<table>
<thead>
<tr>
<th>Module Code</th>
<th>CS7028</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module Name</td>
<td>Audio, Video and Sensor Technologies 1+2</td>
</tr>
<tr>
<td>ECTS Weighting</td>
<td>10 ECTS</td>
</tr>
<tr>
<td>Semester taught</td>
<td>Semester 1 &amp; 2</td>
</tr>
<tr>
<td>Module Coordinator/s</td>
<td>Neill O'Dwyer, Jack Cawley, Tom Burke, Niall O'Hara</td>
</tr>
</tbody>
</table>

**Module Learning Outcomes**

On successful completion of this module, students will be able to:

- LO1. Understand the nature of sound
- LO2. Use a mixing control and Digital Audio Workstations (DAWs)
- LO3. Use Virtual Studio Technology (VST plug-ins)
- LO4. Set up microphones for recording voice and acoustic instruments
- LO5. Conduct an audio recording session in a sound recording studio
- LO6. Control the audio in a live performance
- LO7. Create audio software using the Pure Data visual programming environment.
- LO8. Assess the technical requirements for producing a video.
- LO9. Operate professional camera and apply shooting techniques.
- LO10. Produce professional quality video projects
- LO11. Recognise common terms and practices in the creation of a video
- LO12. Shoot / light an interview with edited cutaway sequences
- LO13. Assess the technical requirements for producing a video.
- LO14. Operate professional camera and apply shooting techniques.
- LO15. Produce professional quality video projects
- LO16. Recognise common terms and practices in the creation of a video
- LO17. Shoot / light an interview with edited cutaway sequences
- LO18. Fourth learning outcome (Niall O’Hara)
- LO19. Fifth learning outcome
- LO20. Sixth learning outcome

**Module Content**

**Audio Technologies (Jack Cawley)**

- **Introduction to Sound and Acoustics**: Acoustic waves; Time and Frequency; Decibels and loudness; Inverse Square Law; Transducer systems
- **Room Acoustics and Psychoacoustics**: Pitch, Loudness and Timbre; Impulse responses; Room acoustics: Early Reflections, diffuse field; Psychoacoustic parameters: IACC, LE, LF; Absorbers, diffusers and room treatment
- **Digital and Analog Audio**: Sampling Rate; Bit depth; AD/DA conversion; Sampling theorem; Dynamic Range
- **Mixing Console Workflow**: Gain control; Equalizers; Panning, summing and master faders; Auxiliary channels; Phantom power; Pre-amplification; Pre- and Post-fader control; Cabling and standards
- **Microphones**: Dynamic microphones; Condenser microphones; Microphone Directivity; Proximity effect

---

1. [TEP Glossary](#)
• Multitrack Recording – Digital Audio Workstations (DAWs): Introduction to audio sequencing; Sequencer basics; Monitoring; Click track recording; Editing; Stereo Mixdown
• Audio Signal Processing: Equalizers; Reverberation; Dynamic Range Processing; Modulation Effects; Distortion; Pitch Correction
• Mixing in DAWs: Panning; Equalization; Automation; Inserts; Sends; Mixing for video and games
• Recording Techniques: Monophonic microphone placement; Stereophonic Recording Techniques: Intensity stereo recording, Coincident stereo recording, ORTF, Binaural Audio
• Stereophonic Mastering: Master bus signal processing; Mastering for CD/DVD; The loudness wars; Dithering; Compression & Codecs
• MIDI: How MIDI works; Basic MIDI commands; General MIDI; MIDI Interfaces; MIDI in sequencers; Quantization; Virtual Instruments (VST plug-ins)
• Introduction to Surround Sound: Overview of Multi-Channel Audio Technology; 5.1 Surround sound basics; Setting Up for Surround Sound on commercial loudspeaker layouts; Surround Audio calibration
• Mixing and mastering for 5.1 surround sound: Surround Panning; Surround Sound signal processing; Reverberation control; LFE Channel considerations; Stereo Compatibility; Discrete Vs. Matrixed Surround Sound; Dolby Digital Encoding
• Interactive Sound Control with Pure Data (PD): Introduction to Real-time Audio Signal Processing; Audio I/O control with PD; Multichannel Audio in PD; Audio Filtering and DSP with PD

Moving Image for Digital Applications (Neill O'Dwyer)

This module aims to familiarize students with key concepts and debates surrounding the moving image. Theories of representation are explored alongside the development and expansion of the moving image in society. Questions of realism will be discussed; the conventions of commercial narrative cinema will be considered, along with strategies of representation that interrogate notions of transparency. Works that offer alternative approaches to form, that seek to expand the possibilities of the moving image and re-imagine the role of the spectator shall be the focus of weekly discussion. A diverse range of influential theoretical, critical and cultural perspectives related to the study of the moving image will be illustrated via screenings of relevant material.

Moving Image for Digital Applications (Tom Burke)

Specific topics addressed in this module include:

• Narrative and narration
• Editing
• Mise-en-scène
• Documentary Film and Video
- Projection in Performance
- Interview techniques
- Moving Image and Interactive Installation
- Old Media, New Media and the Contemporary Media Landscape
- Camera, Lighting and Editing in Practice
- Digital Video Specifications
- Exposure Control & Colour Balance
- Camera Controls
- Audio Recording – including use of specific microphones
- Composition & Framing
- Lighting Techniques
- Post Production
- Audio Mixing in Post Production
- Digital Video File Encoding: data rates, frame sizes, compression rates, compression codecs, colour depth

Practical topics include:

- **Introduction to Digital Video** (Introductions; Course Outline)
- **Digital Video Specifications** (Sensors: CMOS, CCD; Video formats; Pixel Aspect ratio; Frame rates; Resolution; Scan Method)
- **Exposure & Colour Balance** (Aperture; Shutter Speed; ISO / Gain; White Balance)
- **Introduction to Camera Systems** (Controls; Functions; Operation; Tripod vs Handheld)
- **Audio techniques for video production** (Diegetic, Non Diegetic Sound; Types of microphones; Microphone placement; Room tone & Ambient Sound)
- **Framing & Shot Types** (Shot Size; Composition theory; Head room & Looking room; Depth of Field; Cutaways)
- **Lighting** (Safety; Hard & Soft Light; Colour Temperature; Gels & reflectors; 3 Point lighting; Lighting Ratios)
- **Editing with Adobe Premiere Pro** (Creating a new Premiere project; File formats; Capturing Footage; Editing; Exporting Movies)
- **Funding: An overview of funding sources in the Irish context incl. RTE, BAI, TG4, Virgin Media, The Arts Council, Screen Ireland**

**Introduction to Sensor Technologies (Niall O’Hara)**

- Introduction to Sensor Technology: Providing on overview of Physical Computing / Introduction to the fundamentals of Electronics / Introduction to the components and tools used in the course.
- Introduction to Physical computing
- Basic Electricity and Electronics: Introduction to Electricity; Ohm’s Law; What is a circuit; Reading a Resistor Chart; Reading a Schematic; Principles of Electromagnetic transduction; Using a solder-less breadboard to build a prototype circuit.
- Sensors and Actuators: Digital and Analogue sensors and actuators
- Introduction to the Arduino: Introduction to fundamentals of programming with Arduino/ Simple I/O using DigitalWrite() and DigitalRead() / Building a simple circuit using a sensor and an actuator.
- Introduction to the Arduino Board: Elements of the Microcontroller board; Introduction to the Software IDE; Setting up Arduino: port and board specifications.

**Teaching and Learning Methods**
e.g., lectures, laboratories, tutorials, online, field trips, practice-based, etc.
Please include a brief description.

**Assessment Details**

<table>
<thead>
<tr>
<th>Assessment Component</th>
<th>Brief Description</th>
<th>Learning Outcomes Addressed</th>
<th>% of total</th>
<th>Week set</th>
<th>Week due</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% Coursework</td>
<td>100% Coursework</td>
<td>e.g. LO1, LO2, LO3, LO4, LO5</td>
<td>100%</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**Reassessment Details**
N/A

**Contact Hours and Indicative Student Workload**

<table>
<thead>
<tr>
<th>Contact Hours (scheduled hours per student over full module), broken down by:</th>
<th>66 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 1: Audio Technologies</td>
<td>22 hours</td>
</tr>
<tr>
<td>Semester 1: Moving Image for Digital Applications (Vivienne O’Kelly)</td>
<td>11 hours</td>
</tr>
<tr>
<td>Semester 2: Moving Image for Digital Applications (Tom Burke)</td>
<td>22 hours</td>
</tr>
<tr>
<td>Semester 2: Sensor Technologies (Niall O’Hara)</td>
<td>11 hours</td>
</tr>
<tr>
<td>Independent study (outside scheduled contact hours), broken down by:</td>
<td>72 hours</td>
</tr>
<tr>
<td>preparation for classes and review of material (including preparation for examination, if applicable)</td>
<td>22 hours</td>
</tr>
<tr>
<td>completion of assessments (including examination, if applicable)</td>
<td>16 hours</td>
</tr>
<tr>
<td>Total Hours</td>
<td>116 hours</td>
</tr>
</tbody>
</table>

**Recommended Reading List**
Students will be given recommended reading on a weekly basis and will also be expected to read broadly beyond the topics covered during lectures.

**Module Pre-requisites**
**Prerequisite modules:** None

**Other/alternative non-module prerequisites:** N/A

**Module Co-requisites**
N/A

---

2 TEP Guidelines on Workload and Assessment