Course Syllabus

offered by School of Energy and Environment
with effect from Semester A 2015 /16

Part I Course Overview

Course Title:	Energy Generation and Storage Systems
Course Code:	SEE8111
Course Duration:	One semester
Credit Units:	3
Level:	R8
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)*	SEE6101 Energy Generation and Storage Systems
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

(A 150-word description about the course)

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)

(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.	Analyze the supply and demand of fuel in the world.	10		√	
2.	Discover 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		√	
** If weighting is assigned to CILOs, they should add up to 100%.*		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 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)

(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: _50___%							
In-class test	√	√	√	√		25%	
Assignment	√	√	√	√	√	25%	
Examination: _50___% (duration: 2 hours , if applicable)							
** The weightings should add up to 100%.*						100%	

Examination duration: 2 hrs
Percentage of coursework, examination, etc.: 50% by coursework; 50% by exam

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 Grading of Student Achievement.

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-)	Adequate (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 evaluate and analyse 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

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

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

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

2.2 Additional Readings

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

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/ Renewable Energy Association - http://www.r-e-a.net/ National Hydrogen Association - http://www.hydrogenassociation.org/ EMSD website: http://www.emsd.gov.hk/

Explanatory Notes

1. Course Title

Full title of the course.

2. Course Code

Courses other than Gateway Education Courses

An alphanumeric code normally using the department code as a prefix, followed by 4-5 digits, where the first digit indicates the level of the course.

For example, the course "Operating Systems" may have a course code of "CS5001". "CS" is the department code for the Department of Computer Science. "5" after the department code is the level of the course, and in this case the course is at the level of P5, and "001" is the sequence number assigned to the course.

Gateway Education Courses

An alphanumeric code using "GE" as a prefix, followed by 4 digits, where the first digit indicates the level of the course and the second digit indicates the area.

For example, the course "Accounting in Everyday Life" will have a course code of "GE1222". "1" is the level of the course, and the digit that follows is the GE area. In this case, the course is at the level of B1 and falling into Area 2. The last 2 digits "22" is the sequence number assigned to the course.

3. Course Duration

This refers to the duration of the course in terms of number of weeks or semesters.

4. Credit Units

Number of credit units assigned to the course, with 1 credit unit earned by approximately forty to fifty hours of student work.

5. Level

The level of a course shows its degree of academic difficulty. The following levels should be used:

Associate Degree courses can have levels of A1 or A2;
Bachelor's Degree courses can have levels of B1, B2, B3 or B4;
Taught postgraduate courses can have levels of P5 or P6; and
Professional Doctorate and Research Degree courses can have levels of D8 and R8 respectively.

6. Proposed Area

This section applies to Gateway Education courses only. Insert "1" for the single primary area, and "2" for the secondary area if applicable. Students will only earn credit units from the primary area.

7. Medium of Instruction and Assessment

Unless otherwise determined by Senate for a specific course, the medium of instruction and assessment at the University is English.

8. Prerequisites

Courses that students must pass before being allowed to take the current course. A rigid structure of prerequisites may unintentionally hinder a student's progress and limit flexibility in the choice of courses. Furthermore, the timing of the availability of the prerequisite courses as well as the current course would be critical. Departments should therefore be careful when defining extensive prerequisites for courses.

9. Precursors

Courses that students are advised to take and pass before they attempt the current course. In general, precursors are more flexible in allowing student choice and progression. They also serve as indicators of the requirements of the current course.

10. Equivalent Courses

Courses of same level where there is sufficient overlap in content that students may register in the course to meet degree/programme requirements, to recover a failure or to improve a course grade.

11. Exclusive Courses

These are courses which have sufficient overlap in their content to make it inappropriate for students to earn credit units for more than one of these courses. Students thus should not be allowed to enrol in them.

12. Abstract

The abstract is a short description about the course.

13. Course Intended Learning Outcomes (CILOs)

CILOs state what the student is expected to be able to do at the end of a course according to a given standard of performance. Outcomes should be achievable and assessable. They should be clear to students on the learning outcomes expected at the end of the course and also clear to staff to enable them to design appropriate teaching and learning activities (TLAs) and assessment tasks which facilitate the achievement of CILOs. It is important to ensure that Course ILOs address Programme/Major ILOs. Use verbs from the SOLO Taxonomy in defining Learning Outcomes. The Programme/Major leader has the responsibility to ensure and can demonstrate a proper mapping between the CILOs with the Programme/Major and/or Minor Intended Learning Outcomes.

Weightings can be assigned to CILOs according to their relative importance to the course.

14. Teaching and Learning Activities (TLAs)

TLAs are designed to align with CILOs to facilitate student's achievement of those outcomes. TLAs could be teacher, peer, or self-initiated and take various formats such as project work, case studies, lectures, tutorials, practicals, placements, problem-based learning, studio, etc. The choice of TLAs should facilitate active learning and the achievement of CILOs. Some TLAs may address more than one CILO.

15. Assessment Tasks/Activities

Assessment tasks or activities are designed to align with the CILOs to provide evidence on how well each student has achieved the CILOs. Such evidence could be provided by project work, case studies, assignments, examinations, laboratory work and reports, practicals, practicum, etc. The choice of Assessment Tasks should relate directly to the learning outcomes of the course. "Remarks" could include information such as when a task is to be performed, due dates, word limit of the assessment tasks/activities, assessed on a Pass/Fail basis, etc., as applicable.

16. Assessment Rubrics

Grading of student achievements is based on student performance in assessment tasks/activities with the rubrics defined and be in accordance with the Academic Regulations for Associate Degrees, Bachelor's Degrees, Postgraduate Degrees, Professional Doctorate and Research Degrees, where appropriate. Information on grading of courses can be found at the end of the explanatory notes.

17. Notes for Dissertation-type Courses

Courses may be designated "dissertation-type" courses in the course catalogue. Dissertation-type courses relate to independent work which takes a variable time to complete. Sections of "Teaching and Learning Activities" and "Assessment Tasks/Activities" should be replaced with information relevant to such courses, including a specification of a ***normal duration*** for course registration and a ***maximum duration*** for course registration, both in terms of the number of semesters. In all cases, the Course Syllabus for dissertation-type courses should specify that students are not permitted to repeat a dissertation-type course.

18. Keyword Syllabus

An indication of the key topics of the course. It is provided to let students make informed decisions of whether to take the course. Variations from the indicative topics would be identified in the teaching plan.

19. Amendments/Revisions to Course Syllabus

Amendments or revisions to the information provided in the Course Syllabus are subject to the procedures outlined in the University's QA Principles, Policies and Practices. College and School Boards should consider delegation of authority to Programme Committees, College/School Validation and Monitoring Committees, academic units (in particular for Part III where updates are expected to be quite frequent), as necessary to facilitate innovation and change as appropriate.

Grading of Courses

- Courses are graded according to the following schedule:

Letter Grade	Grade Point	Grade Definitions	
A+ A A-	4.3 4.0 3.7	Excellent	Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.
B+ B B-	3.3 3.0 2.7	Good	Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.
C+ C C-	2.3 2.0 1.7	Adequate	Student who is profiting from the university experience; understanding of the subject; ability to develop solutions to simple problems in the material.
D	1.0	Marginal	Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.
F	0.0	Failure	Little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited, or irrelevant use of literature.
P		Pass	"Pass" in a pass-fail course. Courses to be graded on a pass-fail basis for a programme are specifically identified under the programme in the course catalogue.
Operational Grades			
IP	In Progress	An IP grade is shown where students will register for the same course in subsequent semesters to complete the assessment of the course.	
I	Incomplete	A grade of incomplete may be granted (1) where there are extenuating circumstances that have prevented a student from completing required work, or attending the examination; (2) at the discretion of the Assessment Panel. Where an "I" grade is assigned, the Assessment Panel will approve a schedule for the completion of work, or a supplementary examination. An alternative grade should be assigned no later than four weeks after the “I” grade is first reported or as soon as practicable thereafter.	
S	Dissertation Submitted	In a dissertation-type course, an S grade is assigned by the Course Leader when a student's dissertation has been submitted for assessment.	

TR	Credit Transfer	Assigned when a student is granted transferred credit units for the course.
Z	Exemption	Assigned when a student is exempted from the course.
AU	Audit	An audited grade is assigned when an auditing student has completed the conditions established at registration as an auditor. No assessment is made or grade awarded for auditing.
X	Late Drop	Assigned when a student is permitted to drop the course after the add/drop deadline.
WD	Withdrawn	Assigned when a student has registered for the course in a semester/term and subsequently submitted a notification of withdrawal from the University.

- Students assigned a grade of D or better, or a Pass grade in a pass-fail course, earn credit units for the course. Grades of F, IP, I, S, Z, AU, X and WD do not earn credit units.

- A grade with an asterisk (e.g. B+*) is excluded from the calculation of the GPA. The credits earned will not be counted toward the minimum credit requirement for graduation but will be counted toward the maximum number of credit units permitted.

- Grades of P, IP, I, S, TR, Z, AU, X and WD are not counted in the calculation of a student's CGPA. Grades of F are counted, unless the fail is recovered under the section of "Repeating Courses to Improve Grades" in Academic Regulations.

- Grades of P, IP, I, S, TR, Z, AU, X and WD are not counted in the calculation of a student's SGPA.