Natural Capitalism for Engineers

Critical Literacies for Engineers in Sustainability

Syllabus Overview

Maymester 2005, MTWRF from 12:15-3:30 from 05/09/05-05/26/05

Instructors: Hunter Lovins and Charlie Hargroves

Email: hlovins@natcapgroup.org, charlie@naturaledgeproject.net

Course Description:

The engineering profession will play a significant part in moving society to a more sustainable way of life. It is critically important to provide all engineers, regardless of their discipline, with a basic understanding of sustainability issues and opportunities to fulfill this role in society. The *Natural Capitalism for Engineers: Critical Literacies for Engineers in Sustainability* course is designed to deliver the first principles of a range of key bodies of work, or 'critical literacies', relating to sustainability and engineering. This introductory module is intended to compliment other student studies as an alert to sustainability principles and activity in the engineering profession.

In the study of an introductory course, it is a challenge to cover all possible questions or uncertainties that may arise during delivery of the material. In response to this challenge, this course was developed to be supported by material in the publications, *Natural Capitalism* and *The Natural Advantage of Nations*. It is recommended that where students require additional information or justification of content presented in the course, they read the chapter of the relevant publications that corresponds to the associated unit.

The course is based on how to use the principles of 'Natural Capitalism' and 'Sustainable Development' to achieve sustainable engineering solutions. It reviews the major frameworks that give the scientific foundations of sustainability. This concept has evolved in recent history and is supported by engineering case studies and related material. The goal is to help students understand the central tenets of sustainable development.

Course Learning Objectives:

- Gain a basic environmental and sustainability literacy and understand the national and international context in which sustainable engineering is conducted.
- Gain an introductory understanding of the first principles of sustainable engineering and be exposed to best practices from around the world in delivering genuinely sustainable engineering outcomes.
- Develop skill in critical thinking to assess the quality of information and its importance for decision-making, and demonstrate the ability to write concise summaries on various aspects of sustainability.
- Demonstrate the ability to make professional quality presentations based on material presented in the course.

Course outline:

Class 1: Introduction and course overview
Class 2: Natural Capitalism for Engineers
Class 3: A New Perspective
Class 4: Learning the Language
Class 5: Preparing to 'Walk the Talk'
Class 6: Profitable Greenhouse Solutions
Class 7: Greening of Industry
Class 8: Greening the Built Environment
Class 9: Sustainable Urban Transport
Class 10: Water: Nature's Gold
Class 11: Achieving 'Zero Waste'
Class 12: Class Presentations
Class 13: Class Presentations
Class 14: Wrap-Up Session

Required Texts:

The course material will be based on the following publications:

Hargroves, K and Smith, M (2004) *The Natural Advantage of Nations: Business Opportunities, Innovation and Governance in the 21st Century*, Earthscan, London.

Hawken, P., Lovins, A. and Lovins, H. (1999) Natural Capitalism: Creating the Next Industrial Revolution, Little, Brown & Co. Boston.

Pre-course reading will also include:

AtKisson, A (1999) *Believing Cassandra, An Optimist looks at a Pessimist's World*, Chelsea Green, Publishing Co., White River Junction, VT

Benyus, J (1997) *Biomimicry: Innovations Inspired by Nature*, William Morrow, New York

Lovins, H and Link, W (2002) *Insurmountable Opportunities?: Steps and Barriers to Implementing Sustainable Development*, Comments to the UN Regional Roundtable for Europe and North America, Vail, CO

Womack, J and Jones, D (1996) *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*, Touchstone & Design, New York City

Additional texts used in the course will be:

Anastas, P, Heine, L, Williamson, T and Bartlett, L (2000) *Green Engineering*, American Chemical Society, November

Birkeland, J (2002) *Design for Sustainability: A Sourcebook of Integrated Eco-Logical Solutions*, Earthscan, London

Lovins, A and Lovins, H (1997) *Climate: Making Sense and Making Money*, Rocky Mountain Institute, CO

McDonough, W and Braungart, M (2002) *Cradle to Cradle: Remaking the Way We Make Things*, North Point Press, San Francisco, CA

Mendler, F and Odell, W (2000) *The HOK Guidebook to Sustainable Design*, John Wiley & Sons, Inc Indianapolis, IN

Von Weizsäcker, E, Lovins, A and Lovins, H (1997) *Factor Four: Doubling Wealth, Halving Resource Use*, Earthscan, London