

# City University of Hong Kong

## Information on a Course offered by School of Energy and Environment with effect from Semester A in 2012 / 2013

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### Part I

|   |   |
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| <b>Course Title:</b>                                      | Building Performance Assessment         |
| <b>Course Code:</b>                                       | SEE8116                                 |
| <b>Course Duration:</b>                                   | One Semester                            |
| <b>Credit Units:</b>                                      | 3                                       |
| <b>Level:</b>   | R8                                      |
| <b>Medium of Instruction:</b>                             | English                                 |
| <b>Prerequisites:</b> <i>(Course Code and Title)</i>      | Nil                                     |
| <b>Precursors:</b> <i>(Course Code and Title)</i>         | -                                       |
| <b>Equivalent Courses:</b> <i>(Course Code and Title)</i> | SEE6116 Building Performance Assessment |
| <b>Exclusive Courses:</b> <i>(Course Code and Title)</i>  | Nil                                     |

### Part II

#### Course Aims

The course is an elective within the Research Degree Programmes. It is international in its overview but focuses on specific aspects of Hong Kong's building stock for detailed analysis of problems and solutions and identifies regional approaches (ie Australia, China, Singapore) for comparison. In addition to lectures there will be opportunities for group work within the class as well as explicitly research oriented assignments culminating in the mini-project on a topic of the students own choice.

*This course aims to provide students with basic knowledge on:*

- targets for sustainable buildings' energy and water usage
- new concepts in high performance, low-carbon buildings
- trends in voluntary & mandatory methods to rate performance
- Hong Kong – the building stock, its status and necessary upgrade
- international trends in building performance evaluation techniques

## Course Intended Learning Outcomes (CILOs)

*Upon successful completion of this course, students should be able to:*

| No. | CILOs   | Weighting (if applicable) |
|-----|---|---------------------------|
| 1.  | Identify why building performance assessment is crucial to a low-carbon society & sustainable development   | equal                     |
| 2.  | Assess the contribution of new materials, technologies and procedures to realise higher standards   | equal                     |
| 3.  | Appreciate buildings' holistic performance and the role of computer simulations' real-time response in the assessment   | equal                     |
| 4.  | Link the interaction of government policy with business activity to achieve required outcome  | equal                     |
| 5.  | Evaluate the relative merits of voluntary and mandatory means to prompt socially and environmentally responsible behaviour  | equal                     |
| 6.  | Development of personal skills:<br>a) Analyse complex options & apply information to develop a proposal<br>b) Effective personal research including reasoned argument<br>c) Ability to be concise and persuasive in viewpoints<br>d) Negotiate and work within peer group to express/ present views | equal                     |

## Teaching and Learning Activities (TLAs)

*(Indicative of likely activities and tasks designed to facilitate students' achievement of the CILOs. Final details will be provided to students in their first week of attendance in this course)*

Students are guided to read the relevant reference materials before and/or after each lecture session. Lectures are used to describe and illustrate basic concepts, their principles with case studies as illustration. Guest speakers are specialists who will cover specific topics and there will be the option to attend some site visits on Saturdays. Class work involves students in small groups to discuss aspects and present views. Homework covers four short Assignments presented to Class at the next session for peer review. These are designed to encourage students to choose and explore their own topics within a given brief. They are intended as a lead-in to the Mini-project which is personal research requiring data collection and analysis. It is the major output of the coursework.

|        | Lecture | Class-work | Assignment | Mini-project | Contact Hours |
|--------|---------|------------|------------|--------------|---------------|
| CILO 1 | •       | •          | •          | •            | 3             |
| CILO 2 | •       | •          | •          | •            | 9             |
| CILO 3 | •       | •          | •          | •            | 12            |
| CILO 4 | •       | •          | •          | •            | 3             |
| CILO 5 | •       | •          | •          | •            | 9             |
| CILO 6 | •       | •          | •          | •            | 3             |
| Total  |         |            |            |              | 39            |

Note: 2-hour lecture & 1-hour class work per week

## Assessment Tasks/Activities

*(Indicative of likely activities and tasks designed to assess how well the students achieve the CILOs. Final details will be provided to students in their first week of attendance in this course)*

| CILO No. | Type of Assessment Tasks/Activities                    | Weighting (if applicable) | Remarks |
|----------|--|---------------------------|---------|
| CILO 1   | Class-work , Assignments, Mini-project and examination |                           |         |
| CILO 2   | Class-work , Assignments, Mini-project and examination |                           |         |

|        |  |  |  |
|--------|--|--|--|
| CILO 3 | Class-work , Assignments, Mini-project and examination |  |  |
| CILO 4 | Class-work , Assignments, Mini-project and examination |  |  |
| CILO 5 | Class-work , Assignments, Mini-project and examination |  |  |
| CILO 6 | Class-work, Assignments and Mini-project               |  |  |

### Grading of Student Achievement:

Coursework: **60%**

Examination: **40%** (Duration of examination: two hours)

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, mini-project, group work 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 Grading of Student Achievement.

1. **Assignments** involve research into a topic of choice (within the brief) presented in one-A4 page written form (English) and presented to the class in a medium of choice. The scope is intended to assist in the research required for the mini-project.
2. **Mini-project** is a report on the outcome of a personal research project including data collection and analysis.
3. An **Examination** may consist of essay type questions and a quick question section.

|                              | Class work | Assignment | Mini-project | Examination | Weighting* |
|------------------------------|------------|------------|--------------|-------------|------------|
| <b>CILO 1</b>                | •          | •          | •            | •           | 3          |
| <b>CILO 2</b>                | •          | •          | •            | •           | 3          |
| <b>CILO 3</b>                | •          | •          | •            | •           | 3          |
| <b>CILO 4</b>                | •          | •          | •            | •           | 2          |
| <b>CILO 5</b>                | •          | •          | •            | •           | 2          |
| <b>CILO 6</b>                | •          | •          | •            | •           | 1          |
| <b>Assessment Percentage</b> | <b>14</b>  | <b>16</b>  | <b>30</b>    | <b>40</b>   |            |

\*Weightings are assigned to the CILOs according to their relative importance to the course (3 = most important).

## Part III

### Keyword Syllabus

- Building energy use and distribution
- Green building design and features: green roof/wall, shading devices, building thermal insulation, smart glass, solar films, daylight utilization, natural ventilation, hybrid systems, green living quality, phase change materials applications
- Contemporary problems: planning density, over-cooled indoor environment, screen-like building, urban heat island effects
- Environment assessment criteria: HKBEAM, BEAM-Plus, LEED rating system, OTTV regulations
- Advanced technological developments: advanced glazing systems, building integrated photovoltaic/thermal systems, LED lighting, zero-energy building features, Building energy management systems (BEMS)
- Building simulation tools

### Recommended Reading

#### Text(s)

A Handbook of Sustainable Building Design & Performance, eds. Mimovic & Santamouris, Earthscan 2009

ASHRAE Standard 90.1 (2007)

Buildings Department. Building (Energy Efficiency) Regulation (Cap. 123)

Buildings Department. OTTV Criteria and Calculation Notes (2000)

BEAM Society. BEAM2009NB: Building Environmental Assessment Method 2009 for New Buildings.

BEAM Society. BEAM2009EB: Building Environmental Assessment Method 2009 for Existing Buildings.

EMSD. Hong Kong Energy End-use Data (latest version)

EMSD. Performance-based Building Energy Code. (latest revision)

IEA – Energy Performance Certification of Buildings, A Policy Tool to Improve Energy Efficiency (Policy Pathways 2010)

### Online Resources

1. Hong Kong Government Architecture Services Department website:  
<http://www.archsd.gov.hk/>
2. Hong Kong Government Electrical & Mechanical Services Department website:  
<http://www.emsd.gov.hk/>
3. Sustainable Development Unit website: <http://www.susdev.gov.hk/html/en/index.htm>
4. US Department of Energy, EnergyPlus Energy Simulation Software website:  
<http://www.eere.energy.gov/buildings/energyplus>.