MODULE SPECIFICATION

PRINCIPLES OF ACOUSTICS

This version of the specification was approved for its first delivery in the academic year 2021/22

Short Module Title:

Module Description:

Principles of Acoustics equips you with the understanding of the most fundamental ideas of the physical acoustics. The module also explains the main mathematical techniques (such as complex numbers, ordinary and partial differential equations) used to describe the basic acoustic phenomena.
The module covers a selection of topics: from the linear theory of mechanical vibrations to radiation of sound by the sources of various geometry. You will also learn MATLAB capabilities necessary for modelling and visualising the wave phenomena.
The principle aim of the Principles of Acoustics module is:
To familiarise tyou with the basic acoustic phenomena and to equip you with the critical understanding of some analytical and numerical modelling techniques.

STANDALONE MODULE

Will this module be marketed as a standalone module? No, this module will not be marketed as a stand alone module

Entry Requirements:

Module Level	Level 5	Module Code	J930 20018
Module Credit Value	20	HECoS Code	
Owning School	School of Science, Engineering and En...		
Contributing School		Percentage delivered by another school	0

Is this module available to International Students? Yes

DELIVERY DETAILS

CRN	*Semester Part Code*	Campus
17786	*S4 - September Start, Trimesters 1&2 (Long Thin)*	University of Salfo...

	S1 - September Start, Trimester 1 (Short Fat)	
	S1 - September Start, Trimester 1 (Short Fat)	
	S1 - September Start, Trimester 1 (Short Fat)	
	S1 - September Start, Trimester 1 (Short Fat)	
	S1 - September Start, Trimester 1 (Short Fat)	
	S3 - September Start, Trimester 3 (Short Fat)	
	J2 - June Start, Trimester 2 (Short Fat)	

For a full set of module CRNs, please go to PaMIS or contact the Quality and Enhancement Office on QEO@salford.ac.uk

INDICATIVE LEARNING HOURS

Lecture:	44	Practical Classes and Workshops:	10
Seminar:		Supervised studio/workshop time:	
Tutorial:		Fieldwork:	
Project supervision:		External Visits:	
Demonstration:		Work Based Learning:	
Placement:		Year Abroad:	
Guided Independent Study	146	Total:	200
		Other (including additional placement hours):	

INDICATIVE LEARNING OUTCOMES

Aims:

1. To provide you with the knowledge and critical understanding of the fundamental principles of acoustics.
2. To develop skills in the application of these fundamental principles to solve acoustical problems.

3. To develop MATLAB skills necessary for simulation of wave phenomena.

Intended Learning Outcomes: Knowledge and Understanding:

1. Demonstrate knowledge and critical understanding of the principles of acoustics, including vibrations, resonances, wave equation, types of wave, characteristics of sources and impedance.

2. Solve acoustical problems by the application of these fundamental principles.
3. Understand and apply these fundamental principals through computer modelling using MATLAB software.

Intended Learning Outcomes: Key Subject Specific Skills:

MODULE REQUIREMENTS

Pre-Requisites:

None

Co-requisites:

None

ETHICS

Does this module require ethical approval? No ethical approval is required

Will students require individual ethical approval for an assessment task? No ethical approval is required.

ASSESSMENT TASKS

Is this module eligible for compensation? Yes

Mark Calculation Method Method A

KIS Type	*Description*	*Pass/ Fail?*	*ILO of this task*	*Weight*	*Duration/ Word Count*	*Component Pass Req'd?*	*eSubmission*	*Organiser?*
Coursework	*MATLAB-based modelling assignment*	☐	*1,3*	*50*	*2500-38...*	*No*	*Yes*	*School*
Written	*Examination*	☐	*1, 2*	*50*	*2 hours*	*No*	*No*	*SA-Exams*
		☐				*No*	*Yes*	
There is no Programme Specific Regulation for additional assessments								
		☐					*Yes*	
		☐					*Yes*	
		☐					*Yes*	

Learning Teaching and Assessment Strategies:

- Lectures: board work to develop theory, numerical demonstrations to illustrate the basic theoretical concepts, discussion of the applications
- Tutorials: discussion of numerical examples and mathematical techniques used in their solutions
- Computer classes: emphasis on MATLAB capabilities to simulate wave phenomena, validation of numerical results against the analytical solutions, accuracy of the approximations used in mathematical models

Reassessment Strategies:

Syllabus Outline:

Part 1:

- Mechanical vibrations. Free and forced vibrations. Role of intial conditions. Mechanical impedance. Resonance
- Fourier theorem. Fourier synthesis
- Plane acoustic waves in fluids. Pressure, particle velocity, intensity and power. Characteristic acoustic impedance. Resonaces in open and closed pipes
- Impedance discontinuity – reflection and absorption coeffcients
- Standing waves. Impedance tube.Surface impedance
- Wave equation. Resonances of open and closed tubes.

Part 2

- Spherical wave – radiation from pulsating sphere. Monopole. Cylindrical waves
- Radiation by dipole and doublet
- Radiation by column and line sources. Directivity patterns
- Radiation by a circular piston – axial responce and far feld directivity
- Radiation impedance

Indicative texts:

Kinsler LE. Fundamentals of acoustics. John Wiley & Sons Inc; 2000.

O.Umnova Lecture notes, 2017.

U. Ingard Notes on Acoustics, Infinity Science Press, 2008.

Up to date lists should be accessed at www.salford.ac.uk/readinglists

IMPLEMENTATION

	Display Name
Module Leader:	Olga Umnova,#,#School of Science,, Engineering & Environme...
Approval Date:	22/06/2021

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