**City University of Hong Kong**
**Course Syllabus**

**offered by School of Energy and Environment**
**with effect from Semester A 2022 / 23**

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## Part I Course Overview

| | |
|---|---|
| **Course Title:** | Energy Generation and Storage Systems |
| **Course Code**: | SEE8111 |
| **Course Duration:** | One semester |
| **Credit Units**: | 3 |
| **Level**: | R8 |
| **Medium of Instruction:** | English |
| **Medium of Assessment:** | English |
| **Prerequisites**: | Nil |
| **Precursors**: | Nil |
| **Equivalent Courses**: | SEE6101 Energy Generation and Storage Systems |
| **Exclusive Courses**: | Nil |

## Part II Course Details

### 1. Abstract

*This course is mainly related to energy supply and storage system that are commonly used in our society. Operation principles of basic energy generation and storage systems, their advantages, and major drawbacks will be taught in the course. Non-conventional energy and renewable energy will be introduced as means of sustainable development.*

### 2. Course Intended Learning Outcomes (CILOs)

| No. | CILOs | Weighting* (if applicable) | Discovery-enriched curriculum related learning outcomes (please tick where appropriate) | | |
|---|---|---|---|---|---|
| | | | *A1* | *A2* | *A3* |
| 1. | Analyze the supply and demand of fuel in the world. | 10 | | √ | |
| 2. | Describe the pros and cons of conventional energy sources | 20 | √ | √ | |
| 3. | Describe and compare the operation principle and environmental impacts of a coal-fired power plant with a nuclear power plant | 20 | | √ | |
| 4. | Identify the different sources of renewable energy and innovative technologies in harnessing energy from these renewable sources | 40 | √ | √ | |
| 5. | Describe and compare different energy storage technologies | 10 | | √ | |
| | | 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)

| TLA | Brief Description | CILO No. | | | | | Hours/week (if applicable) |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | |
| Lecture | Explain key concepts, such as theories related to energy generation and storage | √ | √ | √ | √ | √ | 2.5 hrs/wk |
| Tutorial, class demo | Solidify students' concepts with practice | √ | √ | √ | √ | √ | 0.5 hr/wk |

## 4. Assessment Tasks/Activities (ATs)

| Assessment Tasks/Activities | CILO No. | | | | | Weighting* | Remarks |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | | |
| Continuous Assessment: _60___% | | | | | | | |
| In-class test | √ | √ | √ | √ | √ | 20% | |
| Assignment | √ | √ | √ | √ | √ | 40% | |
| Examination: _40___% (duration: 2 hours , if applicable) | | | | | | | |
| | | | | | | 100% | |

## 5. Assessment 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) |
|---|---|---|---|---|---|
| 1. In-class test | Ability to analyse and solve practical problems related to energy supply and power plant | High | Significant | Moderate | Not even reaching marginal levels |
| 2. Assignment | Ability to analyse and solve questions related to energy generation and storage | High | Significant | Moderate | Not even reaching marginal levels |
| 3. Final exam | Ability to analyse and solve practical problems related to energy generation and storage | High | Significant | Moderate | 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) | Failure (F) |
|---|---|---|---|---|---|---|
| 1. In-class test | Ability to analyse and solve practical problems related to energy supply and power plant | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| 2. Assignment | Ability to analyse and solve questions related to energy generation and storage | High | Significant | Moderate | Basic | Not even reaching marginal levels |
| 3. Final exam | Ability to analyse and solve practical problems related to energy generation and storage | 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

Fuel availability; fossil fuels; conventional and non-conventional energy systems; biomass; combustion; steam cycle; pulverized coal fired power plant, nuclear power plant; generator; emission control; principles of renewable energy such as solar, wind, hydro, tidal and wave; energy storage systems.

## 2. Reading List

### 2.1 Compulsory Readings

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|---|---|
| 1. | Energy Science, Principles, Technologies, and Impacts, John Andrews and Nick Jelley, Oxford University Press, 2nd edition, 2013, |

### 2.2 Additional Readings

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|---|---|
| 1. | Alternative Energy Systems and Applications, B. K. Hodge, John Wiley and Sons, 2010. |
| 2. | Energy and Climate: How to achieve a successful energy transition, Alexandre Rojey, Wiley, 2009. |
| 3. | Renewable Energy. Boyle G. Oxford University Press, 2012. |
| 4. | Energy for a Sustainable World, Nicola Armaroli, Vincenzo Balzani, Wiley-VCH, 2011. |
| 5. | The World Scientific Handbook of Energy, Gerard M. Crawley, World Scientific, 2013. |
| 6. | Principles of Sustainable Energy, Frank Kreith, Jan F. Kreider, CRC Press, 2011. |
| 7. | Nuclear Energy: what everyone needs to know, Charles D. Ferguson. Oxford University Press, 2011. |
| 8. | Introduction to Wind Energy Systems. Basics, technology and operation. Hermann-Josef Wagner, Jyotirmay Mathur, Springer 2013. |
| 9. | Geothermal Energy: renewable energy and the environment, William E. Glassley, CRC Press, 2010. |
| 10. | Solar Energy Fundamentals. Robert K. McMordie, Fairmont Press, 2012. |
| 11. | Electrochemical Technologies for Energy Storage and Conversion, Ru-Shi Liu et al. Wiley-VCH, 2012. |
| 12. | US Department of Energy - http://www.energy.gov/<br>Renewable Energy Association - http://www.r-e-a.net/<br>National Hydrogen Association - http://www.hydrogenassociation.org/<br>EMSD website: http://www.emsd.gov.hk/ |