

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: <ul style="list-style-type: none"> 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	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>

Teaching/Learning Methodology	Lectures and tutorials In-class assignment Seminars (seminar oral presentation + seminar report) Independent study Demonstrations																																																				
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1" data-bbox="443 472 1469 1010"> <thead> <tr> <th data-bbox="443 472 772 667" rowspan="2">Specific assessment methods/tasks</th> <th data-bbox="777 472 927 667" rowspan="2">% weighting</th> <th colspan="6" data-bbox="932 472 1469 600">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th data-bbox="932 607 1018 667">a.</th> <th data-bbox="1023 607 1109 667">b.</th> <th data-bbox="1114 607 1200 667">c.</th> <th data-bbox="1204 607 1291 667">d.</th> <th data-bbox="1295 607 1382 667"></th> <th data-bbox="1386 607 1469 667"></th> </tr> </thead> <tbody> <tr> <td data-bbox="443 674 772 770">1. In-class assignment</td> <td data-bbox="777 674 927 770">15%</td> <td data-bbox="932 674 1018 770">√</td> <td data-bbox="1023 674 1109 770">√</td> <td data-bbox="1114 674 1200 770">√</td> <td data-bbox="1204 674 1291 770">√</td> <td data-bbox="1295 674 1382 770"></td> <td data-bbox="1386 674 1469 770"></td> </tr> <tr> <td data-bbox="443 777 772 873">2. Self-study report and presentation</td> <td data-bbox="777 777 927 873">25%</td> <td data-bbox="932 777 1018 873">√</td> <td data-bbox="1023 777 1109 873">√</td> <td data-bbox="1114 777 1200 873">√</td> <td data-bbox="1204 777 1291 873">√</td> <td data-bbox="1295 777 1382 873"></td> <td data-bbox="1386 777 1469 873"></td> </tr> <tr> <td data-bbox="443 880 772 936">3. Examination</td> <td data-bbox="777 880 927 936">60%</td> <td data-bbox="932 880 1018 936">√</td> <td data-bbox="1023 880 1109 936">√</td> <td data-bbox="1114 880 1200 936">√</td> <td data-bbox="1204 880 1291 936">√</td> <td data-bbox="1295 880 1382 936"></td> <td data-bbox="1386 880 1469 936"></td> </tr> <tr> <td data-bbox="443 943 772 1010">Total</td> <td data-bbox="777 943 927 1010">100%</td> <td colspan="6" data-bbox="932 943 1469 1010"></td> </tr> </tbody> </table> <p data-bbox="443 1025 1469 1093">Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p data-bbox="443 1126 1469 1193">Assessment of students' performance in the subject will comprise coursework (40%) and examination (60%).</p> <p data-bbox="443 1227 815 1261">The coursework will include:</p> <ul data-bbox="443 1294 986 1395" style="list-style-type: none"> • in-class assignment; and • student seminar and self-study report. 							Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a.	b.	c.	d.			1. In-class assignment	15%	√	√	√	√			2. Self-study report and presentation	25%	√	√	√	√			3. Examination	60%	√	√	√	√			Total	100%						
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Reading List and References	<p data-bbox="443 1467 1086 1500">A. Fry (1988). <i>Noise Control in Building Services</i>.</p> <p data-bbox="443 1534 1469 1601">D.A. Bies and C.H. Hansen (2003). <i>Engineering Noise Control: Theory and Practice</i>.</p> <p data-bbox="443 1635 906 1668">H. Kuttruff (1991). <i>Room Acoustics</i>.</p> <p data-bbox="443 1702 1225 1736">I. Sharland (1979). <i>Woods Practical Guide to Noise Control</i>.</p> <p data-bbox="443 1769 1469 1836">I.L. Ver and L.L. Beranek (2006). <i>Noise and Vibration Control Engineering: Principles and Applications</i>.</p> <p data-bbox="443 1870 1469 1937">L.E. Kinsler, A.R. Frey, A.B. Coppens and J.V. Sanders (2000). <i>Fundamentals of Acoustics</i>.</p> <p data-bbox="443 1971 1321 2004">L.L. Beranek (1996). <i>Concert Halls and Theatres: How they sound</i>.</p> <p data-bbox="443 2038 1469 2105">M. Mehta, J Johnson and J Rocafort (1999). <i>Architectural Acoustics, Principles and Design</i>.</p>																																																				

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