

Module code: MOD007363	Version: 3 Date Amended: 22/Jan/2025
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1. Module Title
Acoustics

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
4

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 & Music Technology; BSc (Hons) Audio & Music Technology (with placement year); appropriate framework award		

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

This module establishes how sound is generated, how it radiates into space, and how it propagates and interacts with its surroundings. At the same time, the module considers how humans perceive physical sound.

We will introduce you to the basic properties of waves with special emphasis on sound waves in air, and the mechanisms of sound production, absorption, reflection, and transmission. We will explore the acoustic characteristics of a range of musical instruments and, among other phenomena, demonstrate the mechanical properties of stretched strings and vibrating air columns in pipes, while we also establish the acoustical functioning of microphones. We will furthermore describe the many ways in which room acoustics affects sound.

The second part of the module introduces psychoacoustics, which outlines aural physiology and the perceptual attributes of sound. The relationships between these and the measurable physical parameters are examined, namely, for the musical parameters pitch, loudness/dynamics, and timbre. Spatial localisation of sound sources through binaural hearing will be established and the implications for stereophonic recording and reproduction explained.

Acoustic phenomena are demonstrated in lectures by means of a selection of experiments, and the basic equations describing the behaviour of sound will be introduced and used. We will employ theoretical models, measurement hardware, and simulation using MATLAB or other computational tools.

6b. Outline Content

- Introduction to sound: air pressure, propagation, waves
- Sound on surfaces: transmission, isolation, reflection, absorption
- Sound in rooms: reverberation, comb filtering, resonant modes
- Sound in recording studios: studio-design approaches
- Room-acoustics description: impulse-response measurement, room-acoustical parameters
- Sound sources (instruments): vibrating strings, air columns, bars, membranes, body resonances, source directivity
- Sound receivers: microphones, human hearing
- Sound perception: musical pitch, loudness, dynamics, timbre, sound quality, spatial hearing

6c. Key Texts/Literature

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

6d. Specialist Learning Resources

A quiet resource for acoustic demonstrations and experiments (absence of background noise essential) during lectures. Apparatus from labs and the recording studios each week as needed. 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	Understand the processes involved in the generation, transmission and reception of sound.
2	Knowledge and Understanding	Use simple wave theory to make calculations.
3	Knowledge and Understanding	Understand the processes involved in sound perception and the psychophysical parameters conveyed.
4	Intellectual, practical, affective and transferrable skills	Appreciate the basics of musical instruments and their characteristics.
5	Intellectual, practical, affective and transferrable skills	Apply acoustic theory to practical cases.
6	Intellectual, practical, affective and transferrable skills	Analyse audio processes and auditory perception with technical accuracy.

8a. Module Occurrence to which this MDF Refers				
Year	Occurrence	Period	Location	Mode of Delivery
2026/7	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	20	1-6	2 hour lecture/demonstration in Weeks 1-6 and 8-11
Other teacher managed learning	26	1-6	2 hour tutorial in Weeks 1-6 and 8-11 2 hour reading session in Week 7 2 hour feedback session in Week 7 2 hour revision session in Week 12
Student managed learning	254	1-6	Experiments, coursework and revision
TOTAL:	300		

9. Assessment for the above Module Occurrence

The assessment for some modules includes a presentation (see below for details on how this particular module is assessed). We recognise that presenting, especially to a large group, can cause significant anxiety or distress for some students. If this may affect you, please contact your Module Leader or the Disability and Neurodiversity Service as early as possible. We will work with you to consider appropriate reasonable adjustments. Depending on your individual needs, these might include, for example, presenting to a smaller group or presenting only to a member of academic staff.

Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
010	Coursework	1, 3, 4, 6	30 (%)	Fine Grade	30 (%)

Report - 2,000 word equivalent

Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
011	Coursework	1, 2, 5	30 (%)	Fine Grade	30 (%)

Report - 2,000 word equivalent

Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
012	Coursework	1, 3, 5, 6	40 (%)	Fine Grade	30 (%)

Open-book, online exam (test/quiz) administered via Canvas - 2 hours

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]