

### Subject Description Form

<b>Subject Code</b>	ABCT5031
<b>Subject Title</b>	Ecological Approaches for Carbon Management
<b>Credit Value</b>	3
<b>Level</b>	5
<b>Pre-requisite/ Co-requisite/ Exclusion</b>	Nil
<b>Objectives</b>	The subject aims to guide students through the application of ecological science in achieving carbon neutrality for the sustainable development of our modern society. We will explore the chemistry behind the global carbon cycle and climate change, and the role of ecosystems in regulating these environmental processes. This knowledge in ecology and chemistry is important for developing nature-based solutions to mitigate the climate change impacts. Common tools for carbon management will also be introduced, such as carbon offsetting that can be implemented through ecological approaches. Relevant case studies in Hong Kong and worldwide will be presented and discussed.
<b>Intended Learning Outcomes</b>	Upon completion of the subject, students will be able to: <ul style="list-style-type: none"> <li>a. explain the chemical and ecological processes in the carbon cycle and climate change, and the causes and impacts of global warming and ocean acidification;</li> <li>b. develop and evaluate nature-based solutions with knowledge of applied ecology to mitigate the climate change effects and achieve carbon offsets;</li> <li>c. calculate carbon footprints and make use of the common carbon management tools for corporates and individuals to demonstrate carbon neutrality; and</li> <li>d. appreciate the importance of environmental, social and national responsibilities, as well as professional integrity and ethics.</li> </ul>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b>Overview of the global carbon cycle</b></p> <ul style="list-style-type: none"> <li>▪ Carbon fluxes in terrestrial and marine ecosystems</li> <li>▪ Identification of carbon sources and carbon sinks</li> <li>▪ The role of ecological processes in carbon dynamics</li> </ul> <p><b>Causes and effects of climate change</b></p> <ul style="list-style-type: none"> <li>▪ The role of human activities in climate change</li> <li>▪ Global warming and ocean acidification, the evil twins</li> <li>▪ Ecological impacts of climate change</li> </ul> <p><b>Nature-based solutions for climate change</b></p> <ul style="list-style-type: none"> <li>▪ The terrestrial green carbon approach</li> <li>▪ The marine and coastal blue carbon approach</li> <li>▪ Carbon offsets through ecological sequestration</li> <li>▪ Case studies in Hong Kong and worldwide</li> </ul>

	<p><b>Carbon management models</b></p> <ul style="list-style-type: none"> <li>▪ Carbon as an emergent asset and the carbon markets</li> <li>▪ Formulation for a carbon assessment framework</li> <li>▪ Steps to demonstrate carbon neutrality</li> <li>▪ Case studies in Hong Kong and worldwide</li> </ul>																																								
<p><b>Teaching/Learning Methodology</b></p>	<p><b>Interactive lectures</b></p> <ul style="list-style-type: none"> <li>▪ To facilitate students' learning of key concepts with case studies, and promote communication between teachers and students</li> </ul> <p><b>Tutorials and discussion</b></p> <ul style="list-style-type: none"> <li>▪ To enhance interaction among students and their awareness of environmental issues through discussion and experience sharing</li> </ul> <p><b>Test and exercise</b></p> <ul style="list-style-type: none"> <li>▪ To reinforce students' knowledge learnt in the lectures, which can also be applied to address real-life environmental problems</li> </ul> <p><b>Individual essay and group presentation</b></p> <ul style="list-style-type: none"> <li>▪ To encourage students to research into relevant topics, and present their findings and views both individually and in a team</li> </ul>																																								
<p><b>Assessment Methods in Alignment with Intended Learning Outcomes</b></p>	<table border="1" data-bbox="512 1021 1374 1361"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">Percentage weighting</th> <th colspan="4">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> </tr> </thead> <tbody> <tr> <td>Test</td> <td>20%</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Exercise</td> <td>20%</td> <td></td> <td></td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Individual essay</td> <td>30%</td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> </tr> <tr> <td>Group presentation</td> <td>30%</td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Total</td> <td>100 %</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assessment of this subject comprises both formative and summative parts. To ensure that students learn and reflect continuously, we adopt a continuous assessment which contains four components including an individual essay, a group presentation, an exercise and a test. The individual essay will be assessed using the Structure of the Observed Learning Outcome Taxonomy, which will allow us to recognise where students find difficulties and address the problems accordingly. The group presentation and exercise aim to foster students' ability to make connection with what they have learnt to the real-life situations. These components are comprehensive in nature and will encourage knowledge transfer from the classroom to students' personal and professional lives. For the summative part, a test will be used to evaluate students' level of understanding and provide high order thinking questions to assess students' analytical and problem-solving skills.</p>	Specific assessment methods/tasks	Percentage weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				a	b	c	d	Test	20%	✓	✓			Exercise	20%			✓	✓	Individual essay	30%	✓	✓		✓	Group presentation	30%		✓	✓	✓	Total	100 %				
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<b>Student Study Effort Expected</b>	Class contact:	
	▪ Lecture	30 hours
	▪ Tutorial	9 hours
	Other student study effort:	
	▪ Exercise	9 hours
	▪ Preparation for the individual essay and group presentation	36 hours
	▪ Self-study and preparation for the test	36 hours
	Total student study effort	120 hours
<b>Reading List and References</b>	Reading materials will be provided in class.	