postgraduate programmes. The APR includes consideration of the School's Taught Programmes Action Plan, which records progress on learning and teaching related actions on a rolling basis.

What academic support is available?

All students are assigned an academic advisor during induction week. The advisor 's role is to guide their advisees in their academic development including module selection, and to provide first-line pastoral support.

In addition, the School has a Senior Tutor for postgraduate students who provides second-line guidance and pastoral support for students, as well as advising staff on related matters.

Every member of teaching staff holds 2 open office hours per week during term-time.

Additional academic support is provided to those students who are successful in securing an industrial-linked project.

Programme-specific rules and facts

The programme adheres to the standard Academic Regulations for taught postgraduate programmes, with a special regulation for a progression point after the taught component.

How inclusive is the programme for all students, including those with disabilities?

Queen Mary has a central Disability and Dyslexia Service (DDS) that offers support for all students with disabilities, specific learning difficulties and mental health issues. The DDS supports all Queen Mary students: full-time, part-time, undergraduate, postgraduate, UK and international at all campuses and all sites.
Students can access advice, guidance and support in the following areas:
• Finding out if you have a specific learning difficulty like dyslexia
• Applying for funding through the Disabled Students' Allowance (DSA)
• Arranging DSA assessments of need
• Special arrangements in examinations
• Accessing loaned equipment (e.g. digital recorders)
• Specialist one-to-one "study skills" tuition
• Ensuring access to course materials in alternative formats (e.g. Braille)
• Providing educational support workers (e.g. note-takers, readers, library assistants)

• Mentoring support for students with mental health issues and conditions on the autistic spectrum.

Links with employers, placement opportunities and transferable skills

The School has a wide range of industrial contacts secured through research projects and consultancy, our Industrial Experience programme and our Industrial Advisory Panel.

The Industrial Advisory Panel works to ensure that our programmes are state-of-the-art and match the changing requirements of this fast-moving industry. The Panel includes representatives from a variety of Computer Science oriented companies ranging from SMEs to major blue-chips. These include: Microsoft Research, Royal Bank of Scotland, BT Labs, Oaklodge Consultancy, Intel Research, The Usability Company, Hewlett Packard Labs and Arclight Media Technology Limited.

Recent graduates have found employment as IT consultants, specialist engineers, web developers, systems analysts, software designers and network engineers in a wide variety of industries and sectors. A number of students also go on to undertake PhDs in electronic engineering and computer science. Merril Lynch, Microsoft, Nokia, Barclays Capital, Logica,, Credit Suisse, KPMG, Transport for London, Sky and Selex ES are among the organizations that have recently employed graduates of EECS programmes.

Transferable skills are developed through a variety of means, including embedding of QM Graduate Attributes in taught modules and the summer project, together with the opportunity to participate in extra-curricular activities, e.g. the School's E++ Society, the School's Annual Programming Competition and external competitions with support from the School.

Students have the opportunity to undertake an industrial-linked project in the summer - these are very competitive.

Programme Specification Approval

Person completing Programme Specification:	Diego Perez Liebana
Person responsible for management of programme:	Diego Perez Liebana
Date Programme Specification produced / amended by School / Institute Education Committee:	21 Nov 2023
Date Programme Specification approved by Taught Programmes Board:	