Subject Description Form

Subject Code	BSE5410
Subject Title	Noise and Vibration in Sustainable Built Environments
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject provides students with up-to-date knowledge on noise and vibration control in sustainable built environments. The objectives of the subject are to enable students to learn the knowledge of acoustics, to increase their awareness of the issues of sustainability in acoustics design and to apply the principles of acoustics to remove the problems that obstruct a "sustainable" solution.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. apply the knowledge and various technologies to control noise and vibration control for sustainable built environments; b. integrate sustainability into acoustic design; c. acquire the basic theories in noise and vibration control; and d. apply the relevant recommendations/standards and relevant calculations.
Subject Synopsis/ Indicative Syllabus	**Noise and vibration fundamentals:** An introduction to acoustics, basic terminology and definitions of noise and vibration parameters, sound and vibration generation and transmission, noise and vibration control concepts. Noise and vibration calculations. **Acoustical design for sustainable environments:** Sustainability, Relationship between acoustics and sustainable design, Environment, acoustic materials, sound insulation, green and sustainable buildings/sustainable environments, environmental aspects and impact, legislation, Noise Control Ordinance, Concept of building environmental assessment method(s) such as BEAM (BEAM noise criteria for new and existing buildings, BEAM acoustics and noise), effects of noise and vibration on human. **Propagation of sound in urban environments:** Reflection, refraction, scattering and diffraction. Absorption of sound in air. Acoustic impedance of ground surfaces. Attenuation of sound over ground. Noise reduction by barriers. Application of the Calculation of Road Traffic Noise (CRTN) and Calculation of Rail Noise (CRN) for prediction of noise in complex urban environments. **Vibration control for sustainable environment:** Fundamentals of vibration, vibration sources and control, forced vibration, structure-borne sound power transmission, mobility effect, vibration isolation of equipment, vibration problems.

<table>
<tr><td>Teaching/Learning Methodology</td><td>Lectures and tutorials

In-class assignment

Seminars (seminar oral presentation + seminar report)

Independent study

Demonstrations</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="6">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><td></td><td></td></tr>
<tr><td>1. In-class assignment</td><td>15%</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>2. Self-study report and presentation</td><td>25%</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>3. Examination</td><td>60%</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>Total</td><td>100%</td><td colspan="6"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Assessment of students' performance in the subject will comprise coursework (40%) and examination (60%).

The coursework will include:

• in-class assignment; and

• student seminar and self-study report.
</td></tr>
<tr><td>Reading List and References</td><td>A. Fry (1988). Noise Control in Building Services.

D.A. Bies and C.H. Hansen (2003). Engineering Noise Control: Theory and Practice.

H. Kuttruff (1991). Room Acoustics.

I. Sharland (1979). Woods Practical Guide to Noise Control.

I.L. Ver and L.L. Beranek (2006). Noise and Vibration Control Engineering: Principles and Applications.

L.E. Kinsler, A.R. Frey, A.B. Coppens and J.V. Sanders (2000). Fundamentals of Acoustics.

L.L. Beranek (1996). Concert Halls and Theatres: How they sound.

M. Mehta, J Johnson and J Rocafort (1999). Architectural Acoustics, Principles and Design.</td></tr>
</table>

	P.A. Nelson and S. J. Eillott (updated edition). *Active Control of Sound*. R.J.M. Craik (1996). *Sound Transmission Through Buildings Using Statistical Energy Analysis*. T.J. Schultz (1982). *Community Noise Rating*. *ASHRAE Handbook*, HVAC Applications SI Edition, 47.7-47.10. (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2007). BS and ISO standards. *CIBSE guide **B5** Noise and Vibration Control for HVAC*, 7-9 (The Chartered Institution of Building Services Engineers London, May 2005). Hong Kong Ordinances - Noise Control Ordinance (Cap 400) Hong Kong Regulations – Noise Control Regulations (Cap 400)