Queen Mary
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Programme Specification (PG)

Awarding body / institution:	Queen Mary University of London
Teaching institution:	Queen Mary University of London
Name of final award and programme title:	Master of Science (MSc) MSc in Big Data Science
Name of interim award(s):	N/A
Duration of study / period of registration:	1 year
Queen Mary programme code(s):	H6J7
QAA Benchmark Group:	Computing
FHEQ Level of Award:	Level 7
Programme accredited by:	
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:

NA

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

NA

Programme outline

The Big Data science movement is transforming how Internet companies and researchers over the world address traditional problems. Big Data refers to the ability of exploiting the massive amounts of unstructured data that is generated continuously by companies, users, devices, and extract key understanding from it.

A Data Scientist is a highly skilled professional, who is able to combine state of the art computer science techniques for processing massive amounts of data with modern methods of statistical analysis to extract understanding from massive amounts of data and create new services that are based on mining the knowledge behind the data. The job market is currently in shortage of trained professionals with that set of skills, and the demand is expected to increase significantly over the following years.

The course leverages the world-leading expertise in research at Queen Mary with our strategic partnership with IBM and other leading IT sector companies to offer to students a foundational MSc on the field of Data Science. The MSc modules cover the following aspects:

- Statistical Data Modeling, data visualization and prediction
- Machine Learning techniques for cluster detection, and automated classification

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- Big Data Processing techniques for processing massive amounts of data
- Domain-specific techniques for applying Data Science to different domains: Computer Vision, Social Network Analysis, Natural Language Processing, Risk Analysis and Decision Support, etc.
- Use case-based projects that show the practical application of the skills in real industrial and research scenarios.

Students will be offered lectures that explain the core concepts, techniques and tools required for large-scale data analysis. Laboratory sessions and tutorials will put these elements to practice through the execution of use cases extracted from real domains. Students will also undertake a large project where they will demonstrate the application of Data Science skills in a complex scenario.

The programme is offered by academics from the Networks, Centre for Intelligent Sensing, Risk and Information Management, Computer Vision and Cognitive Science research groups from 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 fields of Intelligent Sensing, Network Analytics, Big Data Processing platforms, Machine Learning for Multimedia Pattern Recognition, Social Network Analysis, and Multimedia Indexing.

Aims of the programme

The course will provide students with cutting edge tools, methods, and techniques for analysing large-scale datasets in order to detect patterns/trends and extract valuable information from raw data. Programme graduates will be able to pursue careers in Data Scientist positions in industry, as well as initiate research in multiple scientific domains that rely on performing advanced data analysis.

The programme will cover the following topics:

- Statistical Data Modeling, data visualization and prediction
- Machine Learning techniques for cluster detection, and automated classification
- Big Data Processing techniques for processing massive amounts of data
- Domain-specific techniques for applying Data Science to different domains: Computer Vision, Social Network Analysis, Bio Engineering, Intelligent Sensing and Internet of Things
- Use case-based projects that show the practical application of the skills in real industrial and research scenarios.

What will you be expected to achieve?

Knowledge and understanding of:

Academic Content:	
A 1	Statistical modeling of real data sources for trend detection and prediction
A 2	Programming tools and techniques for processing massive amounts of data such as Map/Reduce and Hadoop
A 3	Methods and techniques for automated classification and pattern recognition

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Disciplinary Skills - able to:	
B 1	Evaluate the scientific, mathematical and software 'tools' relevant to the problem domain of Big Data science
B 2	Develop novel techniques for analyzing unstructured data sources
B 3	Establish hypotheses on data sources, and validate them through statistical techniques

Attributes:	
C 1	Engage critically with knowledge in the domain of Big Data science
C 2	Develop a global perspective on the sources and uses of new data
C 3	Develop information expertise in the domain

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.

Tutorial sessions actively engage students on applying the techniques and tools presented in the lectures to solve practical problems. These sessions take the form of exercise classes and programming laboratories under the guidance of the teaching staff. 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 organised in three semesters:

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-The first semester consists of three core modules plus one optional module that will cover the foundational techniques and tools employed for Big Data Science analysis.
- The second semester has one core module plus three modules that are chosen among a set of options. The module selection allows students to focus on domain-specific research or industry applications for Big Data Science. Module options allow students to develop themselves along two broad professional profiles, namely Data Engineer and Data Scientist. The Data Engineer profile puts emphasis in cloud technologies, Internet services and social media, whereas the Data Scientist profile focuses on complex data sources (vision and language) and advanced machine learning approaches (neural networks, specifically deep learning).
- Students carry out a large project full time in the third semester, after agreeing to a topic and supervisor in the first semester, and completing the preparation reading over the second semester.

Academic Year of Study   FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Applied Statistics	ECS764P	15	7	Compulsory	1	Semester 1
Data Mining	ECS766P	15	7	Compulsory	1	Semester 1
Principles of Machine Learning		15	7	Compulsory	1	Semester 1
Semi-Structured Data and Advanced Data Modelling	ECS789P	15	7	Elective	1	Semester 1
Natural Language Processing	ECS763P	15	7	Elective	1	Semester 1
Big Data Processing	ECS765P	15	7	Compulsory	1	Semester 2
Neural Networks and NLP	ECS7001P	15	7	Elective	1	Semester 2
Risk and Decision-Making for Data Science and AI	ECS7005P	15	7	Elective	1	Semester 2
Digital Media and Social Networks	ECS757P	15	7	Elective	1	Semester 2
Cloud Computing	ECS781P	15	7	Elective	1	Semester 2
Distributed Systems	ECS796P	15	7	Elective	1	Semester 2
Information Retrieval	ECS736P	15	7	Elective	1	Semester 2
Neural Networks and Deep Learning	ECS659P	15	7	Elective	1	Semester 2

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What are the entry requirements?

A high (2:2) honours BSc in Computer Science, Electronic Engineering, Maths, Physics or related disciplines is required. International students must have English Language skills to a recognised standard. The minimum requirement is:
IELTS 6.5, TOEFL (CBT) 237, 92 (iBT) or TOEFL (written test) 580.
Good knowledge of computer programming is highly recommended for students.

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

The Staff-Student Liaison Committee provides a formal means of communication and discussion between Schools and its students. The committee consists of student representatives from each year in the school/institute together with appropriate representation from staff within the school/institute. It is designed to respond to the needs of students, as well as act as a forum for discussing programme and module developments. Staff-Student Liaison Committees meet regularly throughout the year.

Each school operates a Learning and Teaching Committee, or equivalent, which advises the School/Institute Director of Taught Programmes 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, such as through student membership, or consideration of student surveys.

All schools operate an Annual Programme Review of their taught undergraduate and postgraduate provision. The process is normally organised at a School-level basis with the Head of School, or equivalent, responsible for the completion of the school's Annual Programme Reviews. Schools/institutes are required to produce a separate Annual Programme Review for undergraduate programmes and for postgraduate taught programmes using the relevant Undergraduate or Postgraduate Annual Programme Review pro-forma. Students' views are considered in this process through analysis of the NSS and module evaluations.

What academic support is available?

All students will be assigned a tutor, with whom they will have bi-weekly meetings. In addition the students will have all the standard induction, advice and supervisory arrangements normally offered to students within EECS.

The school handbook will be provided (and made accessible at all times) to students, where all the channels of support will be outlined. These include the support channels within the school and also those available at College level.

Programme-specific rules and facts

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

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• 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 staff involved in the MSc of Big Data Science have strong links and research collaboration with industrial partners including IBM, HP, BBC, and Tech City IT startups. Several of these companies will be involved in the teaching activities, providing guest lectures, as well as business use cases for applying Big Data Science techniques.
Additionally, several of the MSc projects offered to the students will be performed in collaboration with an industry partner, including summer placement opportunities.

Programme Specification Approval

Person completing Programme Specification:

Dr Jesús Requena Carrión

Person responsible for management of programme:

Dr Jesús Requena Carrión

Date Programme Specification produced / amended by School / Institute Learning and Teaching Committee:

Date Programme Specification approved by Taught Programmes Board:

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