Module Title: 4B12 Acoustics

Code: ME4B12

Level: Senior Sophister (Optional module)

Credits: 5

Lecturer(s): Professor Henry Rice (hrice@tcd.ie) – Coordinator
Dr Eoin King (kingea@tcd.ie)

Module Organisation
This module runs for the 12 weeks of semester two (except during study/assignment week) and comprises three lectures per week plus one one-hour tutorial per week. There is also a detailed laboratory session which must be formally written up. Total contact time is 50 hours.

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<th>Semester</th>
<th>Start Week</th>
<th>End Week</th>
<th>Associated Practical Hours</th>
<th>Lectures</th>
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Total Contact Hours: 50

Module Description, Aims and Contribution to the Programme
Acoustic analysis allows for the prediction of the potential for vibration and noise in a given system and to acoustically optimise our environment. This module builds on analysis techniques developed in previous years by applying them to engineering problems and introduces the latest analysis methods for acoustics.

Learning Outcomes
On completion of this module, the student will be able to:
1. perform acoustic measurements and be familiar with standard procedures; in addition, the reasoning behind these standard procedures will be understood;
2. understand the principles of physical acoustics;
3. formulate numerical models for acoustic systems;
4. apply wave-based analysis to applied acoustics problems;
5. analyse and solve some commonly occurring environmental noise problems;
6. understand and interpret key elements of noise legislation and standards.
Module Syllabus

- **Fundamentals of acoustics**
  - nature of sound;
  - measurement and perception of sound
- **Sound waves**
  - wave equation;
  - plane waves;
  - spherical waves;
  - sources of sound;
  - acoustic impedance;
  - transmission problems;
  - acoustic energy
- **Environmental noise**
  - noise measurements and standards;
  - noise in living and working spaces;
  - noise control;
  - architectural acoustics.
- **Acoustic Impedance Measurement**

Teaching Strategies
This module is taught principally through a lecture programme in the second semester. This is supplemented by a detailed laboratory for which a comprehensive report must be submitted. A series of tutorials are run, each of which has its own problem sheet. This activity is managed directly by the lecturers.

Recommended Text(s)

Other Relevant Text(s)
- *Basic Acoustics*, Donald Hall, Wiley

Assessment
This module is assessed by a formal written two-hour examination (85% of final mark) together with laboratory experiments (15% of final mark).

Experiment
*Impedance Tube Measurement*