Course Outline

Semester 1 2016

MECH 9325

FUNDAMENTALS OF ACOUSTICS AND NOISE

Contents

1. Staff Contact Details

Contact details and consultation times for course convenor

Assoc. Prof. Nicole Kessissoglou
Room 408C, Ainsworth Building J17, Level 4
Tel: (02) 9385 4166
Email: n.kessissoglou@unsw.edu.au
Consultation time: Thursday 2-3pm (face-to-face)

Contact details for demonstrator

Samaneh Fard
Room 408C, Ainsworth Building J17, Level 4
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2. Course details

Credit Points:

This is a 6 unit-of-credit (UoC) course, and involves 3 hours per week (h/w) of face-to-face contact.

The UNSW website states “The normal workload expectations of a student are approximately 25 hours per semester for each UoC, including class contact hours, other learning activities, preparation and time spent on all assessable work. Thus, for a full-time enrolled student, the normal workload, averaged across the 16 weeks of teaching, study and examination periods, is about 37.5 hours per week.”

This means that you should aim to spend about 9 h/w on this course. The additional time should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

Contact Hours

	Day	Time	Location
Lecture	Thursday	12noon - 2pm	Electrical Engineering G25
Demonstration	Thursday	2pm –3pm	Electrical Engineering G25

Summary of the Course

This course will focus on the fundamental concepts and measurement of sound. It begins with the development of the acoustic plane wave equation and introduction of important parameters including acoustics pressure, acoustic impedance, characteristic impedance, acoustic energy density, acoustic intensity and acoustic power. The decibel scales and octave band frequency scales for noise are described. In this course, the effect of noise on people and acceptable limits for industrial and community noise are identified. Transmission phenomena including transmission of plane waves between different media, through walls and along pipes are investigation. This includes the basic analysis of expansion chamber mufflers and pipe side-branches. A basic energy approach to room acoustics is derived.

3. Teaching strategies

Lectures in the course are designed to cover the core concepts and background theory in acoustics and noise. The assessment is divided into a range of activities to reinforce the lecture material. Topics covered by this course are separated into ten units. A range of texts in acoustics were used to develop the lecture material. The lecture material is available to students electronically before each class via the UNSW online learning management system (Moodle). The lecture material will be delivered using powerpoint or pdf notes. Non-assessed exercises are embedded within each unit to reinforce the lecture material. Students are required to work through these exercises during the class and also during their own personal study time. Solutions to the exercises for a given unit are uploaded to the online learning management system two weeks after the lecture for that unit.

4. Course schedule

Date	Topic	Location	Lecture Content
3/3/16 Week 1	Unit 1	Electrical Eng G25	Introduction to acoustics: noise and sound, pure tones, decibel scales, frequency analysis, loudness of sound, weighting networks
10/3/16 Week 2	Unit 2	Electrical Eng G25	One dimensional plane acoustic waves: wave equation, standing waves, acoustic energy
17/3/16 Week 3	Unit 3	Electrical Eng G25	Measurement and analysis of sound pressures: sound level meters, microphones
24/3/16 Week 4	Unit 4	Electrical Eng G25	Frequency analysis, frequency bands, decibel scales, descriptors for time varying noise levels
7/4/16 Week 5	Unit 5	Electrical Eng G25	Effects of noise on people: human ear, loudness, weighted sound levels, masking, sound rating, hearing loss
14/4/16 Week 6		Willis Annexe J18	Laboratory 1
21/4/16 Week 7	Unit 6	Electrical Eng G25	Sound sources, sound fields, semi-reverberant field techniques, sound in large spaces, absorption, reverberation time
28/4/16 Week 8	Unit 7	Electrical Eng G25	Measurement of sound power
5/5/16 Week 9	Unit 8	Electrical Eng G25	Applications of the wave equation: transmission between media, transmission through a wall

12/5/16 Week 10		Willis Annexe J18	Laboratory 2
19/5/16 Week 11	Unit 9	Electrical Eng G25	Applications of the wave equation: transmission in pipes
26/5/16 Week 12		Electrical Eng G25	Test
2/6/16 Week 13		Electrical Eng G25	Revision

5. Assessment

Assessment Overview

Assessment	Weight	Learning outcomes assessed	Due date	Marks returned
Assignment 1	5%	1, 3, 4, 5	Wednesday 13th April 5pm	Two weeks after submission
Assignment 2	5%	1, 8, 9, 10	Wednesday 18th May 5pm	Two weeks after submission
Lab 1	10%	2, 3, 4	Wednesday 27th April 5pm	Two weeks after submission
Lab 2	10%	2, 3, 4, 7	Wednesday 25th May 5pm	Two weeks after submission
Literature review essay	10%	1, 2, 3, 4	Wednesday 4th May 5pm	Three weeks after submission
Test	10%	1, 3, 4, 5, 6, 7, 8, 9	Thursday 26th May 12pm	During the revision class in week 13
Final exam1				

Presentation

All submissions should have a standard School cover sheet which is available from this

Special Consideration and Supplementary Assessment

For details of applying for special consideration and conditions for the award of supplementary assessment, see the School intranet, and the information on UNSW's Special Consideration page.

6. Expected Resources for students

All material corresponding to the units (lecture material), unit exercise solutions, assignments and practical handouts will be provided in UNSW Moodle. Extra handouts and further useful material will be posted periodically in Moodle. You are advised to check Moodle regularly.

Recommended texts

Recommended texts for reading for this course which are available in the UNSW bookshop as well as the UNSW library are listed below:

Smith, B.J., Peters, R.J. and Owen, S. Acoustics and noise control, 2nd edition, Addison Wesley Longman, 1996.

Norton, M.P. and Karczub, D. Fundamentals of noise and vibration analysis for engineers, 2nd Edition, Cambridge University Press, Cambridge, 2003.

Bies, D. A. and Hansen C.H. Engineering Noise Control: Theory and Practice, 3rd Edition, E&FN Spon, 2003.

Link to the UNSW Library website: http://www.library.unsw.edu.au/

7. Course evaluation and development

Feedback on the course is gathered periodically using various means, including the Course and Teaching Evaluation and Improvement (CATEI) process, informal discussion in the final class for the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

In this course, recent improvements resulting:17.4>>B 007 Tw 11.

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website

Appendix A: Engineers Australia (EA) Professional Engineer Competency Standard

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex problem solving
	PE2.2 Fluent application of engineering techniques, tools and resources
	PE2.3 Application of systematic engineering synthesis and design processes
	PE2.4 Application of systematic approaches to the conduct and management of engineering projects
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effecti49i 88 Tm s