

Programme Specification (UG)

Awarding body / institution:	Queen Mary University of London
Teaching institution:	Queen Mary University of London
Name of final award and programme title:	Bachelor of Engineering (BEng) Electronics with Music and Audio Systems with Industrial Experience
Name of interim award(s):	Cert HE, Dip HE, BSc(Eng), BEng
Duration of study / period of registration:	4 years FT
QMUL programme code / UCAS code(s):	H289
QAA Benchmark Group:	Engineering
FHEQ Level of Award :	
Programme accredited by:	Institution of Engineering and Technology (IET)
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

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

N/A

Programme outline

This programme uses mathematics and engineering techniques to enable you to understand how technology is applied to music and audio. You will learn how electronics and computers shape electronic musical instruments, analogue and digital audio systems, music downloads, sound effects and games. In addition to a team project in your second year, you will complete an individual final-year project that will be supervised by a researcher in our world-leading Centre for Digital Music (C4DM). The programme includes a year in industry between the second and final years of study.

This programme is accredited by the Institution of Engineering and Technology on behalf of the Engineering Council for the purposes of fully meeting the academic requirement for registration as an Incorporated Engineer and partly meeting the academic requirement for registration as a Chartered Engineer.

Aims of the programme

The aim of this undergraduate programme is to give the student a firm foundation in all aspects of audio systems engineering from the recording and composition/synthesis of music to the design of the underlying hardware and software that makes

recording and synthesis possible. The course includes several practical audio related modules along with the core electronics and programming topics required to understand and master the underlying technology.

The year in industry supports the students in learning about the application of computer science in an organisational context. 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?

Skill-based aims and objectives applying to all engineering undergraduates:

At the end of his/her degree, each student should be able to demonstrate the following abilities:

- the ability to recall factual knowledge and the ability to apply it in familiar and unfamiliar situations;
- the ability to apply scientific, mathematical and software 'tools' to a familiar or unfamiliar situation;
- the ability to use Information Technology as a key tool pervading all aspects of Electronic Engineering;
- the ability to understand practical issues concerning real systems (whether hardware or software);
- the ability to recognise insufficient existing knowledge and the ability to search for the necessary scientific, mathematical and software 'tools' relevant to that particular issue;
- the ability to work as part of a team;
- the ability to manage time effectively;
- the ability to appreciate the financial background against which decisions are made in industry;
- the ability to show a certain level of reflection on the role of engineering in society;

and the following skills:

- the perceptive skills needed to understand information presented in the form of technical circuit-diagrams, flow-charts and high-level languages;
- the practical skills needed to implement a piece of hardware or software and to use laboratory test equipment;
- the analytical skills needed to verify the correct behaviour of a hardware or software system or component and to be able to identify faults;
- the design skills needed to synthesise a design (in hardware and/or software) from a specification (including the choice of the best option from a range of alternatives), to implement the design and to evaluate the design against the original specification;
- the written and oral communication skills needed to present information, in particular written information, effectively;
- the critical reasoning skills needed to appraise a particular topic.

Context-based aims and objectives

- to develop a knowledge of audio and music-related technologies and have a grasp of the latest developments in the field.
- to gain practical experience designing, using and building audio circuits and systems.

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QMUL Model

The QMUL Model is an innovative teaching and learning initiative that will broaden opportunities for Queen Mary undergraduates within and beyond higher education, supporting them to plan and manage their ongoing professional development. The Model is firmly grounded in the core QMUL values of respect for, and engagement with, the local area and communities, with a distinctive focus on enabling students to make a positive societal impact through leadership in their chosen field. The Model is organised around the key themes of:

- networking
- multi- and inter-disciplinarity
- international perspectives
- enterprising perspectives.

Students are required to study QMUL Model modules to the value of at least 10 credits at each year of undergraduate study. Model modules may be 5, 10 or 15 credits. Model modules are indicated within this programme specification.

In your first year of study, the Model module will be core or compulsory and will be situated within your home School or Institute. In subsequent years, students will be strongly encouraged to study at least one Model module beyond their home discipline(s), which could, for example, be in another School / Institute or area of QMUL or undertaken as a module outside of QMUL.

If Model module information is not provided on this programme specification for all subsequent years of study, this will be identified as your studies continue.

Where a Model module elective can be selected from an approved group of Model modules, no guarantee can be provided that your first choice of Model module will be available.

Academic Content:	
A 1	Theories and principles of acoustics plus both analogue and digital audio.
A 2	Analogue and digital hardware knowledge and understanding.
A 3	Programming languages and environments, systems development methodologies.
A 4	Approaches to audio system design and evaluation

Disciplinary Skills - able to:	
B 1	Critically evaluate audio systems.
B 2	Design, implement and test audio systems (hardware/software/both)
B 3	Critically evaluate audio technologies, make informed decisions about how best to solve problems.
B 4	Critically reflect on their own performance in practical projects and apply to future work.

Attributes:	
C 1	Integrate scholarship, research and professional activities within the audio area of the EE discipline in a developing professional career.
C 2	Evaluate their practice and engage in continuing professional development.

QMUL Model Learning Outcomes - Level 4:	
D 1	(Networking) Identify and discuss their own career aspirations or relevant skills and knowledge and how they i
D 2	(Networking) Identify and discuss what their own role in their programme and/or subject discipline might mea
D 3	(International Perspectives) Consider the role of their discipline in diverse cultural and global contexts

QMUL Model Learning Outcomes - Level 5:	
E 1	(Enterprising Perspectives) Demonstrate and evaluate how they have enhanced their own learning through engaging
E 2	(Networking) Evaluate and demonstrate their own attitudes, values and skills in the workplace and/or in the wider wo
E 3	(Networking) Evaluate and demonstrate evidence of their skills to support networking and how these have influenced

QMUL Model Learning Outcomes - Level 6:	
F 1	
F 2	

F3	
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QMUL Model Learning Outcomes - Level 7:	
G1	
G2	
G3	

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 throughout the year 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.

How will you be assessed?

The assessment of taught modules normally consists of a combination of written examination and coursework. Specialised audio related modules also include elements of performance and presentation for some courseworks.

Project modules are normally examined on the basis of a written report, a formal oral presentation, and, where applicable, a demonstration of any software and/or hardware developed.

The industrial placement is assessed by a combination of written report, viva, learning journal and 2 employer evaluations. The first employer evaluation takes place a few months into the placement and the second takes place shortly before the end of the placement. Each evaluation involves employer and student jointly setting appropriate objectives within a structured framework of categories; progress is later measured against these objectives using set marking criteria.

How is the programme structured?

Please specify the full time and part time programme diets (if applicable). Please also outline the QMUL Model arrangements for each year of study. The description should be sufficiently detailed to fully define the structure of the diet.

Year 1 Modules
Semester 1
ECS401U Procedural Programming (15 credits)
ECS408U Electronic Engineering Mathematics I (15 credits)
ECS412U Digital Circuit Design (15 credits)
ECS427U Professional and Research Practice (15 credits)
Semester 2
ECS409U Analogue Electronic Systems (15 credits)
ECS411U Signals and Information (15 credits)
ECS415U Introduction to Audio (15 credits)
ECS416U Introduction to Multimedia (15 credits)
Semester 1 and 2

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<p>ECS4**U Skills for Electronic Engineering (non-credit bearing module)</p> <p>Year 2 Modules</p> <p>Semester 3</p> <p>ECS501U C Programming (15 credits)</p> <p>ECS502U Microprocessor Systems Design (15 credits)</p> <p>ECS517U Electrical Devices and Applications (15 credits)</p> <p>ECS521U Interactive Media Design (15 credits)</p> <p>Semester 4</p> <p>ECS512U Sound Design (15 credits)</p> <p>ECS514U Design and Build Project in Electronic Engineering (15 credits)</p> <p>ECS515U Signals and Systems Theory (15 credits)</p> <p>Plus one module from:</p> <p>ECS522U Graphical User Interfaces (15 credits)</p> <p>ECS527U Digital Systems Design (15 credits) (pre-requisite for ECS617U)</p> <p>Year 3 modules</p> <p>Semester 5 and 6</p> <p>ECS550U Industrial Placement Project (30 credits)</p> <p>Final Year Modules</p> <p>Semester 7</p> <p>ECS625U Project (30 credits)</p> <p>ECS602U Digital Signal Processing (15 credits)</p> <p>ECS614U Sound Recording and Production Techniques (15 credits)</p> <p>Plus one module from:</p> <p>ECS607U Data Mining (15 credits)</p> <p>ECS650U Semi-Structured Data and Advanced Data Modelling (15 credits)</p> <p>Semester 8</p> <p>ECS625U Project (cont) (30 credits)</p> <p>ECS622U Product Development (15 credits)</p> <p>ECS623U Digital Audio Effects (15 credits)</p> <p>Plus one module from:</p> <p>ECS605U Image Processing (15 credits)</p> <p>CS612U Interaction Design (15 credits)</p> <p>ECS617U Integrated Circuit Design (15 credits) (pre-requisite ECS527U)</p> <p>ECS637U Digital Media and Social Networks (15 credits)</p>
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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	QMUL Model
Professional and Research Practice	ECS427U	15	4	Compulsory	1	Semester 1	<input checked="" type="checkbox"/>
Procedural Programming	ECS401U	15	4	Compulsory	1	Semester 1	<input type="checkbox"/>
Electronic Engineering Mathematics	ECS408U	15	4	Compulsory	1	Semester 1	<input type="checkbox"/>

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Digital Circuit Design	ECS412U	15	4	Compulsory	1	Semester 1	<input type="checkbox"/>
Analogue Electronic Systems	ECS409U	15	4	Compulsory	1	Semester 2	<input type="checkbox"/>
Signals and Information	ECS411U	15	4	Compulsory	1	Semester 2	<input type="checkbox"/>
Introduction to Audio	ECS415U	15	4	Compulsory	1	Semester 2	<input type="checkbox"/>
Introduction to Multimedia	ECS416U	15	4	Compulsory	1	Semester 1	<input type="checkbox"/>
Skills for Electronic Engineering	ECS4**U	15	4	Compulsory	1	Semesters 1 & 2	<input type="checkbox"/>

Academic Year of Study FT - Year 2

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
C Programming	ECS501U	15	5	Compulsory	2	Semester 1	<input type="checkbox"/>
Microprocessor Systems Design	ECS502U	15	5	Compulsory	2	Semester 1	<input type="checkbox"/>
Electronic Devices and Applications	ECS517U	15	5	Compulsory	2	Semester 1	<input type="checkbox"/>
Telecommunication Systems	ECS525U	15	5	Compulsory	2	Semester 1	<input type="checkbox"/>
Electric and Magnetic Fields	ECS504U	15	5	Compulsory	2	Semester 2	<input type="checkbox"/>
Design and Build Project in Electronic Engineering	ECS514U	15	5	Compulsory	2	Semester 2	<input type="checkbox"/> Yes
Signals and Systems Theory	ECS515U	15	5	Compulsory	2	Semester 2	<input type="checkbox"/>
Digital Systems Design	ECS527U	15	5	Compulsory	2	Semester 2	<input type="checkbox"/>

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Academic Year of Study FT - Year 3

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
IE Placement Project	ECS550U	30	5	Core	3	Semesters 1 & 2	<input type="checkbox"/>

Academic Year of Study FT - Year 4

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Project	ECS625U	30	6	Core	4	Semesters 1 & 2	<input type="checkbox"/>
Digital Signal Processing	ECS602U	15	6	Compulsory	4	Semester 1	<input type="checkbox"/>
Sound Recording and Production Techniques	ECS614U	15	6	Compulsory	4	Semester 1	<input type="checkbox"/>
Data Mining	ECS607U	15	6	Elective	4	Semester 1	<input type="checkbox"/>
Semi-Structured Data and Advanced Data Modelling	ECS650U	15	6	Elective	4	Semester 1	<input type="checkbox"/>
Product Development	ECS622U	15	6	Compulsory	4	Semester 2	<input type="checkbox"/>
Digital Audio Effects	ECS623U	15	6	Compulsory	4	Semester 1	<input type="checkbox"/>
Imaged Processing	ECS605U	15	6	Elective	4	Semester 1	<input type="checkbox"/>
Interaction Design	ECS612U	15	6	Elective	4	Semester 2	<input type="checkbox"/>
Integrated Circuit Design	ECS617U	15	6	Elective	4	Semester 2	<input type="checkbox"/>
Digital Media and Social Networks	ECS637U	15	6	Elective	4	Semester 2	<input type="checkbox"/>

What are the entry requirements?

Further information about the entry requirements for this programme can be found at:

<http://www.eecs.qmul.ac.uk/undergraduates/entry-requirements/>

How will the quality of the programme be managed and enhanced?

EECS has a Student Experience Teaching Learning and Assessment (SELTA) structure which enables programmes to be both managed and enhanced.

The Structure allows for subject level teaching groups and programme coordinators to regularly evaluate the content and delivery of each programme. Feedback from module evaluations and SSLC meetings are fed into these groups and this provides an opportunity for student feedback to be incorporated into the programmes.

Additionally, programme coordinators work with the Director of Taught Programmes to ensure each programme is current and can be delivered effectively.

How do we listen to 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 Student Experience Learning Teaching And Assessment (SETLA) Committee .

The School's SETLA 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.

What academic support is available?

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

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

The School also has a Student Support Officer who is the first point of contact regarding all matters.

Every member of Teaching Staff holds 2 open office hours per week during term time.

Programme-specific rules and facts

Further information on the Academic Regulations can be found at <http://www.arcs.qmul.ac.uk/media/arcs/policyzone/academic/Academic-Regulations-2017-18.pdf>

In addition to this the programme does have special regulations (further details are available in the Academic Regulations):

1. There is a requirement for students to achieve a minimum mark of 30.0 in every module, and to pass the project outright (in addition to the standard award rules) in order to achieve the intended, accredited, award.
2. The exit award and the field of study of the exit award will be dictated by the specific modules passed and failed by a student.

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. Merrill 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 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:

Person responsible for management of programme:

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

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**Date Programme Specification approved by Taught
Programmes Board:**