Sustainable Product Innovation

Impetus & Focus of the course

Global demand for natural resources and environment services exceeds Earth's carryingcapacity

Environmental impact of economic activities global warming & pollution threaten human well-being & biodiversity

The neoclassical economic system has led to extreme social inequity Strategies & Techniques Development & Commercialization of **Sustainable** Products & Services

What is unique about this course in product development?

Systems approach in product lifecycle

- Multi-stakeholder optimization in space & time
 - Customers
 - **Firm**
 - Investors
 - Supply chain actors
 - Regulators
 - Global society
 - Earth



Course Learning Objectives

Importance of sustainable development and the challenges and opportunities for business.

State-of-art practices in product innovation, development and commercialization incl. design-for-sustainability techniques: industrial ecology, lifecycle assessment (LCA)

Evolution of environmental sustainability concepts and associated governmental regulations.

Complexities associated with operationalizing sustainability across a product lifecycle (R&D, development, production and end-of-life.)

Decision-making leadership in development of sustainable products for commercial success.

Course Structure

- 1. Case studies
- 2. Guest lectures
- 3. Class discussions
- 4. Projects (in teams)
 - Option 1: Develop a new sustainable product
 - Option 2: Field study with a local company

Team Projects Form teams of 3 to 5

Option 1	Option 2	
Field Study	New Product Development	
Deliverables: a. Final report & presentation	Deliverables: a. Final report & presentation incl. a prototype of the product	
 Scope Select a company Investigate the new product development process and manufacturing in the company incl. sustainability practices and challenges. Determine, classify, and evaluate the company's products and practices. Focus on a specific sustainability issue. Identify opportunities for improvement in the company's product and/or development process. 	 Scope Select a product category and target application Consider a product that can be made locally! Gather data on user/stakeholder unmet needs. Develop a sustainable product concept. Demonstrate product's technical & commercial feasibility. Build a prototype (working or mockup) 	

Textbook

Rafinejad, D. "SUSTAINABLE PRODUCT INNOVATION: Entrepreneurship for Human Well-Being", J. Ross Publishing, August 2017.

Recommended books

Rafinejad, D. "*Innovation, Product Development and Commercialization*", J. Ross Publishing, June, 2007, ISBN: 978-1-932159-70-7 www.jrosspub.com

Citizen Engineer

A Handbook for Socially Responsible Engineering

- Downloadable for free at:
- <u>http://citizenengineer.org/</u>
 <u>q=node/12</u>

Class Schedule

Class	Topic or Case	Book Chapter
1	Introduction (course description)	Prologue & Introduction
2	The Sustainability Challenge	Chapter 1
3	Sustainability & Business Strategy	Chapter 2
4	Industrial Ecology & Sustainability Frameworks	Chapter 3
5	Life Cycle Assessment (LCA) Methods	Chapter 4
6	Technology and Product Strategy	Chapter 5
7	Product Development and Commercialization Process (PDCP)	Chapter 6
8	User Need Research & Design Thinking	Chapter 7
9	Design-for-Excellence & Sustainability	Chapter 8
10	Design for End-of-Life Management	Chapter 9
11	Public Policy and Design	Chapter 10
12	Decision Analysis in Sustainability	Chapter 12
13	Return-on-Investment in Product Development	Chapter 13
14	Leadership for Sustainability	Epilogue
15	Prius Development Case Study	Appendix I
16	Chevy Volt Case Study	Appendix II
17	Re-use Program at Cisco Systems, a Case Study	Can be obtained upon request
18	Final Project Presentations	Student Teams

Thank You!