

EDMM 4570 – Manufacturing for Sustainability

Course Syllabus

Catalog Data

Examines how manufacturing enterprises can develop cost-effective strategies for products and processes that address current and future needs for sustainability. The course focuses on manufacturing processes, systems, and tooling/machinery, including energy, materials, and supply chain and distribution factors as they impact manufacturing.

Recommended Prerequisites: EDMM 2500 – Plastics Properties and Processes; EDMM 3200 – Engineering Cost Analysis; EDMM 3520 – Metal Casting

Required Texts: *Green Manufacturing: Case Studies in Leadership and Improvement.* Association for Manufacturing Excellence.
Other readings as assigned. Also see EDMM 4570 library list.

Overview Statement

“Sustainability” is now commonly heard in the news and on corporate websites, but is a poorly understood and often misused concept. This course provides the basis for understanding (1) historic, current, and future situations that lead us to the need for sustainability; (2) what is meant by sustainable manufacturing and product life-cycle design, and how these concepts relate to big-picture issues of global demands, energy use and independence, and social impact; (3) current and anticipated sustainable manufacturing practices; (4) how to practice continuous improvement using sustainability thinking; and (5) communication of sustainability efforts and opportunities to internal and external constituencies.

Material in the course may be supplemented by speakers with broad backgrounds in corporate settings, manufacturing, and academia. A series of individual and team investigations will be required, with students working in teams to research, interpret, critique, and respond. Class projects will apply analysis techniques covered in this course to design and develop products or processes that lead to sustainable manufacturing improvements. Interaction with industry and collection of real-world data will be encouraged.

Objectives¹ – By the end of the semester, the student should be able to:

1. Investigate, understand, and critique new and ongoing developments in sustainable engineering practices
2. Identify analysis tools and concepts to apply to manufacturing processes / products in order to develop continuous improvement applications for sustainability
3. Analyze an existing manufacturing process in an industry setting, and identify or design changes that will result in sustainable improvements
4. Be a member of a project team and apply appropriate skills and techniques to analysis of a current technology
5. Effectively communicate project activities, analysis, and recommendations in professional written, oral, and graphical formats

Performance Criteria

Objective 1:

- Research appropriate topics and contribute to class discussions.
- Read, critique, and interpret texts and readings on sustainability concepts and applications.
- Demonstrate understanding of current and new developments through application to projects, homework, and in quizzes and exams.
- Demonstrate understanding of “triple bottom line”: environmental, economic, and social interactions of manufacturing for sustainability.

Objective 2:

- Demonstrate effective use of concepts and analysis tools through homework and quizzes / exams.
- Use appropriate tools and concepts to analyze case studies and explore cost-effective options for improvement.
- Select LCA/I tools appropriate to analyze existing processes.

Objective 3:

- Collect and evaluate data of existing process or product and perform a life-cycle analysis.
- Design changed or new process or product using sustainability concepts; perform cost analysis; make recommendations.

Objective 4:

- Work with team to manage and perform all necessary tasks for identified project.
- Present team status reports as assigned.
- Maintain and submit updated Gantt charts / project timelines when requested.
- Complete peer-evaluations of team and self performance.

Objective 5:

- Perform research, interact with professionals, and report findings in appropriate formats.
- Provide a written summary of project activities, results, and recommendations.
- Present project activities and outcomes in a professional quality oral report.

Assignments and Percentage Values*

Quizzes, exams	40%
Text review	15%
Individual LCA	20%
Team LCA project	20%
Class contributions	5%

* Assignments and values may change, based on class input