# MODULE SPECIFICATION

## COMPUTER SIMULATION FOR ACOUSTICS L6

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

Short Module Title:

Module Description:

This module will teach you the fundamental principles of computer simulation techniques, which are an essential and ubiquitous tool in modern acoustical engineering. You will study established methods such as finite element method, boundary element method and geometric room acoustics, learning the principles through simple examples in Matlab and then applying commercial software packages (e.g. COMSOL Multiphysics) to realistic problems. You will undertake practical problem-solving using computer modelling of acoustical systems and assess the field of application, accuracy and limitations of these methods. The module makes good use of the strong research track record of Salford in computer simulation of acoustics by exposing students to current research ideas, often via the researchers themselves.

## 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 6 | Module Code | H341 30040 |
| 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 |
|---|---|---|
| *52851* | *S2 - September Start, Trimester 2 (Short Fat)* | University of Salfo... |
| | | |
| | | |

| | | |
|---|---|---|
| | *S1 - September Start, Trimester 1 (Short Fat)* | |
| | *S1 - September Start, Trimester 1 (Short Fat)* | |
| | *S1 - September Start, Trimester 1 (Short Fat)* | |
| | *S2 - September Start, Trimester 2 (Short Fat)* | |
| | *B1 - January Start, Trimester 1 (Short Fat)* | |
| | *S2 - September Start, Trimester 2 (Short Fat)* | |
| | *S2 - September 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:* | 22 | Practical Classes and Workshops: | |
| *Seminar:* | | Supervised studio/workshop time: | |
| *Tutorial:* | 22 | Fieldwork: | |
| *Project supervision:* | | External Visits: | |
| *Demonstration:* | | Work Based Learning: | |
| *Placement:* | | Year Abroad: | |
| *Guided Independent Study* | 156 | Total: | 200 |
| | | *Other (including additional placement hours):* | |

## INDICATIVE LEARNING OUTCOMES

*Aims:*

1. To introduce a systematic understanding of the principles of computer simulation methods that are commonly used in acoustics.

2. To develop an awareness of the different types of computer simulation techniques available (e.g. low & high frequency models) and the ability to apply them.

3. To enable self-directed learning of these techniques through modelling of practical acoustical systems.

4. To communicate the conclusions of analysis to specialist audiences.

*Intended Learning Outcomes: Knowledge and Understanding:*

1. Understand and apply the basic principles of computer simulation techniques: geometrical room acoustics, finite element method, and boundary element method.

2. Solve problems using computer modelling of acoustical systems.
3. Evaluate the applicability, accuracy and limitations of computer simulation methods.
4. Undertake problem solving, communication, information retrieval, and the use of both general and specialist IT facilities.
5. Apply skills of engineering analysis and numeracy, though use and comparison between numerical models.

*Intended Learning Outcomes: Key Subject Specific Skills:*

## MODULE REQUIREMENTS

*Pre-Requisites:*

Co-requisites:

## 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* | *Assignment* | ☐ | *1-5* | *100* | *4000 wo...* | *No* | *Yes* | *School* |
| | | ☐ | | | | *No* | *Yes* | |
| | | ☐ | | | | *No* | *Yes* | |
| *There is no Programme Specific Regulation for additional assessments* | | | | | | | | |
| | | ☐ | | | | | *Yes* | |
| | | ☐ | | | | | *Yes* | |
| | | ☐ | | | | | *Yes* | |

Learning Teaching and Assessment Strategies:

This module is co-delivered with Computer Simulation for Acoustics at level 7. Level 6 and 7 students attend the same class sessions and engage with each other in the seminars and tutorial sessions. Learning outcomes and assessments are different for L6 and L7.

This module is centred on a weekly programme of directed reading and/or videos to watch, supported by a detailed study guide and sets of tutorial problems. All students will be expected to read/watch the

material before class, so more advanced and challenging points can be focussed upon in-class. Some class time will be devoted to work on tutorial problems, but students will also need to work on these in their own time.

The module is delivered on-site in a PC suite, where class time is used for mini-lectures, discussion of tricky points in the material, undertaking tutorial tasks and learning to use the simulation software (COMSOL).

The summative assessment will typically ask you to use acoustic simulation software to analyse a case study problem, within which you will have to assume certain properties or data (e.g. material or algorithm parameters). It will require you to use both general purpose mathematical modelling software such as MATLAB and specific numerical tools such as finite element and boundary element modelling software. The assessment will be on a written report, including both your simulated results and how well you demonstrate understanding through your discussion.

A formative assessment is run earlier in the trimester. This has a similar format to the summative assessment it aims to prepare you for but is much shorter.

Reassessment Strategies:

The reassessment brief will be the same as the summative brief.

Syllabus Outline:

- Geometric room acoustic modelling & its relation to statistical room acoustics
- Finite element method for modal analysis and frequency response studies
- Boundary element method for acoustic radiation modelling
- Material characterisation: absorption and scattering mechanism
- Application of software packages to acoustics case study problems
- Current research topics in algorithm development

Indicative texts:

https://salford.leganto.exlibrisgroup.com/leganto/public/44SAL_INST/lists/6861168430001611?auth=LOCAL

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

## IMPLEMENTATION

| | |
|---|---|
| *Module Leader:* | ***Display Name*** |
| | Jonathan Hargreaves,#,#School of Science,, Engineering & Envi... |
| *Approval Date:* | 22/06/2021 |

*This specification was printed during academic year 2020/21 on* *18 August 2021*