

**City University of Hong Kong
Course Syllabus**

**offered by Department of Architecture and Civil Engineering
with effect from Semester A 2023/24**

Part I Course Overview

| | |
|---|---|
| Course Title: | Renewable Energy for a Sustainable Building Performance |
| Course Code: | CA5250 |
| Course Duration: | 1 Semester (Some courses offered in Summer Term may start a few weeks earlier than the normal University schedule. Please check the teaching schedules with CLs before registering for the courses.) |
| Credit Units: | 3 |
| Level: | P5 |
| 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

The course aims to provide an overview of renewable energy resources available in Hong Kong and the recent developments in technology and government initiatives for utilizing renewable energy in modern buildings, and developing students' ability in formulating and assessing various renewable energy application strategies in buildings so as to achieve sustainability and energy efficiency.

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. | Identify various renewable energy resources and innovative technologies for modern building applications | | ✓ | | |
| 2. | Understand the effectiveness of using renewable energy in achieving sustainability and energy efficiency in buildings | | ✓ | | |
| 3. | Describe key building systems and elements for the utilization of passive and active renewable energy systems in buildings | | ✓ | | |
| 4. | Apply technological and statutory requirements in the design of active renewable energy systems in buildings | | ✓ | ✓ | |
| | | 100% | | | |

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 | |
| Lectures; seminars | Introduction and explanation of concepts, technologies, government policies and statutory requirements. | ✓ | ✓ | ✓ | ✓ | 2 |
| Tutorials; site visits | Further learning on concepts, systems and current practice through case studies and simple calculations on team work basis. | ✓ | ✓ | ✓ | ✓ | 1 |

| | |
|----------------------------------|---|
| Semester Hours: | 3 hours per week |
| Lecture/Tutorial/Laboratory Mix: | Lecture (2); Tutorial (1); Laboratory (0) |

4. Assessment Tasks/Activities

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

| Assessment Tasks / Activities | CILO No. | | | | Weighting | Remarks |
|--|----------|---|---|---|-----------|---------|
| | 1 | 2 | 3 | 4 | | |
| Continuous Assessment: 50% | | | | | | |
| Mid-term test | ✓ | ✓ | ✓ | ✓ | 25% | |
| Assignment | | ✓ | ✓ | ✓ | 25% | |
| Examination: 50% (duration: 2 hour(s)) | | | | | | |
| Examination | ✓ | ✓ | ✓ | ✓ | 50% | |
| | | | | | 100% | |

To pass a course, a student must obtain minimum marks of 30% in both coursework and examination components, and an overall mark of at least 40%

5. Assessment Rubrics

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

Applicable to students admitted in Semester A 2022/23 and thereafter

| Assessment Task | Criterion | Excellent (A+, A, A-) | Good (B+, B) | Marginal (B-, C+, C) | Failure (F) |
|-----------------|--|-----------------------|--------------|----------------------|-----------------------------------|
| Mid-term test | 1. ABILITY to RECOGNIZE and EXPLAIN the key concepts, mechanisms, and concerns of the integrated renewable energy systems of the building | High | Significant | Basic | Not even reaching marginal levels |
| Assignment | 1. CAPACITY to INQUIRE and ANALYSE the issues and relevant information and references with respect to given scenarios and context. 2. ABILITY to PRODUCE and ARTICULATE rational, substantiated and original discussion and/or suggestion | High | Significant | Basic | Not even reaching marginal levels |
| Examination | 1. ABILITY to EXPLAIN and DISCUSS the key concepts, mechanisms, framework and concerns of the integrated renewable energy systems of the building | High | Significant | Basic | Not even reaching marginal levels |

Applicable to students admitted before Semester A 2022/23

| Assessment Task | Criterion | Excellent (A+, A, A-) | Good (B+, B, B-) | Fair (C+, C, C-) | Marginal (D)/ Pass (P) on P/F basis | Failure (F) |
|-----------------|--|-----------------------|------------------|------------------|-------------------------------------|-----------------------------------|
| Mid-term test | 1. ABILITY to RECOGNIZE and EXPLAIN the key concepts, mechanisms, and concerns of the integrated renewable energy systems of the building | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| Assignment | 1. CAPACITY to INQUIRE and ANALYSE the issues and relevant information and references with respect to given scenarios and context. 2. ABILITY to PRODUCE and ARTICULATE rational, substantiated and original discussion and/or suggestion | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| Examination | 1. ABILITY to EXPLAIN and DISCUSS the key concepts, mechanisms, framework and concerns of the integrated renewable energy systems of the building | High | Significant | Moderate | Basic | Not even reaching marginal levels |

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.)

Wind turbine, photovoltaic, energy from waste, solar heating, passive system, active system, natural lighting, passive ventilation, solar air-conditioning and refrigeration, hybrid photovoltaic/thermal (PV/T) system, grid connection, energy storage, fuel cell, electric vehicle, feed-in-tariff scheme, government policies and statutory requirements, building sustainability and energy efficiency.

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. | Nil |
|----|-----|

2.2 Additional Readings

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

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|-----|--|
| 1. | Trubiano, Franca. Design and construction of high-performance homes : building envelopes, renewable energies and integrated practice. (TH4860 .D47 2013) |
| 2. | Office of the Chief Secretary for Administration, A First Sustainable Development Strategy for Hong Kong. 2005. |
| 3. | http://www.epd.gov.hk/epd/sites/default/files/epd/english/environmentinhk/waste/prob_solutions/files/1stSDStrategyE.pdf . |
| 4. | Hong Kong's Climate Action Plan 2050, (2021) HKSAR Government. |
| 5. | https://www.climate-ready.gov.hk/files/pdf/CAP2050_booklet_en.pdf |
| 6. | Chartered Institution of Building Services Engineers. Renewable energy sources for buildings. (TH6021 .T42 no.38) |
| 7. | Hong Kong Renewable Energy Net, Electrical & Mechanical Services Department, |
| 8. | https://re.emsd.gov.hk/english/index.html |
| 9. | Guidance Notes for Solar Photovoltaic (PV) System Installation (Latest Edition), Electrical & Mechanical Services Department, |
| 10. | https://re.emsd.gov.hk/english/files/PVGuidanceNotes.pdf |
| 11. | The Handbook on Design, Operation and Maintenance of Solar Water Heating System (Latest Edition), Electrical & Mechanical Services Department, |
| 12. | https://re.emsd.gov.hk/files/2_Handbook_on_Design_O&M_of_Solar_Water_Heating.pdf |
| 13. | The Handbook on Design, Operation and Maintenance of Solar Photovoltaic System (Latest Edition), Electrical & Mechanical Services Department, |
| 14. | https://re.emsd.gov.hk/files/1_Handbook_on_Design_O&M_of_Solar_PV.pdf |
| 15. | Sample Specification for Installation of Grid-Connected Solar Photovoltaic System (Latest Edition), Electrical & Mechanical Services Department https://re.emsd.gov.hk/files/Sample_Specification_for_Installation_of_Grid-Connected_Solar_Photovoltaic_System.pdf |

16. Technical Guidelines on Grid Connection of Renewable Energy Power Systems (Latest Edition),
Electrical & Mechanical Services Department,
https://re.emsd.gov.hk/english/fit/tec_gui/grid_tech.html