

Subject Description Form

Subject Code	BSE5411
Subject Title	Building Carbon Footprint Assessment
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	<ol style="list-style-type: none"> 1. To gain an understanding of climate change and national and international gas emissions targets and reporting requirements. 2. To develop skills in carrying out carbon impact assessment for buildings. 3. To gain an understanding of how to achieve a reduction target in greenhouse gas emissions for building construction, operation and maintenance. 4. To formulate low-carbon strategies for building designs. 5. To acquire basic skills on conducting carbon reporting assessments for companies and organizations based on international and local carbon reporting guidelines.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> a. understand the impacts of climate change, and the international and local mitigation strategies and policies; b. understand the impacts of buildings on carbon emissions; c. appreciate the concept of embodied carbon and the carbon footprint of materials and products (using both a process based end to end lifecycle approach and input-output techniques); d. estimate the embodied energy and carbon footprints of the building material use, and energy use due to building operation; e. identify and prioritize appropriate cost effective design and operating strategies to reduce greenhouse gas emissions in a variety of scenarios; and f. apply appropriate quantification methodologies for greenhouse gas emissions mitigation and reporting.
Subject Synopsis/ Indicative Syllabus	<p>Climate Change and Potential International and Local Challenges: climate change; international collaborative efforts, Kyoto Protocol, impact of buildings.</p> <p>Major Carbon Reduction Policies: carbon tax, emission trading, energy saving labels etc.</p> <p>Greenhouse Gas: types and sources, emissions and removals from building activities, accounting and reporting for buildings.</p> <p>Low Carbon Building Design and Building Carbon Footprint Assessment: embodied energy and carbon emissions for material use and operations in buildings, carbon-cost curves, achieving low carbon design through the application of both conventional and state-of-the-art mitigation strategies with the lifecycle cost considerations.</p>

	<p>Building Carbon Audit and Reporting: purposes and functions, overseas and local developments, regulatory control or voluntary participation, carbon accounting protocols (e.g. ISO14064), product carbon accounting standards (e.g. PAS2060:2010).</p> <p>Quantification methodologies: physical and operational boundaries of buildings, scopes of carbon emissions and removals from buildings, data requirements and analyses.</p>																																														
<p>Teaching/Learning Methodology</p>	<ol style="list-style-type: none"> 1. Lectures will be delivered to introduce the concept relating to climate change, carbon impact assessment, auditing etc. 2. Workshops will be organized to enable the students to apply what they learn in lectures. 3. Students will be required to present their solutions and findings obtained from workshop to their peers and lecturers in workshops. 4. Final examination will be held to examine the learning outcomes of students. 																																														
<p>Assessment Methods in Alignment with Intended Learning Outcomes</p>	<table border="1" data-bbox="443 824 1390 1339"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="6">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> <th>f</th> </tr> </thead> <tbody> <tr> <td>1. Continuous Assessments</td> <td>40%</td> <td>√</td> <td>√</td> <td>√</td> <td></td> <td></td> <td>√</td> </tr> <tr> <td>2. Workshops</td> <td>20%</td> <td></td> <td></td> <td></td> <td>√</td> <td>√</td> <td>√</td> </tr> <tr> <td>3. Examination</td> <td>40%</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> </tbody> </table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a	b	c	d	e	f	1. Continuous Assessments	40%	√	√	√			√	2. Workshops	20%				√	√	√	3. Examination	40%	√	√	√	√	√	√	Total	100%						
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<p>Reading List and References</p>	<p>Clark DH. <i>What Color is Your Building?</i> RIBA (2013).</p> <p>Environmental Protection Department (2015), <i>Hong Kong Greenhouse Gas Inventory</i>.</p> <p>Environmental Protection Department and Electrical and Mechanical Services Department (2010), <i>Guidelines to Account for and Report on Greenhouse Gas Emissions and Removals for Buildings (Commercial, Residential or Institutional Purposes) in Hong Kong</i>.</p> <p>Franchetti MJ and Apul D. <i>Carbon Footprint Analysis: Concepts, Methods, Implementation, and Case Studies</i> (2012), CRC Press Inc.</p> <p>International Energy Agency (2017), <i>CO₂ Emissions from Fuel Combustion</i>.</p> <p>International Organization for Standardization. ISO-14064:1 <i>Greenhouse gases – Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals</i>, ISO (2006).</p> <p>IPCC, <i>IPCC Fifth Assessment Report, Climate Change (2020)</i></p>																																														