Programme Title: MSc FT Machine Learning for Visual Data Analytics

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 in Machine Learning for Visual Data Analytics
Name of interim award(s):	PG Certificate and PG Diploma
Duration of study / period of registration:	1 Year FT
Queen Mary programme code(s):	H6JE
QAA Benchmark Group:	
FHEQ Level of Award:	Level 7
Programme accredited by:	BCS The Chartered Institute for IT
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:

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

Programme outline

As recent developments in computers and sensors make easier the generation, storage and processing of visual data, methods that enable a machine to analyse and understand images and videos become increasingly relevant. Increasingly so, the analysis of the images and image sequences that are produced in an unprecedented pace, is done with Machine Learning methodologies. The advances in the field are behind autonomous vehicles, Facebook's face and image analysis technologies, Google's visual search engine to name just a few of the applications that have found their way in our everyday life. As the field matures, more applications in areas such as Robotics, Human Computer Interaction, Medical Imaging and Multimedia Indexing and Retrieval are to be expected towards systems that can perceive the world with visual sensors and learn with different types of guidance, including Natural Language.

Recent trends in the field utilise multi-modal information and in particular representations from Natural Language Processing to guide learning.

The course aims at providing the students with the knowledge and skills to pursue a career in research or in related industries. It covers

   Fundamental methods and techniques in Computer Vision, Machine Learning, Image Processing and Natural Language

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Processing
  Programming tools, languages and techniques for application of Machine Learning methods for the Analysis of Visual Data
  Methods and techniques for Systems and Applications

The students are given
  Lectures in which the theory and the algorithms are presented
  Practical sessions / labs in which they get hands on experience with tools and algorithms
  A final year project in which they are supervised by world leading experts in cutting edge research topics.

The programme is offered and taught by academics from experts in Machine Learning, Computer Vision and Natural Language Processing in the School of Electronic Engineering and Computer Science. This is a team of more than 100 researchers (academics, post-docs, research fellows and PhD students), performing world leading research in the field.

Aims of the programme

The course will enable students to study cutting edge technologies in the field of Machine Learning for Visual Data Analytics, and will provide them with the background and skills they need to pursue careers in research or in related industries. Specific aims include the completion of a broad range of advanced study in methods for design, build, and evaluation of related systems.

The course will give training and experience through lectures with associated lab and coursework, and a major individual project. The course covers is developed around three core strands.

1) Fundamental methods and techniques (in Computer Vision, Machine Learning, Image Processing and Natural Language Processing)
2) Programming tools, languages and techniques
3) Methods and techniques for Visual Analytics Systems and Applications

What will you be expected to achieve?

By the end of the programme the students will have
a) Awareness of the major applications in the area of Visual Data Analytics and the related challenges
b) Knowledge of the fundamental methodologies and recent trends in the area of Computer Vision and Natural Language Processing or Image Processing
c) Hands-on practical programming experience in labs
d) Hands on experience in design, implementation and evaluation of a mini research project

Academic Content:	
A 1	A critical awareness of current problems and new insights at the forefront of Machine Learning for Visual Data Analytics
A 2	Knowledge of the fundamental methodologies in the field of Machine Learning for Visual Data Analytics

Disciplinary Skills - able to:	
B 1	The ability to apply appropriate analysis methods for solving complex problems and to assess their limitations
B 2	Knowledge, understanding and skills to work with information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory or experimental research to mitigate deficiencies

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Attributes:	
C 1	Awareness of the need for a high level of professional and ethical conduct in engineering

How will you learn?

Each non-project-based course unit 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 the guidance and help while solving a problem. These sessions take the form of exercise classes and programming laboratories that allow the students to learn-by-doing in order to complement the lectures. In addition to the final year project, other modules introduce project working skills.

How will you be assessed?

The assessment of the taught course units takes place through a written examination and coursework.

The final year project is examined on the basis of a written report, a formal oral presentation, and a demonstration of the piece of software developed by the student. The projects will have two examiners each, with a third if there is disagreement.

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.

The programme is offered in two streams, both of which are organised in three terms. In each of the first two terms the students are offered four taught modules per term. In the last term the students carry out a major project.

The two streams differ on the taught modules that are being offered.

In the first stream, Vision and Language, the emphasis is on the intersection of Machine Learning, Computer Vision and Natural Language Processing. You will be offered the following modules:

Semester 1
ECS708P Machine Learning
ECS709P Introduction to Computer Vision
ECS764P Applied Statistics
ECS763P Natural Language Processing

Semester 2
ECS795P Deep Learning and Computer Vision
ECS797P Machine Learning for Visual Data Analysis
ECS7001P Neural Networks and NLP

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ECS7026P Neural Networks and Deep Learning

In the second stream, Computer Vision and Image Processing, the emphasis is on Machine Learning and Computer Vision. You will offered the following modules:

Semester 1
ECS708P Machine Learning
ECS709P Introduction to Computer Vision
ECS764P Applied Statistics
ECS762P Computer Graphics

Semester 2
ECS795P Deep Learning and Computer Vision
ECS797P Machine Learning for Visual Data Analysis
ECS776P Image Processing
ECS7026P Neural Networks and Deep Learning

Semester 3
ECS750P Project Module

Academic Year of Study   FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Machine Learning	ECS708P	15	7	Compulsory	1	Semester 1
Introduction to Computer Vision	ECS709P	15	7	Compulsory	1	Semester 1
Applied Statistics	ECS764P	15	7	Compulsory	1	Semester 1
Natural Language Processing	ECS763P	15	7	Compulsory	1	Semester 1
Computer Graphics	ECS762P	15	7	Compulsory	1	Semester 1
Deep Learning and Computer Vision	ECS795P	15	7	Compulsory	1	Semester 2
Machine Learning for Visual Data Analysis	ECS797P	15	7	Compulsory	1	Semester 2
Neural Networks and NLP	ECS7001P	15	7	Compulsory	1	Semester 2
Neural Networks and Deep Learning	ECS7026P	15	7	Compulsory	1	Semester 2
image Processing	ECS776P	15	7	Compulsory	1	Semester 2

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Project Module	ECS750P	60	7	Core	2	Semester 3

What are the entry requirements?

Further information on our entry requirements can be found at www.qmul.ac.uk/postgraduate/taught/coursefinder/courses/machine-learning-for-visual-data-analytics-msc/

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 School's Education Committee (EduComm).

The School's EduComm advises the Director of Education on all matters relating to the delivery of taught programmes at school level including monitoring the application of relevant QM policies and reviewing all proposals for module and programme approval and amendment before submission to Taught Programmes Board. Student views are incorporated in this Committee's work in a number of ways, including through student membership and consideration of student surveys and module questionnaires.

The School participates in the University'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 Student Experience Action Plan, which records progress on learning and teaching related actions on a rolling basis. Students' views are considered in the APR process through module questionnaires, among other data.

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

Special regulations apply for programmes accredited by the Engineering Council. Please refer to the Academic Regulations for

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full details. Students who complete the programme but do not meet the Engineering Council's requirements will graduate with an alternate programme title.

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, IBM, The National Physical Laboratory, National Instruments, PA Consulting, Rohde and Schwarz, O2, Cisco Systems, ARM, Selex and BAE Systems.

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:

Ioannis Patras

Queen Mary
University of London

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Person responsible for management of programme:

Ioannis Patras

Date Programme Specification produced / amended by School / Institute Education Committee:

9 Dec 2024

Date Programme Specification approved by Taught Programmes Board:

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