Module Specification

Summary Information

Module Code	5601STE
Formal Module Title	Advanced Technical Studies – Digital Systems & Processing
Career	Undergraduate
Credits	30
Academic level	FHEQ Level 5
Module Pass Mark	40

Learning Methods

Learning Method Type	Hours
Lecture	40
Seminar	2
Workshop	40

Module Offering(s)

Start Month	Duration
September	28 Weeks

Aims and Outcomes

Aims	To provide students with a clear understanding of the essential theory associated with digital audio systems and their implementation.
	To apply digital signal processing theory in the development of practical audio tools.
	To work effectively with the implementation of IT networks when applied to media over IP use cases.
	To investigate the psychoacoustic and technical considerations of a variety of spatial audio systems.

Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Apply digital signal processing theory in the design of practical audio tools.
MLO2	Demonstrate a variety of processing and reproduction techniques associated with spatial audio.
MLO3	Explain the underlying theory and practice associated with digital audio conversion and transmission.
MLO4	Evaluate a range of techniques employed in data compression for audio.
MLO5	Implement and troubleshoot AoIP networks.

Module Content

Outline Syllabus

Digital Audio Signal Path

A/D converter topologies – advantages and disadvantages of individual approaches. Clock function and distribution; dithering function and options; compatibility issues; digital audio transmission standards – AES/EBU, SP-DIF, TDIF, MADI; metering considerations. Quality considerations in digital systems – jitter, PLL stability.

Digital Audio Networking

Networking basics; OSI model; switching and routing; Layer1,2 and 3 approaches and standards; circuit switched vs packet switched approaches. Switching and routing, network topologies, switch configuration. AoIP protocols and implementations – Dante, AES67, Milan.

Digital Signal Processing

Digital filter implementation. Convolution. Reaktor software as an audio processing development tool. Design of digital audio processing tools using modular software such as Native Instruments Reaktor – reverberation, EQ, dynamics, spatial modulation.

Spatial Audio Techniques

Psychoacoustic principles. Stereo. Binaural. Multichannel. Ambisonics. Dolby Atmos. Creative Spatial Audio Effect Design.

Data Compression

Information theory and notions of redundancy; lossless compression – Huffmann, LZW; lossy compression precepts; architecture and operation of MPEG 1, MPEG2 and AAC audio codecs; compression artefacts and what to listen for; objectively evaluating codec performance.

Module Overview

This module is intended to bridge the gap between theoretical concepts and their application especially those relating to current developments in digital audio system related areas such as signal processing, networking, data storage and transmission, and immersive audio.

The content is delivered through lectures where the various ideas are introduced and discusses, and a variety of workshops in the recording and digital audio lab where a

variety of tools can be designed, and systems can be compared for the purposes for understanding the technical components within a familiar practical setting.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Exam	Exam	40	1.5	MLO3, MLO4, MLO5
Practice	DSP & Spatial Processor Design	60	0	MLO1, MLO2