

University Of California, Berkeley
Department of Mechanical Engineering

ME 290I: Sustainable Manufacturing (3 units)

Graduate Course

Syllabus

FULL DESCRIPTION

Sustainable Design, Manufacturing and Management as exercised by the enterprise is a poorly understood idea and one that is not intuitively connected to business value or engineering practice. This is especially true for the manufacturing aspects of most enterprises (tools, processes and systems). This course will provide the basis for understanding (1) what comprises sustainable practices in for-profit enterprises, (2) how to practice and measure continuous improvement using sustainability thinking, techniques and tools for product and manufacturing process design, and (3) the techniques for and value of effective communication of sustainability performance to internal and external audiences. Material in the course will be supplemented by speakers with diverse backgrounds in corporate sustainability, environmental consulting, non-governmental organizations and academia. Discussions of papers in the reader including case studies will be used to illustrate topics. A series of small projects is used throughout the semester and a final class project will be required, with students working individually or in small groups. Cross functional groups including students from different disciplines or backgrounds are encouraged. Class projects will apply the analysis techniques covered in this course to design and develop environmentally mindful products or processes or analyze policies that lead to environmental improvements. Interaction with industry and collection of real-world data will be encouraged.

COURSE PREREQUISITES

Graduate standing, or permission of instructor, especially for students not in engineering, business, or other Management of Technology programs.

PREREQUISITE KNOWLEDGE AND/OR SKILLS TEXTBOOK(S) AND/OR OTHER REQUIRED MATERIAL

- Appropriate texts to be used are currently under review. There are no current textbooks on green process design and manufacturing available. The course will have an extensive reader developed during the first 4 offerings of this as a seminar the past three years consisting of:
 - cases and other reading materials associated with green and sustainable business practices
 - standards and requirements for green practices
 - assessment tools
 - fundamentals of manufacturing tools, processes and systems
 - design of manufacturing for sustainability

COURSE OBJECTIVES

Students can expect to acquire a broad understanding of sustainable manufacturing, "green" product and process development as well as more detailed understanding of analytical tools, techniques and organizational structures that support sustainable manufacturing and environmental management practice.

TOPICS COVERED

- Course introduction; overview and drivers for sustainable business.
- Introduction to corporate sustainability; life cycle issues
- Developing metrics for sustainable design and manufacturing; Team composition/project introduction
- Metrics for sustainable design and manufacturing, cont'd
- Analytical tools for sustainability; life cycle assessment
- Manufacturing tools, processes and systems
- Case studies in sustainable design and manufacturing: DFE
- Case studies in sustainable design and manufacturing: Green mfg
- Aligning cost assessment with sustainability objectives
- Outside speaker 1: Future Trends of Green Design in Consumer Electronics
- Outside speaker 2: Communicating sustainability value through products and processes
- Project team reports; Global regulatory issues and drivers
- Outside speaker 3: NGO/Deriving Business Value out of Sustainability Initiatives;
- Global regulatory issues and drivers, cont'd
- Outside speaker 4: Product Stewardship in Industry; Sustainability communication and public reporting
- Student project/paper presentations

CLASS/LABORATORY SCHEDULE

3 hrs of lecture, no scheduled lab although special lab sessions may be arranged as needed, and 1 hour of discussion per week.

ASSESSMENT OF STUDENT PROGRESS TOWARD COURSE OBJECTIVES

- Bi-Weekly homework assignments (40%). There will be bi-weekly homework assignments/projects.
- Class participation (20%). Students will be graded each lecture on the quality of their preparation for and participation in class discussions.
- Midterm examinations and deliverables (20%). There will be a midterm assessment based on bi-weekly projects, assessment of progress towards the team semester project; as well as peer team evaluations/feedback of teamwork.
- Final examination/project (20%). As this is primarily a projects-based learning course there will be a final presentation at the end of the semester and a written report in lieu of a final examination.

PERSON(S) WHO PREPARED THIS DESCRIPTION:

David Dornfeld
17 March 2011

ABBREVIATED TRANSCRIPT TITLE (19 SPACES MAXIMUM): SUSTAINABLE MANUFACTURING

TIE CODE: LECS

GRADING: Letter

SEMESTER OFFERED: Fall and/or Spring

COURSES THAT WILL RESTRICT CREDIT: Engineering 290C

INSTRUCTORS: Dornfeld

DURATION OF COURSE: 14 Weeks

EST. TOTAL NUMBER OF REQUIRED HRS OF STUDENT WORK PER WEEK: 9

IS COURSE REPEATABLE FOR CREDIT? No

CROSSLIST: None