



## Department of Electronic Engineering : Programme Specification

### MSc : Audio and Music Technology



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**UNIVERSITY OF YORK  
POSTGRADUATE PROGRAMME SPECIFICATION**

This document applies to students who commence the following programme:					
Awarding & Teaching institution: <b>University of York</b>					
Department: <b>Electronics</b>					
Award and programme title: <b>MSc in Audio and Music Technology</b>					
Level of qualification: <b>Level 7 (Masters)</b>					
Awards available only as interim awards:					
Postgraduate Diploma Audio and Music Technology (exit point only for 120cu)					
PGCert in Audio and Music Technology (exit point only for 60cu)					
There are two pathways through the programme:					
<ul style="list-style-type: none"> <li>▶ <b>Audio and Music Technology: Analysis and Programming [Pathway A - all modules are run by the Electronics Department]</b></li> <li>▶ <b>Audio and Music Technology: Audio Technology [Pathway B - some modules in the Spring term are run by the Music Department]</b></li> </ul>					
<b>Admissions criteria</b>					
<p>In addition to the University requirements, applicants should possess an upper second -class, or higher, degree in Music Technology, or the 'Tonmeister' recording engineering qualification. Graduates of other disciplines such as Electronic Engineering, Mathematics, Natural Sciences or Computer Science, or graduates of any other subject with demonstrable technical experience/aptitude, will also be considered if they also can demonstrate an understanding of music theory, digital audio or have proven skills in music production or music performance. Applicants lacking formal qualifications may be considered if they can demonstrate significant relevant industry experience.</p> <p>A pre-programme learning/revision package is provided which is strongly recommended for those who do not have formal qualifications in a signal processing/music technology related field, or for those who have taken time out between graduating and commencing the masters programme.</p> <p>For non-English native speakers English language skills at the standard university requirement of at least IELTS 6.0 or the equivalent are expected.</p>					
Length and status of the programme and mode of study:					
Programme	Length (years) and status (full-time/part-time)	Start dates/months	Mode		
			Face-to-face, campus-based	Distance learning	Other
MSc in Audio and Music Technology	1 year full-time	October	Yes	No	N/A
<b>Language of study:</b> English					
<b>Programme accreditation by Professional, Statutory or Regulatory Bodies</b>					
none					
<b>Educational aims of the programme</b>					

**For the Masters, Diploma and Certificate:**

The programme aims to equip students with the necessary skills, knowledge and understanding to work effectively in many areas of audio processing, room acoustics, interactive music and audio applications, voice analysis and synthesis, audio programming, or to go on to further study in these fields. The programme also aims to provide the opportunity for students to develop intellectual skills such as critical analysis and evaluation, synthesis of theory and practice, creative problem-solving, design and implementation as well as to enhance oral and written communication skills. The programme is informed by latest developments and issues in the discipline, and is delivered by staff who are members of a research group active in the fields of audio analysis and music technology. The programme is intended for applicants who wish to undertake Masters' level training with a view to (a) a career working in audio signal processing, software programming for audio, acoustic consultancy or voice analysis and related areas or (b) those seeking to pursue further research in audio, acoustics or music technology related fields

Teaching and learning on the programme is supported by a wide range of facilities including two recording studios, a Digital Audio Workstation (DAW) production room, a dedicated listening space with surround sound loudspeaker array, a 6-sided anechoic chamber and a newly equipped Mac Workstation suite specifically for audio app development, as well as state-of-the-art equipment for voice analysis and synthesis and the opportunity to access audio facilities across campus including the 3Sixty (immersive audio visual space) and the Rymer Auditorium (Music Research Centre).

**Additionally for the Masters:**

Masters students will gain experience of undertaking an extended research project on a relevant topic in the field of digital audio analysis, programming or music production, with the following aims:

- preparation for entry into research degrees or industrial research projects.
- exposure to the issues and challenges of an extended research project.

**Diagrammatic representation of the programme structure by stage, showing the distribution and credit value of core and option modules**

Autumn Term	Spring Term	Summer Term	Summer Vacation
<b>Personal Professional Practitioner</b> [ELE00036H] 10 CU, Level 6 P/F	<b>Music Perception and Critical Listening</b> [ELE00073M] 10 CU, Level 7	<b>Project Development</b> [ELE00076M] 40 CU, Level 7	
<b>iOS Programming for Audio</b> [ELE00083M] 10 CU, Level 7	<b>Audio, Acoustics and Applications</b> [ELE00086M] 20 CU, Level 7		
<b>Audio Signals and Psychoacoustics</b> [ELE00087M] 20 CU, Level 7	<b>Option Choice</b> 10 CU, Level 6/7		

**Intended learning outcomes for the programme – and how the programme enables students to achieve and demonstrate the intended learning outcomes**

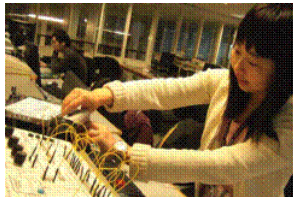


**A: Knowledge and understanding**

After having successfully completing this programme, students will have a solid knowledge of, and developed skills in, the theory, applications and research in Audio Engineering. This knowledge, and related skills, will provide students with appropriate grounding for careers in the audio engineering, music technology, or multimedia industries and/or research. Most teaching will be undertaken through lectures, laboratory sessions, seminars and workshops, and will be assessed through and a variety of continuous assessments and closed-book examinations.

Knowledge & Understanding	Module	Delivery & Assessment
Audio signal processing, acoustics and human hearing system; sound sources, acoustic environments and wave propagation; audio signal detection and conversion to electrical signals; signal representation, analysis and visualisation; acoustic and psychoacoustic theories relating to audio and music production including acoustic properties of instruments; room acoustics; timbre perception; pitch perception; 3-D sound; perceptual testing methodologies.	<b>Audio Signals and Psychoacoustics</b>	Lectures and Computer Practical Sessions. In class test and coursework.
Novel interactive musical and audio Apps for iOS devices such as iPad, iPhone and iPod Touch; iOS architecture and programming environment; The XCode Integrated Development Environment; Objective C programming language; iOS simulator.	<b>iOS Programming for Audio</b>	Lectures, Tutorials, Practicals. Continuous assessment. (Programming exercise and research paper).
Business forms; business law; 'Event' management; Personal financial management; Personal professional development; Creativity; Personal business effectiveness: Strategic planning and thinking; standards and compliance requirements; public engagement, marketing and promotion.	<b>Personal Professional Practitioner</b>	Lectures, Practicals and Self Study. Continuous assessment. (Design and manage a group event, personal marketing pack and business pitch).
Critical listening skills and psychoacoustic theory; rhythm, tempo, pulse, melody, harmony, voice leading, timbre, musical forms, textures; musical structure; tuning systems and temperaments.	<b>Music Perception and Critical Listening</b>	Lectures and Practicals. Continuous assessment. (Seminar Presentation and Report assessed.)

Research or programming project; current research literature.	<b>Project Development</b>	Special Interest Groups and Individual Supervisions. Continuous assessment. (Extended literature review, presentation and dissertation/technical report assessed.)
Analysis and synthesis of audio, music and acoustics audio signals - voice signals or room acoustics; use of analysis to inform, manipulate and synthesize acoustic signals for specific applications.	<b>Audio Acoustics and Applications</b>	Lectures, seminars, workshops and Practical Sessions; Presentation and short research paper (with audio examples).
Real-time visual feedback systems for musical performance	<b>Music Performance Analysis Systems</b>	Lectures, Workshops. Closed-book examination.
The development of physical modelling sound synthesis and its impact on the commercial market. An overview of physical modelling research. Physical modelling synthesis techniques - Kelly-Lochbaum; Karplus-Strong; digital waveguides, modal synthesis and spectral techniques; digital waveguides. Higher level techniques - multi-dimensional physical modelling and finite difference methods. Future directions for physical and spectral modelling research.	<b>Physical Modelling Synthesis</b>	Lectures and practicals. Assessment by production of web-page tutorial report with accompanying sound examples.
Practical skills in recording and processing technology; critique of audio recording and production styles; time-domain, frequency-domain and dynamic range processing tools for audio.	<b>Audio Production Techniques and Aesthetics (Music Dept)</b>	Seminars and practicals. Guided Learning. Continuous assessment. (Multi-track audio production - assessed.)



### B: (i) Skills: Discipline-related

A number of the modules will provide skills specific to Audio Engineering & Music Technology – notable examples being Audio Signal Processing, iOS Programming, Audio Acoustics and Applications, Music Performance Analysis Systems, Audio Production Techniques and Aesthetics. These enable students to design and implement software and hardware devices to industry standards, paying special regard to creatively acceptable output and other professional requirements. The many computer laboratories will also enable students to develop skills in the underlying technologies.

<b>Discipline-related Skills</b>	<b>Module</b>	<b>Delivery &amp; Assessment</b>
MATLAB programming language and Pure Data for audio applications; developing and applying theoretical knowledge to design processes; specifying, designing and implementing a process in software.	<b>Audio Signals and Psychoacoustics</b>	Lectures and Computer Practical Sessions. In class test and coursework.
Design programs for mobile devices; Test iOS programs; Document software specifications and programs ; Create innovative audio software; Assess user-interfaces.	<b>iOS Programming for Audio</b>	Lectures, Tutorials, Practical. Continuous assessment. (Programming exercise and research paper).
Negotiating skills; developing skills in facilitation and creativity.	<b>Personal Professional Practitioner</b>	Lectures, Practical and Self Study. Continuous assessment. (Design and manage a group event, personal marketing pack and business pitch).
Critical listening skills; critical evaluation of a portfolio of chosen music or sound art.	<b>Music Perception and Critical Listening</b>	Lectures and Practical. Continuous assessment. (Seminar Presentation and Report assessed.)
Organisation of MA/MSc conference; presentation of research to general public.	<b>Project Development</b>	Special Interest Groups and Individual Supervisions. Continuous assessment. (Extended literature review, presentation and dissertation/technical report assessed.)
Current analysis techniques, including their merits, limitations and appropriate applications; objective analysis techniques to verify the results from measurement/simulation; demonstrations for playback and evaluation by an audience.	<b>Audio Acoustics and Applications</b>	Lectures, seminars, workshops and Practical Sessions; Presentation and short research paper (with audio examples).
Music information retrieval, performance analysis and perception; document software specifications; user-interfaces.	<b>Music Performance Analysis Systems</b>	Lectures and Practical. Continuous assessment. (Audio processing exercise and report assessed.)
Practical experience in developing physical and spectral modelling algorithms using a variety of software synthesis tools including Matlab.	<b>Physical Modelling Synthesis</b>	Lectures and practicals. Assessment by production of web-page tutorial report with accompanying sound examples.
DAW software applications; microphone and processing techniques. audio recording, mixing and mastering.	<b>Audio Production Techniques and Aesthetics (Music Dept)</b>	Seminars and practicals. Guided Learning. Continuous assessment. (Multi-track audio production - assessed.)



### B: (ii) Skills: Transferable

A number of the modules in the programme include an element of group working. This provides an excellent opportunity to gain experience working in a group, much in the way development is undertaken in industry. In addition to attaining technical experience, experience in interpersonal skills is also gained. Our experience with students on all our taught MScs has demonstrated how much overseas students can benefit from this aspect of the programme, especially if they have aspirations to work in multinational companies.

Transferable skills of project management, presentation and technical writing are taught as part of the Project Development module.

These are further developed during you independent Research Project, will allows you to consolidate your knowledge and skills, in undertaking an extended piece of research or software development.

In addition to skills developed through academic programmes, the University's York Award can help students to plan and reflect on their experience and gain certification for many extra-curricular activities.

<b>Transferable Skills</b>	<b>Module(s)</b>	<b>Delivery &amp; Assessment</b>
Analytical skills; Numeracy skills; Problem solving; Reviewing progress; Independent learning. Independent task planning and implementation; Written communication skills.	<b>Audio Signals and Psychoacoustics</b>	Lectures and Computer Practical Sessions. In class test and coursework.
Problem solving; Lateral thinking; Reviewing progress; Autonomous task planning and implementation; Creativity and innovation.	<b>iOS Programming for Audio</b>	Lectures, Tutorials, Practical. Continuous assessment. (Programming exercise and research paper).
Problem solving; Communications skills, oral presentation skills; Group working and Interpersonal skills; Project planning and development; Self-management and self-motivation; Independent learning; Creativity and innovation.	<b>Personal Professional Practitioner</b>	Lectures, Practical and Self Study. Continuous assessment. (Design and manage a group event, personal marketing pack and business pitch).
Group learning; Autonomous task planning and implementation; Analytical	<b>Music Perception</b>	Lectures and Practical. Continuous assessment. (Seminar

skills Collate and summarise data from a variety of sources.	<b>and Critical Listening</b>	Presentation and Report assessed.)
Planning and managing workload; Self-management and Self-motivation; Group working; Project planning and development; Risk management; Interpersonal skills; Oral communication and presentation skills; Time management.	<b>Project Development</b>	Special Interest Groups and Individual Supervisions. Continuous assessment. (Extended literature review, presentation and dissertation/technical report assessed.)
Team working; Independent working; Report writing; Research strategies including critical thinking and literature review; Presentation skills; Analytical and numerical skills; Communication skills; Healthy voice use and vocal hygiene; Problem solving.	<b>Audio Acoustics and Applications</b>	Lectures and Practicals. Continuous assessment. (Audio processing exercise and report assessed.)
Creativity; Initiative and lateral thinking; Problem solving; Flexibility and adaptability Analytical skills; Organisation and planning; Reviewing progress; Oral communication skills.	<b>Music Performance Analysis Systems</b>	Lectures and Practicals. Continuous assessment. (Audio processing exercise and report assessed.)
Research skills; Written communication skills; Analytical skills; Numeracy skills; Problem solving; Creativity and innovation.	<b>Physical Modelling Synthesis</b>	Lectures and practicals. Assessment by production of web-page tutorial report with accompanying sound examples.
Autonomous task planning and implementation; Problem solving; Flexibility and adaptability; Commitment and motivation.	<b>Audio Production Techniques and Aesthetics (Music Dept)</b>	Seminars and practicals. Guided Learning. Continuous assessment. (Multi-track audio production - assessed.)

## C: Experiences of the MSc in Audio and Music Technology

Students on the MSc in Audio and Music Technology benefit from a wide-ranging programme covering both theoretical and practical aspects of audio engineering and of signal processing, programming and theories of aural perception for all aspects of audio as well as music making with technology. Students gain experience with their independent research project which allows them to specialise either in design and development or empirical research in an audio and acoustics. To support this independent research, students receive literature reviews, time management and writing for academic and lay audiences. Students keep a personal blog on their research projects, and enjoy on-line interaction with experts and research findings. Modules are taught by internationally leading experts in their field using a variety of teaching techniques such as traditional lectures, problem-based teaching. The high level of teaching quality and innovative and novel learning and teaching experiences have been praised by our students.



### Student Profile: Experience of the course – Fei Sha

After graduating with a Bachelor's degree in Engineering specialising in Imaging and Audio Engineering in China, I wanted to further my project at University in China, I had found a book on Acoustics by Prof. David M Howard (the head of Audio Lab at York) really useful and Music Technology at the University of York.

In the past three terms, the experience of being a MSc student in AMT has confirmed that York was the best choice for me.

The modules such as Audio and Signal Processing, iOS Programming and Acoustics and Psychoacoustics have not only broadened my horizons but also exercised my practical skills through different labs as well as the assignments we have completed.

One aspect of the AMT programme I have particularly liked is the choice between two different pathways in the second term.

I chose to join the music department to learn more about recording and mixing skills. During that term I gained knowledge and experience.

The facilities at York such as the Mac labs, the studios and the media suite as well as all the speakers, microphones, headphones, instruments and mixing desks are all first class, gain a lot and enjoy a lot.

## Overview of modules by stage

### Core module table

Module Title	Module Code	Credit Level <sup>1</sup>	Credit Value <sup>2</sup>	Terms Taught	Pre-requisites	Assessment Rules <sup>3</sup>	Timing and format of main assessment <sup>4</sup>
Audio Signals and Psychoacoustics	ELE00087M	7/M	20	AuT	n/a		SpT Coursework
Audio, Acoustics and Applications	ELE00086M	7/M	20	SpT	n/a		SpT & SuT Coursework
Music Perception and Critical Listening	ELE00073M	7/M	10	SpT	None		SpT & SuT Coursework
Personal Professional Practitioner	ELE00036H	6/H	10	AuT	none	P/F	SpT & SuT Coursework
Project Development	ELE00076M	7/M	40	SuT			SuT Coursework
iOS Programming for Audio	ELE00083M	7/M	10	AuT			SpT Coursework

### Option modules

Module Title	Module Code	Credit Level <sup>1</sup>	Credit Value <sup>2</sup>	Terms Taught	Pre-requisites	Assessment Rules <sup>3</sup>	Timing and format of main assessment <sup>4</sup>
Audio Algorithm Design and Implementation for MSc	ELE00039H	6/H	10	AuT	None	P/F	SpT Coursework
Industrial Project	ELE00078M	7/M	100	SuT	None		SuV Coursework
Music Performance Analysis Systems	ELE00065M	7/M	10	SpT & SuT	For UG students: Core for Music Technology students Course Prerequisites: Stage 3 Music Technology Core material		SuT Coursework
Physical Modelling Synthesis for MSc	ELE00044H	6/H	10	SpT		P/F	SuT Coursework
Research Project	ELE00077M	7/M	60	SuT	MSc admission/confirmation		SuV Coursework

<sup>1</sup> The **Credit Level** is an indication of the module's relative intellectual demand, complexity and depth of learning and of learner autonomy (Level 4/Certificate, Level 5/Intermediate, Level 6/Honours, Level 7/Masters).

<sup>2</sup> The **Credit Value** gives the notional workload for the module, where 1 credit corresponds to a notional workload of 10 hours (including contact hours, private study and assessment).

<sup>3</sup> **Assessment rules**

- P/F = the module marked on a pass/fail basis (NB pass/fail modules cannot be compensated).
- NC = the module cannot be compensated.
- NR = there is no reassessment opportunity for this module. It must be passed at the first attempt.

<sup>4</sup> **Timing and format of main assessment**

- AuT = Autumn Term.
- SpT = Spring Term.
- SuT = Summer Term.
- SuV = Summer Vacation.

<b>Relevant Quality Assurance Agency benchmark statement(s) and other relevant external reference points</b> (e.g. National Occupational Standards, or the requirements of Professional, Statutory or Regulatory Bodies)	
Framework for Higher Education Qualifications in England, Wales and Northern Ireland – August 2008 <a href="http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/FHEO08.pdf">http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/FHEO08.pdf</a>	
<b>University award regulations</b>	
To be eligible for an award of the University of York a student must undertake an approved programme of study, obtain a specified number of credits (at a specified level(s)), and meet any other requirements of the award as specified in the award requirements and programme regulations, and other University regulations (e.g. payment of fees). Credit will be awarded upon passing a module's assessment(s) but some credit may be awarded where failure has been compensated by achievement in other modules. The University's award and assessment regulations specify the University's marking scheme, and rules governing progression (including rules for compensation), reassessment and award requirements. The award and assessment regulations apply to all programmes: any exceptions that relate to this programme are approved by University Teaching Committee and are recorded at the end of this document.	
<b>Departmental policies on assessment and feedback</b>	
Detailed information on assessment (including grade descriptors, marking procedures, word counts etc.) will be available in the written statement of assessment which applies to this programme and the relevant module descriptions. These will available in the student handbook and on the Department's website prior to commencement of the programme. <a href="https://www.elec.york.ac.uk/">https://www.elec.york.ac.uk/</a>	
University Regulations: <a href="https://www.york.ac.uk/about/organisation/governance/corporate-publications/ordinances-and-regulations/regulation-5/#5.7">https://www.york.ac.uk/about/organisation/governance/corporate-publications/ordinances-and-regulations/regulation-5/#5.7</a>	
Information on formative and summative feedback to students on their work will be available in the written statement on feedback to students which applies to this programme and the relevant module descriptions, which will be published online through the Department's website: <a href="https://www.elec.york.ac.uk/">https://www.elec.york.ac.uk/</a>	
<b>Transfers out of or into the programme</b>	
None.	
<b>Exceptions to University Award Regulations approved by University Teaching Committee</b>	
<b>Exception</b>	<b>Date approved</b>
<b>Quality and Standards</b>	
The University has a framework in place to ensure that the standards of its programmes are maintained, and the quality of the learning experience is enhanced. Quality assurance and enhancement processes include:	
<ul style="list-style-type: none"> <li>▶ The academic oversight of programmes within departments by a Board of Studies, which includes student representation</li> <li>▶ The oversight of programmes by external examiners, who ensure that standards at the University of York are comparable with those elsewhere in the sector</li> <li>▶ Annual monitoring and periodic review of programmes</li> <li>▶ The acquisition of feedback from students by departments.</li> </ul>	
More information can be obtained from the Academic Support Office: <a href="https://www.york.ac.uk/about/departments/support-and-admin/academic-support/">https://www.york.ac.uk/about/departments/support-and-admin/academic-support/</a>	
<b>Date on which this programme information was updated:</b>	03/08/2017 TH
<b>Departmental web page:</b>	<a href="https://www.elec.york.ac.uk">https://www.elec.york.ac.uk</a>
<b>Please note</b>	
The information above provides a concise summary of the main features of the programme and learning outcomes that a typical students might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the leaning opportunities that are provided.	
Detailed information on learning outcomes, content, delivery and assessment of modules can be found in module descriptions.	
The University reserves the right to modify this overview in unforeseen circumstances, or where processes of academic development, based on feedback from staff, students, external examiners or professional bodies, requires a change to be made. Students will be notified of any substantive changes at the first available opportunity.	