

Programme Title: MSc Network Science



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:	MSc Network Science
Name of interim award(s):	PG Diploma/PG Cert
Duration of study / period of registration:	1 year full time/2 years part time
QMUL programme code(s):	PSNSC - G1S6 (full time)/G1S7 (part time)
QAA Benchmark Group:	
FHEQ Level of Award:	Level 7
Programme accredited by:	
Date Programme Specification approved:	
Responsible School / Institute:	School of Mathematical Sciences

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

School of Electronic Engineering & Computer Science

Institution(s) other than QMUL that will provide some teaching for the programme:

N/A

Programme outline

The MSc Network Science is a specialist masters programme aiming at providing graduate students and professionals with a rigorous training in mathematics and computer science applied to networks and communication theory. It is aimed at students whose undergraduate degree is in mathematics or a cognate discipline, who wish to center on a career involving analysis and optimisation of diverse kinds of networks.

The programme is run jointly by the School of Mathematical Sciences and the School of Electronic Engineering and Computer Science and is offered full time (one year) and part-time (two years). Full time students will take four modules per semester, followed by a 10,000 word dissertation.

Aims of the programme

The aim of the programme is to capitalise on the popularity of network science, nationally and internationally. The proposed programme will provide a thorough grounding in the core principles of mathematics as applied to networks, along with the applications of network science to the real world. This would open a host of career opportunities to students in the research sector, public service, industry and commerce that require specialist knowledge and skills. It is expected that the proposed

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programme will be popular, so enabling SMS to expand PGT numbers in accordance with the Queen Mary Strategic Plan. It is also expected that the programme will provide further financial underpinning of SMS growth in terms of its core research activities, as well as additional significant income for the College.

What will you be expected to achieve?

The student will be expected to pass all the taught course material and produce a Masters level 10,000 word dissertation in the area of Network Science.

Academic Content:

A 1	basic techniques in network analysis and modelling
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A 2	applications of network theory
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A 3	design and optimisation of networks
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Disciplinary Skills - able to:

B 1	achieve an understanding of mathematical and computational techniques for networks
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B 2	understanding applied probability and stochastic processes in the context of networks
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B 3	apply network theory to dynamic processes
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Attributes:

C 1	ability to code in C++/Matlab
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C 2	ability to follow the literature and critically evaluate scientific output
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C 3	ability to structure and produce high quality written material
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How will you learn?

The taught programme is designed to provide the students with the understanding and grounding needed to progress successfully through the MSc through to the Dissertation. Lectures that provide the theoretical background will be balanced by coursework and a project that give the students the practical skills needed to undertake research projects. Following the courses

will also prepare students to read, understand and evaluate current scientific literature, and prepare them for analysing and modelling networks and dynamical processes. The final dissertation project will teach students to manage their own study, perform research and produce scientific output at Masters level.

Throughout the whole academic year students are encouraged to undertake independent reading both to supplement and consolidate what is being taught and learnt and to broaden their individual knowledge and understanding of the subject.

Practical and computational skills are developed through coursework, the project work and through interaction with the other research students and the project supervisor.

Technical reports and presentations are taught and developed through workshops and feedback on written coursework, progress reports of the project and presentations. Use of the scientific literature is introduced by the Library during the induction week and then developed by academic staff through lectures on Research Methods, coursework, and reports and presentation of the individual supervised special project.

Transferable skills are built up through the teaching and learning programme outlined above. Effective communication is taught and assessed through workshops and feedback on the project reports and oral presentations. It is assessed through coursework, written examinations and project work.

Usage of information and communications technology is developed through workshops, computer based exercises, coursework activities, the project and other and individual learning.

Management of resources and time is developed throughout the course within a framework of coursework deadlines and the examination system. Moreover, the programme is structured and delivered in such a way as to promote independent learning with open mindedness and critical inquiry.

Throughout the project what is being taught and simultaneously assessed is management skills, the integration and evaluation of information from a variety of sources, and the transfer of knowledge techniques and solutions from one discipline to another.

How will you be assessed?

The assessment is by written examination and a written dissertation, in line with the regulations for projects/dissertations at Masters level. Where computational and programming skills are delivered, modules will have in-term assessed project work and coursework.

The project - a 10,000 word dissertation that counts for 60 credits is written during the summer - starts early in January. It is assessed, on the basis of the individual literature review, main report and presentation, initially by the supervisor and second examiner, and then by the External Examiner and the full Examination Board.

How is the programme structured?

Please specify the full time and part time programme diets (if applicable). The description should be sufficiently detailed to fully define the structure of the diet.

The study programme consists of four compulsory taught modules and four elective modules, with an even split between semesters, as well as a summer dissertation project.

Three compulsory mathematics modules, developed by the School of Mathematical Sciences (SMS) specifically for this programme, will cover the most important network theory and mathematical techniques. Five relevant modules already exist in SMS, four of which are offered as elective modules, and one of which is compulsory. In addition, four elective computational modules will cover the relevant computing elements. These modules already exist and are offered within the Masters programme run by the School of Electronic Engineering and Computer Science (EECS).

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Academic Year of Study FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Graphs and Networks	MTH750P	15	7	Compulsory	1	Semester 1
Research Methods in Mathematical Sciences	MTH700P	15	7	Compulsory	1	Semester 1
Machine Learning	ECS708P	15	7	Elective	1	Semester 1
Topics in Scientific Computing	MTH739P	15	7	Compulsory	1	Semester 1
Computational Statistics with R	MTH791P	15	7	Elective	1	Semester 2
Processes on Networks	MTH751P	15	7	Compulsory	1	Semester 2
Digital Media and Social Networks	ECS757P	15	7	Compulsory	1	Semester 2
Complex Systems	MTH743P	15	7	Elective	1	Semester 2
MSc Dissertation (10000 words)	MTH788P	60	7	Core	1	Semester 1-3
Data Mining	ECS766P	15	7	Elective	1	Semester 1
Database Systems	ECS740P	15	7	Elective	1	Semester 2
Trading and Risk Systems Development	MTH789P	15	7	Elective	1	Semester 2
Dynamical Systems	MTH744P	15	7	Elective	1	Semester 1
Machine Learning with Python	MTH786P	15	7	Elective	1	Semester 2

What are the entry requirements?

A good degree (at least 2.i or equivalent) in a subject with substantial mathematical component (e.g. Mathematics, Statistics, Physics, Computer Science, Engineering).
 IELTS/TOEFL standard requirements for international students, C in GCSE English or equivalent for home students.

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/institutes 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/institute 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 the committee's work in a number of ways, such as through student membership, or consideration of student surveys.

All schools/institutes operate an Annual Programme Review of their taught undergraduate and postgraduate provision. APR is a continuous process of reflection and action planning which is owned by those responsible for programme delivery; the main document of reference for this process is the Taught Programmes Action Plan (TPAP) which is the summary of the school/institute's work throughout the year to monitor academic standards and to improve the student experience. Students' views are considered in this process through analysis of the NSS and module evaluations.

What academic support is available?

The Postgraduate Taught Programmes Officer and Student Support Officer in SMS will liaise with the Programme Director and with EECS staff to run the induction programme. The Senior Tutor in SMS will assign an adviser to each student on the programme - initially this will be the Programme Director but as numbers increase, we expect other staff will also advise students on the programme. The Student Support teams in SMS and EECS will ensure that students feel able to consult staff in either School to resolve any difficulties as they arise.

Course representatives from the new programme will attend the Postgraduate Student-Staff Liaison Committee in SMS. The programme review will be overseen by the Director of Taught Programmes in SMS and the SMS Teaching and Learning Committee.

Programme-specific rules and facts

N/A

Specific support for disabled students

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)

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- 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 MSc Network Science programme will prepare students for a range of careers, especially in the information technology sector, as well as public health, finance, public services, marketing, consultancy and commerce. The analytic and computing skills acquired through the programme are much valued in the financial sector and a number of recent graduates from the School of Mathematical Sciences have gone on to work for companies such as the Royal Bank of Scotland, HSBC, Procter and Gamble, Barclays Capital, JP MorganChase and EDF Energy. During the project phase of the MSc, the students will have the opportunity to define their project in collaboration with our external collaborators.

Programme Specification Approval

Person completing Programme Specification:

Sebastian del Bano Rollin

Person responsible for management of programme:

Ginestra Bianconi

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

6 Feb 2018

Date Programme Specification approved by Taught Programmes Board: