Queen Mary
University of London

Programme Specification

Awarding Body/Institution	Queen Mary, University of London
Teaching Institution	Queen Mary, University of London
Name of Final Award and Programme Title	MSc Digital Signal Processing
Name of Interim Award(s)	PG Certificate and PG Diploma
Duration of Study / Period of Registration	12 Months FT, 24 Months PT
QM Programme Code / UCAS Code(s)	
QAA Benchmark Group	Engineering
FHEQ Level of Award	Level 7
Programme Accredited by	The Institution of Engineering and Technology
Date Programme Specification Approved	5 Feb 2015
Responsible School / Institute	School of Electronic Engineering & Computer Science

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

Institution(s) other than Queen Mary that will provide some teaching for the programme

Programme Outline

This programme is intended to respond to a growing skills shortage in industry for engineers with a high level of training in signal processing, and to support internet, multimedia, communications, mobile and consumer industries. You will develop core knowledge of fundamental DSP theory and real-time DSP, with a range of options across computer vision, audio & music, machine learning, interactive system design, and internet of things. The taught modules are fully supported, with computing and laboratory work. The MSc is intended for graduates in a related discipline, who wish to enhance and specialise their skills in the area, and also for industrialists with some experience of working with signal processing in the IT sector, who wish to obtain a formal qualification.

Aims of the Programme

The overall aims are to provide masters level engineering students with training in advanced digital signal processing, and in particular to give them the background and skills they need for careers in related technologies.

Specific aims include the completion of a broad range of advanced study in methods of processing, analysis, synthesis and manipulation of digital signals.

Queen Mary
University of London

Programme Title: MSc Digital Signal Processing

This involves the use of both established and specialised data analysis and signal processing techniques, an understanding of theory, and an understanding of standards, formats, broadcasting and transmission methods, and multimedia systems.

The aims of the placement year are to:
• Ground the taught components of the programme in practical experience at a scale not possible within the College;
• Improve career preparation, giving students a better understanding of future career options and enhancing their career prospects.

What Will You Be Expected to Achieve?

• An understanding of the fundamentals of digital signal processing
• An understanding of the nature and use of advanced transform techniques
• An understanding of the nature and use of statistical methods, particularly with respect to data evaluation for signal processing
• An understanding of the techniques needed for real time digital signal processing
• An appreciation of the techniques underlying the use and transmission of multimedia images, voice and data
• An appreciation of the techniques required for the successful application of signal processing in the digital domain
• An ability to use modern digital techniques for the analysis of speech, music, video and image transmission and processing
• A demonstration of the use of taught knowledge via the successful completion of a project in digital signal processing or a cognate subject.

Academic Content:	
A 1	An ability to implement and use modern digital techniques for the analysis of speech, music, video transmission and processing
A 2	An understanding of the nature and use of digital signal processing, real-time digital signal processing and advanced transform techniques
A 3	A theoretical and practical understanding of the nature and use of statistical methods, particularly with respect to data evaluation for signal processing
A 4	Knowledge of theories and principles of standards, formats, broadcasting and transmission methods relevant to digital signal processing

Disciplinary Skills - able to:	
B 1	Analyse information and experiences, formulate independent judgements, and articulate reasoned arguments through reflection, review and evaluation
B 2	Source, navigate, select, retrieve, evaluate, manipulate and manage information from a variety of sources
B 3	Carry out extended critical and analytic writing through a dissertation on their research project.
B 4	Take a practical approach to designing empirical experiments for testing hypotheses, including selection of appropriate methods, stimuli, participants, and methods for analysis.

Attributes:	
C 1	Work independently on a practical or research-based project under supervision

Queen Mary
University of London

C2	Analyse complex, novel and diverse situations, and identify appropriate methods of working and communicating
C3	Able to engage confidently with others in identifying and communicating problems, identifying goals and solutions and work with others and individually towards achieving them.

How Will You Learn?

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?

The programme is structured to enable students to have some choice within the programme, while compulsory modules cover the essential themes. The programme structure is as follows:

Semester 1

ECS706P - Advanced Transform Methods
ECS707P - Fundamentals of DSP
ECS701P - Communication Theory
ECS709P - Introduction to Computer Vision

Semester 2

ECS732P - Real -Time DSP

Plus three options from:
ECS722P Sensors and Internet of Things
ECS728P Business Technology Strategy
ECS729P Music and Speech Processing
ECS730P Digital Audio Effects
ECS734P Techniques in Computer Vision

Queen Mary
University of London

Programme Title: MSc Digital Signal Processing

Semester 3:
ECS750P - Project

Academic Year of Study

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester

What Are the Entry Requirements?

The entry requirements are a good second class degree in Electronic Engineering, Computer Science, Mathematics or a related discipline. Applicants with unrelated degrees will be considered if there is evidence of significant relevant industrial experience.

In addition applicants should have completed an undergraduate module in at least one of the following areas:
• Signals and Systems
• Control
• Analogue Filters

The applicants should also have prior knowledge of the following topics:
Time and Frequency Domains, including Negative Frequency Polynomials and Rational Functions of Complex Variables (real coefficients) and their Singularities (Poles, Zeros), Continuous & Discrete Time LTI systems and signal definitions, Laplace Transform properties (Conv, Mult etc) and principle of inversion, Fourier Series & Transform, Sampling, ADC/DAC.

For international students, English Language skills are required to a recognised standard. The minimum requirement is: IELTS 6.5 or TOEFL (IBT) 92. For students not quite meeting this requirement (e.g. IELTS 6.0), enrolling on a one month pre-sessional English Language course is required. These conditions are higher than standard College conditions.

How Do We Listen and Act on Your Feedback?

The Student-Staff Liaison Committee 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. Student-Staff Liaison Committees 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 Learning and Teaching Committee.

The School's Learning and Teaching Committee advises the 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, including through student membership and consideration of student surveys and module questionnaires.

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. Students' views are considered in the APR process through analysis of the NSS and module questionnaires, among other data.

Queen Mary
University of London

Academic Support

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.

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)
• 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,

Programme Title: MSc Digital Signal Processing

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.

Programme Specification Approval

Person completing Programme Specification	Virginia Elgar
Person responsible for management of programme	John Schormans
Date Programme Specification produced/amended by School Learning and Teaching Committee	5 Feb 2015
Date Programme Specification approved by Taught Programmes Board	5 Feb 2015

Queen Mary
University of London