City University of Hong Kong
Course Syllabus

offered by School of Energy and Environment
with effect from Semester A 2017/18

Part I Course Overview

Course Title:	Design of Smart Cities and Sustainable Building
Course Code:	SEE4205
Course Duration:	1 semester
Credit Units:	3 credits
Level:	B4
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	Nil
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

(A 150-word description about the course)

This course aims to provide the students with the knowledge and principles needed for the successful design of sustainable and energy efficient buildings and smart and sustainable cities. The course introduces environmental design and engineering principles applied to the built environment.

Students will learn the fundamentals of passive and active design in response to site conditions. The adaptation of the built environment to future warmer climate conditions to minimise the effects of Urban Heat Island Effects is explored. Issues such as Walled Effects and planning for ventilation availability will be explored. The renovation and refurbishment of existing buildings and precincts to reduce CO_2 emissions are explored.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs[#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Explain the principles of sustainable design principles and context.		✓		
2.	Explain the design considerations and local and global constraints including social, regulatory, technical and environmental constraints.		✓		
3.	Generate sustainable design at building, district and city level.		✓	✓	✓
4.	Describe global implications of sustainable built environment.		✓	✓	
5.	Apply the principles of sustainable design in response to specific site conditions while complying with planning parameters and client's requirements.		✓	✓	✓
		100%			

** If weighting is assigned to CILOs, they should add up to 100%.*

[#] Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.					Hours/week (if applicable)
		1	2	3	4	5	
Lecture	Explain key theories and concepts of sustainable design	✓	✓	✓	✓	✓	2 hrs per wk
Tutorial	Learn through case studies and example data sets and application of smart city design	✓	✓	✓	✓	✓	1 hr per wk
Analysis	Students to analyse data sets and examples to demonstrate critical thinking and interpretation of the empirical evidence of the environmental performance of the built environment	✓	✓	✓	✓	✓	3 hrs per wk

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.					Weighting*	Remarks
	1	2	3	4	5		
Continuous Assessment: _100___%							
Task 1	✓	✓	✓			20%	
Task 2		✓	✓	✓		20%	
Individual Assignment	✓	✓	✓	✓	✓	20%	
Group Assignment	✓	✓	✓	✓	✓	40%	
Examination: _0___% (duration: N/A hrs , if applicable)							
** The weightings should add up to 100%.*						100%	

Examination duration: N/A
Percentage of coursework, examination, etc.: 100% by coursework

To pass a course, a student must do ALL of the following:

1) obtain at least 30% of the total marks allocated towards coursework (combination of assignments, pop quizzes, term paper, lab reports and/or quiz, if applicable);
2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and
3) meet the criteria listed in the section on Assessment Rubrics.

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Task 1 - climatic data The students will learn data research and analyse the influence/impact of climatic conditions on building design.	Search appropriate sources from different sources and use of data to inform design process. Analyse buildings to understand how climatic conditions can be incorporated into building design.	High	Significant	Moderate	Basic	Not even reaching marginal level
2. Task 2 – sankey diagram The students will learn data representation and existing building energy use analysis to assist communication of sustainable design.	Utilise end use energy data from EMSD and learn and analyse current building stock's energy use patterns. Use appropriate graphical representations and/or infographics to communicate sustainable design. Understand typical building energy use and differences between typical uses such as residential, office and retail.	High	Significant	Moderate	Basic	Not even reaching marginal level
3. Individual Assignment The students will research zero or low carbon building/community/city and write a critical paper.	Analyse different precedents of zero carbon building/community/city with their success/failure and why. Learn the difference between design data and actual operation data, hence learning the challenge of behavioural change. Highlight unique sustainable features of the chosen projects and how they work.	High	Significant	Moderate	Basic	Not even reaching marginal level

	Prepare ‘posters’ to communicate project’s intent, design, operation data and lessons learned. Present in a short ‘sales pitch’ to present own projects with key points. Understand different definitions of low, zero carbon, energy, operational energy projects with the concept of offsite offsets.					
4. Group Assignment The students will adapt the design of a typical office tower in two different climatic zones in response to site conditions and planning parameters.	Understand how to develop and incorporate sustainable design while complying with planning parameters. Use building energy data and establish sustainable design strategy to ensure energy-efficient building. Understand the importance of clean energy sources, hence carbon emissions from electricity. Devise strategies to reduce environmental impact of a building from different players’ point of view. Student report will provide an overview of the design aims and concepts and understanding of sustainable design principles.	High	Significant	Moderate	Basic	Not even reaching marginal level

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

Sustainable Building, Energy Efficiency in the Built Environment, Smart City, Passive Design Green House Gas Emissions, Building Rating Systems.

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	Introduction to Building Physics. Carl-Eric Hagentoft Published by Studentlitteratur AB, 2001
2.	DeKay, M. and Brown, G.Z., 2013. Sun, wind, and light: Architectural design strategies. John Wiley & Sons.
3.	Mackay, D., Sustainable Energy – Without Hot Air, http://www.withouthotair.com/

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	A Handbook of Sustainable Building Design and Engineering: An Integrated Approach to Energy, Health and Operational Performance (BEST (Buildings Energy and Solar Technology)) Hardcover – January 30, 2009 by Dejan Mumovic (Editor), Mat Santamouris (Editor)
2.	Counteracting Urban Heat Island Effects in a Global Climate Change Scenario. Editors: Musco, Francesco