Subject Description Form

Subject Code	ABCT1D11D
Subject Title	Life without Fossil Fuel
Credit Value	3
Level	1
~~Pre-requisite /~~ ~~Co-requisite/~~ Exclusion	ABCT1D11
Objectives	To provide an introduction of the social and technological view of the present fossil fuel based energy system and the alternative renewable energy technologies. The main objective is to provide students with an overview on the advantages and disadvantages of each technology and the political obstacles to this transition so that they can develop a critical thinking in identifying their own points of view towards this ongoing challenge.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) Identify the causes and consequences of energy crisis and the advantages and disadvantages of the latest forms of renewable energy. (b) Identify how the policy affects the introduction of renewable energy to replace fossil fuel. (c) Integrate the above information and make critical judgment to raise the awareness in fossil fuel usage and promote the use of renewable energy. (d) Read with greater comprehension on scientific materials. (e) Apply the scientific evidence based method in problem solving new problems though researching with literature review. (f) Be a better team player in small working group.
Subject Synopsis/ Indicative Syllabus	**1. Introduction to the present scenario (1 hour)** a. Latest statistics on fossil fuel reserve b. Global warming c. Energy generation related pollution **2. Renewable energy technology (12 hours)** a. Wind energy b. Hydro and Tidal energy c. Geothermal energy d. Solar energy e. Biomass energy **3. The need of energy storage (2 hours)** a. Intermittence of renewable energy b. Mechanical energy storage c. Massive electrochemical storage d. Hydrogen as an energy carrier e. Other organic compounds as energy carrier **4. Present Policy on renewable energy (1hour)** a. Kyoto Protocol b. Copenhagen Climate Change Conference c. Energy security d. Hong Kong policy on renewable energy

Teaching/Learning Methodology	Lectures: Lectures are the main channel for delivering fundamental information to students in this course. In order to facilitate them to learn more effectively, a few key points will be given to students before each lecture to induce them to look for unclear concepts or questions beforehand. They are encouraged to try to solve their problems by referring to relevance reference materials so as to aroused self-learning habit and be better prepared for the lectures. A year end quiz will be arranged at the end of the semester. Tutorials: Students will form groups of four to six students to discuss and share their views on a selected topic concerning the lectures. They are required to submit individual short tutorial reports on their views on these questions after each tutorial. Students will also be given the chance to raise questions concerning the lectures to increase interaction between the lecturer and the students. Also, the lecturer can access how well the students can follow to see if further explanation is needed. A presentation will be organized at the end of the course on their views on solution to the energy crisis for different countries during the tutorial class. They are also required to submit a written report after the presentation. Self-study: Students are advised to spend three to four hours per lecture hour on reading the suggested reading materials to familiarize themselves with reading scientific literatures and the content. In order to enhance the self-study efficiency, students are required to share their views on these materials during the tutorials so that they can learn from each other on the extraction of important information and interpretation of this information. Through this practice, the students can improve their comprehension skills as well as the organization and presentation skills. Literacy: The students will be provided with reading materials and extracts from selected news beforehand in helping them to prepare their lectures. With suitable highlight questions and guidelines provided, the students will be guided to read more effectively. With the training of identifying key ideas and figures on a quick scan, the student will be able to read scientific writing at a higher speed. As the students are required to discuss their findings with classmates during the tutorial class and hand in a short tutorial report afterwards, their communication skills and writing skills will also be enhanced. [Outcomes (a), (b), (c) and (d)] Higher order thinking: The introduction of the present energy system and the available renewable energy technologies will help the students to admire how the science work in this area and initiate them to compare the strength and weakness of different technologies. As there is no simple solution available, the students are required to identify the critical factors and integrate them into their own solution model towards the energy crisis as the conclusion of their group presentation. Upon the completion of this course, they will govern the way of critical thinking and make independent judgment based on scientific evidence. [Outcomes (a), (b), (c), (d) and (e)] Life-long learning: To serve as a general subject for students with various backgrounds, this course is designed to cover a broad area with only essential information to stimulate their interests towards the sustainable future. This opens the gate to pursuit of their own views on how to achieve a sustainable future with the green energy.

	Upon the completion of this course, the students are equipped with a set of transferable tools including comprehensive reading skill for scientific literature, critical thinking and making judgment with evidence, which enable them to solve other academic or even career problems in the future. As students are required to participate in a group discussion to express their views on the solution to energy crisis and come up with a group decision for their presentation, they ought to be a better team player which is a lifelong transferable skill. [Outcomes (c), (d), (e) and (f)]

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	f
1. Quiz	50	✓	✓	✓	✓	✓	
2. Tutorial participation	10	✓	✓	✓	✓	✓	✓
3. Presentation	20	✓	✓	✓	✓	✓	✓
4. Report	20	✓	✓	✓	✓	✓	✓
Total	100 %						

Student Study Effort Required

Class contact:	
▪ Lecture	16 Hrs.
▪ Tutorial and presentation	23 Hrs.
Other student study effort:	
▪ Preparation on presentation	16 Hrs.
▪ Self-study	45 to 70 Hrs.
Total student study effort	100-125 Hrs.

Reading List and References

Please indicate clearly in this section if the subject should have an "R" designation. If so, subject proposers should also indicate clearly which items on the Reading List constitute the expected reading requirement and include the page numbers.

Required reading :

1. Roland Wengenmayr and Thomas Bührke, "*Renewable energy sustainable concepts for the energy change*", Weinheim : Wiley-VCH, 2nd edition, 2013.
2. Christian Ngô and Joseph B. Natowitz, "*Our energy future : resources, alternatives, and the environment*", J. Wiley & Sons, 2nd edition, 2016.
3. Selected news articles, journals and web content concerning the course content.

Additional reading:

1. Martin Kaltschmitt , Wolfgang Streicher and Andreas Wiese, "*Renewable Energy Technology, and Environment Economics*", Springer Berlin Heidelberg, 2007 [available online]
2. Frano Barbir and Sergio Ulgiati, "*Sustainable Energy Production and Consumption Benefits, Strategies and Environmental Costing*", Springer Netherlands, 2008. [available online]

	3. Benjamin K. Sovacool and Marilyn A. Brown, "*Energy and American Society – Thirteen Myths*", Springer, 2007. [available online] 4. David Elliott, "*Sustainable Energy Opportunities and Limitations*", Palgrave Macmillan, 2007. 5. International Energy Agency, "*Energy Security and Climate Policy – Assessing Interactions"*, IEA/OECD, Paris, France, 2007. 6. International Energy Agency, "*Act Locally, Trade Globally – Emissions Trading for Climate Policy*", IEA/OECD, Paris, France, 2005. 7. HK RE NET, http://re.emsd.gov.hk/eindex.html, Electrical and Mechanical Services Department, HKSAR Government. 8. Energy Sources, http://www.energy.gov/energysources/, Department of Energy, U. S. Government. **9.** Re-Energy.ca, http://www.re-energy.ca/, The Pembina Institute. **10.** "The Paris Agreement" , https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement