



## Course Syllabus (Academic Year 2021)

School of Interdisciplinary Studies, Kanchanaburi Campus, Mahidol University

- Course No. and Title** : KAED 441 Noise and Vibration Control  
**Credit (study hours)** : 3(3-0-6)
- Program Name** : Bachelor of Engineering Program in Environmental Engineering and Disaster Management
- Course Module** : Elective Course  
**Pre/co-requisite** : None
- Class Semester** : 2<sup>nd</sup> Semester Academic Year 2021
- Class Schedule & Venue:** Monday 13:00 – 16:00
- Class Coordinator**

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### 7. Course Description

หลักการของคลื่นเสียง เครื่องมือ และการวัดเสียงและการสั่นสะเทือนโดยการใช้เครื่องมือ แหล่งกำเนิดและผลกระทบของเสียงและการสั่นสะเทือนที่มีต่อสุขภาพมนุษย์และสิ่งแวดล้อม การตอบสนองทางร่างกายและจิตใจต่อเสียงและการสั่นสะเทือน กฎหมายและข้อกำหนด เทคนิคที่ใช้ลดและควบคุมเสียงและการสั่นสะเทือนในสถานะแวดล้อม และการใช้วัสดุป้องกันเสียงสะท้อน และเครื่องกั้นเสียง

Principle of sound wave, instrumentation and measurements of noise and vibration, sources and impacts of noise and vibration on human health and environment, general physiological and subjective responses to noise and vibration, laws and regulation, techniques available for noise and vibration control in the environment and use of acoustic material and barriers.

### 8. Course Objectives / Course Learning Outcomes (CLOs)

No.	Objectives / CLOs	Expected Skills / Knowledge			Sub-PLOs
		Specific	Generic	Knowledge	
8.1	CLO1: Describe principles of sound and vibration waves	/			1.1
8.2	CLO2: Assess exposure levels of noise and vibration	/			1.3, 2.2.
8.3	CLO3: Assess health risk associated with noise and vibration pollution	/			1.3, 2.2

8.4	CLO4: Correctly explain the laws and relevant regulations concerning noise and vibration	/			1.3
8.5	CLO5: Conduct hearing conservation project	/			2.1, 2.2
8.6	CLO6: Demonstrate vibration measurement	/			1.3
8.7	CLO7: Propose measures to minimize risk associated with noise and vibration	/			1.3

## 9. Course Outline

Week	Topic/Details	Number of hours		CLOs	Teaching activities/ media	Instructors
		Classroom sessions	Practice sessions			
1 15 Nov 2021	-Introduction to course outline, objectives, and assessment - Sound wave: Physical properties and wave characteristics	3		1	Lecture Activity - Compression and Rarefaction <b>Media:</b> PPT	AB
2 22 Nov 2021	Sound wave analysis	2	1	1	Lecture Activities - Sound level: outdoor survey - Combine sources: indoor experiment - Hearing Test <b>Media</b> - PPT - VDO	AB
3 29 Nov 2021	Sound descriptors for ambient noise monitoring	3		2	Lecture In-class calculations <b>Media:</b> PPT	AB
6 Dec 2021	Rama 9 Holiday					
4 13 Dec 2021	Noise contour map		3	2	Discussing case-study: Refuse-fueled power plant Activity ( <b>Assignment 1</b> ): Noise contour mapping <b>Media:</b> Report on the Noise contour map: Refuse-fueled power plant	AB
5 20 Dec 2021	Noise measurement and regulations	3		2	Lecture Activities - Design Logbook <b>Media</b> - PPT	AB

Week	Topic/Details	Number of hours		CLOs	Teaching activities/ media	Instructors
		Classroom sessions	Practice sessions			
6 27 Dec 2021	Noise measurement and relevant regulations (cont.)		3	2, 4	Lecture Activity ( <b>Assignment 2</b> ) - Measuring Leq, 24 hr from transportation - Specific noise from point sources <b>Media</b> - Lab sheets - คู่มือตรวจวัดเสียงรบกวน กรมควบคุมมลพิษ	AB
3 Jan 2022	New Year Break					
7 10 Jan 2022	Noise Pollution Reduction	3		7	Lecture Media: PPT	AB
8 10 Jan 2022	Noise Pollution Reduction (Cont.) Indoor noise measurement	2	1	7	Lecture Activity ( <b>Assignment 3</b> ): Indoor noise measurement: US Noise Criteria <b>Media:</b> PPT	AB
17 Jan 2022	Mid-term examination					
9 22 Jan 2022 (SAT) 9.00 AM to 4:00 PM (6 hour)	Vibration measurement		3	6	- Demonstration	AB วัชรพล เจริญ ถนอม (Innovative Instrument)
10 24 Jan 2022	Hearing Conservation Project	3		3, 5, 7	Lecture Discussing case study: นว โลหะไทย <b>Assignment 4:</b> MUKA textile industry <b>Media:</b> - PPT Hearing Conservation Project Report	AB

Week	Topic/Details	Number of hours		CLOs	Teaching activities/ media	Instructors
		Classroom sessions	Practice sessions			
11 31 Jan 2022	Hearing Conservation Project (cont.)		3	3, 5, 7	Activity: Presenting Hearing Conservation Project for MUKA textile industry	AB
12 7 Feb 2022	Vibration: Effects, Assessment, and Regulation	3		2, 3, 4	Lecture <b>Media:</b> - PPT - VDO youtube	AB
13 14 Feb 2022	Vibration Control	3		7	Lecture <b>Media:</b> - PPT - VDO youtube	AB
14 21 Feb 2022	2-storey house housing under earthquake with different damping materials	3		7	<b>Assignment 5</b> Problem-based study	AB
15 28 Feb 2022	Machine-induced vibration reduction by different stiffness materials Effects of mass on vibration under various r	3		7	<b>Assignment 6</b> Problem-based study	AB
14 Mar 2022	Final Examination					
	Total	31	14			

## 10. Course Assessment

No.	Methods/ Activities	Regulations	CLOs	Week	Weight Distributio n
1	Assignmen t*	<p>I. Learner must practice the engineering skills from exercises and assignments</p> <p>II. The score will be evaluated according to the quality and details of work by instructors. (Correctness, Determination)</p>	2, 3, 5, 7	4, 6, 8,9, 10, 13, 14	65
2	Midterm Examinati on	<p>III. The exam will be held on schedule.</p> <p>IV. It is <b>open-book exam</b> which student can use personal calculator.</p> <p>V. The scope of exam will be cover topics of the 1<sup>st</sup>-8<sup>th</sup> week in this course.</p>	All	9	15
3	Final Examinatio n	<p>VI. The exam will be held on schedule.</p> <p>VII. It is <b>open-book exam</b> which student can use personal calculator.</p> <p>VIII.III. The scope of exam will cover all topics of this course.</p>	All	16	20
				Total	100

\* Assignment 1 (10%): Noise contour mapping

Assignment 2 (10%): Measuring Leq, 24 hr from transportation / Annoyance level (specific noise) from point sources

Assignment 3 (10%): Indoor noise measurement: US Noise Criteria

Assignment 4 (15%): MUKA textile industry Media:

Assignment 5 (10%): Problem-based study

Assignment 5 (10%): Problem-based study

## 11. Grading System

Criterion-referenced evaluation

The student performance in overall course will be measured by Criterion-referenced assessment as following table.

Grade	Score	Grade	Score	Grade	Score	Grade	Score
A	80%	B	70 – 74.99%	C	60 – 64.99%	D	50 – 54.99%
B+	75 – 79.99%	C+	65 – 69.99%	D+	55 – 59.99%	F	< 50 %

## 12. References

1. KAED 441 PPT Class handout, downloadable in the Classroom
2. บริษัท นวโลหะไทย จำกัด โครงการอนุรักษ์การได้ยิน นโยบายกิจกรรมการค้นหาและประเมินอันตราย กิจกรรม Jishuken และการปรับปรุงสภาพแวดล้อมในการทำงาน
3. บริษัท ทีพีไอ โพลีน เพาเวอร์ จำกัด (มหาชน) รายงานการจัดทำ Noise Contour Map โครงการผู้ผลิตไฟฟ้ารายเล็กจากพลังงานหมุนเวียนประเภทเชื้อเพลิงพลังงานความร้อนจากขยะชุมชนและขยะอุตสาหกรรมที่ไม่ใช่ขยะอันตรายและร้อยทิ้งจากกระบวนการผลิตปูนซีเมนต์
4. บริษัท Innovative instrument จำกัด คู่มือแนะนำการตรวจทำความเข้าใจความเสี่ยงเพื่อบำรุงรักษาเครื่องจักรเบื้องต้น
5. กรมควบคุมมลพิษ คู่มือวัดเสียงรบกวน คพ 03-126

13. PLOs that the course is responsible for

CLOs	Sub PLOs
CLO1 Describe principles of sound and vibration waves,	1.1. Accurately explain basic concepts, theories and principles of environmental engineering
CLO2 Assess exposure levels of noise and vibration	1.3. Use knowledge and skills of environmental engineering for solving the problems according to Professional Standards 2.2. Select appropriate methods and analyze data systematically
CLO3 Assess health risk associated with noise and vibration pollution	1.3. Use knowledge and skills of environmental engineering for solving the problems according to Professional Standards 2.2. Select appropriate methods and analyze data systematically
CLO4 Correctly explain the laws and relevant regulations concerning noise and vibration	1.3. Use knowledge and skills of environmental engineering for solving the problems according to Professional Standards
CLO5: Conduct hearing conservation project	2.1. Accurately define the problems in simulated scenarios 2.2. Select appropriate methods and analyze data systematically 5.4. Apply knowledge in environmental engineering and disaster management to create benefits and positive impact to local communities and societies
CLO6: Demonstrate vibration measurement	1.3. Use knowledge and skills of environmental engineering for solving the problems according to Professional Standards
CLO7: Propose measures to minimize risk associated with noise and vibration	1.3. Use knowledge and skills of environmental engineering for solving the problems according to Professional Standards 2.2. Select appropriate methods and analyze data systematically