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Module Definition Form (MDF)

Module code: MOD007370	**Version:** 1 **Date Amended:** 28/Feb/2020

1. Module Title
Audio Programming

2a. Module Leader
Sven-Amin Lembke

2b. School
Cambridge School of the Creative Industries

2c. Faculty
Faculty of Arts, Humanities, Education and Social Sciences

3a. Level
5

3b. Module Type
Standard (fine graded)

4a. Credits
30

4b. Study Hours
300

5. Restrictions

Type	Module Code	Module Name	Condition
Pre-requisites:	None		
Co-requisites:	None		
Exclusions:	None		
Courses to which this module is restricted:	BSc (Hons) Audio and Music Technology; BSc (Hons) Audio and Music Technology (with placement); appropriate framework award		

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

This module enhances your skills in audio programming.

Software-based audio processing units and plug-ins are an integral part of current Digital Audio Workstations. This module provides a working knowledge and understanding of how to design and implement bespoke audio plug-ins using programming languages such as C/C++. Such plug-ins are based on signal processing techniques that are ubiquitous in both software- and hardware-based music technologies (e.g. amplitude levelling, panning control, distortion, filtering/equalisation, basic delay units, audio synthesis). The underlying theories behind these processes will be discussed to provide practice and grounding in the conception and development of audio manipulation procedures. Topics include digital audio processing, computer programming, algorithm development (including testing and verification) and music synthesis.

You will gain a sound understanding of the nature, characteristics and sources of audio signals, and have the opportunity to learn how they are processed using analogue and digital techniques. You will also gain an insight into how audio signals are characterised and filtered. The module also looks at frequency analysis and its application to audio signals, and algorithm development (including testing and verification). You will then develop an operational audio plug-in using a language such as C/C++.

6b. Outline Content

- Programming essentials for audio processing and plugin development
- Introduction to Digital Signal Processing (DSP)
- User control, parameter values and parameter ranges
- Real time audio processing techniques and concerns
- Common audio plugin theory and principles
- Applications and development of audio plugins in industry
- Objective and subjective appraisal of (post-plugin) processed audio
- Nature of signals: sine waves, superposition principle, Fourier analysis, periodicity, DTFM
- Modulation techniques: amplitude and frequency
- Nature of noise; power measurement, white noise
- Amplifiers: transfer function, harmonic distortion, attenuation, bandwidth, feedback, op-amps and domestic audio amplifiers
- Audio signals: amplification, clipping, gating, compression
- Vibrations: damping, critical frequencies, harmonic generation, oscillations
- Frequency: audio, spectral analysis, harmonics, magnitude and phase
- Filters: analogue, specifications, design, digital filters, graphic equalisers, mixing desks
- Digital signals: ADC, DAC, sampling frequency, resolution, CD standards, digital recording

6c. Key Texts/Literature

The reading list to support this module is available at: https://readinglists.aru.ac.uk/

6d. Specialist Learning Resources
Access to music technology studios and programming laboratory. Suitable hardware and software.

7. Learning Outcomes (threshold standards)		
No.	**Type**	**On successful completion of this module the student will be expected to be able to:**
1	Knowledge and Understanding	Demonstrate a working knowledge of common audio processes used in software based music technologies;
2	Knowledge and Understanding	Demonstrate an understanding of digital audio algorithm and processing theory;
3	Intellectual, practical, affective and transferrable skills	Implement and critically appraise a specific audio plug-in that incorporates elements of audio processing commonly used in music technology software.

8a. Module Occurrence to which this MDF Refers				
Year	**Occurrence**	**Period**	**Location**	**Mode of Delivery**
2025/6	ZZF	Template For Face To Face Learning Delivery		Face to Face

8b. Learning Activities for the above Module Occurrence			
Learning Activities	**Hours**	**Learning Outcomes**	**Details of Duration, frequency and other comments**
Lectures	60	1-3	TRI1: 1 hour lecture/tutorial in Weeks 1-6 and 8-11 TRI2: 2 hour lecture/tutorial in Weeks 1-6 and 8-11
Other teacher managed learning	18	1-3	Tri1: 4-hour feedback session in week 7 Tri1: 4-hour feedback session in week 12 Tri2: 4-hour feedback session in week 7 Tri2: 6-hour presentation session in week 12
Student managed learning	222	1-3	Coursework
TOTAL:	300		

9. Assessment for the above Module Occurrence					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
010	Coursework	1-4	30 (%)	Fine Grade	30 (%)
Logbook, 2000 word equivalent due end of Tri1					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
011	Coursework	1-4	70 (%)	Fine Grade	30 (%)
Logbook and Audio, 3000 word equivalent, due end of Tri2					

In order to pass this module, students are required to achieve an overall mark of 40% (for modules at levels 3, 4, 5 and 6) or 50% (for modules at level 7*).

In addition, students are required to:
(a) achieve the qualifying mark for each element of fine graded assessment as specified above
(b) pass any pass/fail elements

[* the pass mark of 50% applies for all module occurrences from the academic year 2024/25 – see Section 3a of this MDF to check the level of the module and Section 8a of this MDF to check the academic year]