Subject Description Form

Subject Code	CSE587
Subject Title	Environmental Noise and Vibration Control
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	**Mutual exclusions**: *Building Acoustics* (BSE541) or *Noise Pollution Control* (CSE525) Recommended background knowledge: Engineering or applied science undergraduate background.
Objectives	To provide students with knowledge about measuring, assessing, and managing noise generated by transportation, construction, and industrial activities.
Intended Learning Outcomes	Upon completion of the subject, students will be able: a. to apply the fundamental knowledge of noise and vibration control assessment to formulate effective solutions for environmental engineering problems in Hong Kong; b. to identify, structure and analyze diverse problems arising from the changing constraints that influence engineering projects, such as environmental, legislative, sustainability, and technological considerations; c. to work with others in group works, and take responsibility for an agreed area of a shared activity; and d. to have creative and critical thinking and an ability to work independently.
Subject Synopsis/ Indicative Syllabus	**Keyword Syllabus** i) Basic Acoustics Sound sources - spherical and cylindrical radiation, acoustic parameters. Decibel scales - sound pressure level, sound intensity level, sound power level, directivity index. Atmospheric noise propagation, background noise, multiple sources. ii) Measurement Instrumentation Sound level meters, microphones, accelerometers, and accessories - sensitivity, frequency response and dynamic range. Filter characteristics, weighting functions, averaging time.

<table>
<tr><td></td><td>iii) <u>Road Traffic</u>

Vehicle noise - sources, emission limits. Traffic noise - characteristics, propagation. Noise criteria. Noise prediction and assessment. Methods of noise control for new roads and buildings.

iv) <u>Railbound Traffic</u>

Wayside noise and vibration, squealing noise. Noise sources and control technology. Noise prediction and assessment. Noise control for new railways.

v) <u>Construction & Industrial Noise</u>

Major noise sources - powered mechanical equipment, piling and demolition operations. Noise prediction and assessment. Engineering and management control.

vi) <u>Noise and Vibration Control</u>

Noise reflection and transmission across partitions. Sound absorption materials, silencers, acoustic panels, vibration isolators and dampers. Design and calculation methods. Enclosure design and examples.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Lectures will provide basic knowledge relating to noise measurement, assessment and control design. Local case studies of traffic noise control, rail noise control in East Rail, West Rail will be introduced.

Tutorials and laboratory sessions will offer students the chance to analyze measurement data, work on problem-solving questions, and engage in hands-on experiments related to noise enclosures and acoustic silencers.

Independent study and associated reading will require students to conduct some problem-solving exercises independently and apply to case studies in Hong Kong.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a.</td><td>b.</td><td>c.</td><td>d.</td></tr>
<tr><td>1. Continuous Assessment</td><td>40%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Written Examination</td><td>60%</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="4"></td></tr>
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<tr><td></td><td colspan="2">Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The continuous assessment will consist of laboratory reports (20%), individual assignments (10%), and group discussions on case studies (10%).

The written examination is assessed through a final exam that covers all pertinent topics related to noise and vibration control in the subject.

Students must pass the final examination and achieve a passing overall score / grade to pass the subject.</td></tr>
<tr><td rowspan="5">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>Lectures / Lab Sessions/ Tutorials</td><td>39 Hrs.</td></tr>
<tr><td>Other student study efforts:</td><td></td></tr>
<tr><td>Self-study and course work</td><td>78 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>117 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2"><u>Books</u>

Peters, R. J. et al., Acoustics and Noise Control, London: Routledge (2013).

Barron, R.F., Industrial Noise Control and Acoustics, Marcel Dekker, Inc., New York, (2001)

Grondzik et al., Mechanical and Electrical Equipment for Buildings, Wiley (2019)

Beranek, L.L. and Ver, I.L., Noise and Vibration Control Engineering, Wiley, (1992).

Cavanaugh, W.J., Architectural Acoustics, Wiley, (1999).

Hansen, C.H., Noise Control: from concept to application, Taylor & Francis, (2005).

Nelson, P.M., Transportation Noise Reference Book, Butterworths, (1987).

<u>Conference Proceedings & Symposia</u>

Proceeding Inter-Noise, 1998 – present</td></tr>
</table>

	Journals Journal of Acoustical Society of America Journal of Sound and Vibration Noise Control Engineering Journal **Reports and Standards** *BS 5228 Noise Control on Construction and Open Sites*, London, British Standards Institution *Environmental Guidelines for Planning in Hong Kong*, by Hong Kong Government *Noise Control Ordinance 1988*