

## **SOSC 2170 Environment, Sustainability and Business: A Design Approach**

**Instructor: Jerry PATCHELL**, [sopatch@ust.hk](mailto:sopatch@ust.hk)  
Office Hours: Wed. 12-2:00; Room 2354

**TA: Stephen CHOY**, [choyho@ust.hk](mailto:choyho@ust.hk)  
Office Hours: 11am to 12:30pm Wed and Friday; Room 3005

Wednesdays and Fridays 3:00-4:20 Room: 2504

The environmental crisis is a design challenge. Until recently the goods and services made by business did not take into account the impact they would have on the environment. Times have changed, businesses face market and regulatory pressures to take on their environmental responsibilities. Now products must be designed to reduce or eliminate impacts to the environment when being made, used, and no longer of use.

Every product is part of a system that has diverse environmental impacts throughout its lifecycle. We have to understand these impacts and how they can be eliminated while still retaining the functions of the product. To design for the environment, you have to integrate different technologies and practices into the product system; a company has to integrate different activities and talents; and the product has to be integrated into the natural and socio-economic environment. Design for the environment is more than technological challenge, it is a management and political challenge.

- The first part of the course looks at the forces compelling companies to respond to environmental needs. We review the main environmental problems, and then investigate how society, politics, economics and technology shape the responses of companies to those environmental problems.
- The second part (and core) of the course introduces the concepts and practices of lifecycle analysis (LCA), design for environment (DfE) and industrial ecology (IE). Lifecycle analysis reveals the full breadth of a product's environmental impacts upstream and downstream in the value chain. Design for environment uses LCA to reduce or eliminate a product's environmental impacts throughout the value chain. Industrial ecology describes the technological and socio-economic system that DfE must adapt to and transform.
- The final third of course introduces you to the practices companies use to put design for the environment and industrial ecology into practice. These include environmental reviews, environmental management systems, total cost accounting, green purchasing, green marketing, and reverse logistics.

### **INTENDED LEARNING OUTCOMES**

By the end of the course, students should be able to

- Explain the environmental challenges confronting business including global warming, biodiversity destruction, health impacts, etc.;
- Develop a corporate sustainability strategy based on product design;
- Analyze a product's environmental impacts through the use of environmental lifecycle analysis;
- Design a product strategy to reduce environmental impacts through the lifecycle;
- Implement design requirements throughout the different functions of a company;
- Critique alternative design strategies.

### **EVALUATION SYSTEM**

The course is designed so that you can learn the most powerful way a company can improve its environmental performance, that is, by changing the design of its product systems. Thus, most of the evaluation focuses on a project for designing a new product for a *real* company (see attached outline). We take the first steps in class using a few assignments that ensure you understand the environmental challenges facing businesses and that lead you into the project. The project can be done as a group or as an individual. It consists of written project and presentation, both done as a group/individual. Then, each group member individually chooses three business activities to modify to ensure the implementation of the design. A peer assessment will be conducted at the end of the course to ensure group cooperation and mutual effort.

- 30 % Assignments
- 10 % Design for Environment proposal
- 15 % Presentation of your Design for Environment. *Presentations are evaluated by classmates* (marks will be deducted for not attending and evaluating classmates).
- 35 % Final report
- 5 % Peer assessment
- 5 % Attendance and participation

### **ACADEMIC INTEGRITY**

You come to university to learn how to think and use information creatively. To do so you are exposed to and search out new ideas, theories, and practices. You learn how to use them to create your own ideas, to argue their importance, and see them put into action. If you do so you will greatly enhance your career, enhance your relationships, live a more interesting life, drive a Tesla etc.

Simply copying other people's work or ideas (usually called cheating) doesn't help you develop creativity. In this course, you will extend other peoples' ideas, learn how to use them for your own purposes and generate your own ideas. Cheating shouldn't be an issue. If it is, the University (therefore 'yours truly') must deal with you harshly (see: <http://www.ust.hk/vpaa/integrity/>).

### **INFORMATION SOURCES**

Most of what you need to know for this course is in “The Green to Gold Handbook.” It is a text on corporate environmental management and takes you from environmental problems to corporate strategy and is particularly strong on business functions. This book and an earlier version are accessible as e-books from the library. I will also be providing more depth on areas of environmental problems, sustainability, governance, lifecycle analysis, design for environment and particularly a company’s challenge of ensuring that its DfE intention is realized in practice. The key perspectives on DfE used in this course are from McDonough and Braungart’s Cradle to Cradle. Their ideas have been widely adopted, for example, by Autodesk, whose website we will use. To discuss industrial ecology, we use Graedel and Allenby’s books. These books are on reserve.

**Corporate Environmental Management (Library Electronic Books)**

Esty, Daniel and P.J. Simmons 2011 *The Green to Gold Business Playbook*. Hoboken N.J.: Wiley

Esty, Daniel and Andrew Winston 2006 *Green to Gold*. Hoboken N.J.: Wiley

**Industrial Ecology References On Reserve:**

Graedel T.E. and B.R. Allenby (2003). *Industrial Ecology 2<sup>nd</sup> Edition*. Upper Saddle River: Prentice Hall.

Allenby, Braden (1999). *Industrial Ecology: policy framework and implementation 1<sup>st</sup> Edition*. Upper Saddle River: Prentice Hall.

**Design for Environment References on Reserve**

Fiskel, Joseph R. 2009 *Design for Environment*. New York: McGraw-Hill.

Natrass, Brian F and Mary Altomare 2002. *Dancing with the tiger: learning sustainability step by natural step*. Gabriola Island, B.C.: New Society Publishers.

McDonough, William and Michael Braungart 2002. *Cradle to cradle: remaking the way we make things*. New York: North Point Press.

Fussler, Claude 1996. *Driving eco-innovation: a breakthrough discipline for innovation and sustainability*. London: Pitman Publishing.

## Schedule

<b>Time Period</b>	<b>Topic</b>	<b>Readings</b>
Weeks 1-4	Sustainability and Strategy -Why and how corporations respond to demands for environmental sustainability	<i>Green to Gold Business Playbook</i> : Chapters 1-5, especially Ch. 5.
Weeks 5-8	Lifecycle analysis (LCA), Design for Environment (DfE), Industrial Ecology (IE) - Analyzing the full impacts of products, designing impacts out of them and ensure the design fits into real life situations.	<i>Green to Gold Business Playbook</i> : Chapters 6, 7 and 11. <i>Industrial Ecology 1<sup>st</sup> Edition</i> : Chapter 4 <i>Industrial Ecology 2<sup>nd</sup> Edition</i> for further information
Weeks 9-10	Realizing design through corporate functions - Applying environmental management techniques used by different corporate functions to ensure DfE intent is realized.	<i>Green to Gold Business Playbook</i> : Chapters 8-21.
Weeks 11-13	DfE presentations and submission - Explain to class how your design will reduce impacts through whole lifecycle; submit annotated ppt to instructor on soft copy.	

## **SOSC 2170 ENVIRONMENT AND BUSINESS PROJECT OUTLINE**

Objective: learn the value of lifecycle thinking and design for the environment.

Means: choose a company and redesign one of its products to integrate into an industrial ecology.

People: the project can be done either as a group (max 4) or as an individual.

**Presentation in weeks 11-13; Project submission one week afterward to CANVAS.**

### **Group Presentation**

- 1) Define your product and explain relationship to corporate strategy
- 2) Propose a new design for a product and explain how it will reduce impacts throughout the product cycle.
- 3) Explain the interdependencies among the different stages of product cycle created by your DfE project.
- 4) Explain how your product will fit into and change its industrial ecology and the incentives that link each stage of the value cycle.

### **Final Report**

- 1) Include material from presentation, with amendments and expansion.
- 2) In addition, explain how corporate activities support the DfE project (e.g. production, accounting, purchasing, marketing, logistics, public relations) and explain the interrelations among them.