3.080 Econ & Enviro Issues In Materials Selection

Instructors

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Today’s Mechanics

• Please fill in the sign-up sheet which is going around
  - Email list will be important for communicating with you about course updates

• Information requested
  - Name
  - Department
  - Year
  - Email

Course Materials (Texts)

• Texts on Reserve:
  - *Materials Selection in Mechanical Design*, Michael Ashby
    - 3rd edition hardcopy on reserve
Course Materials (other)

• Course website
  - Used to distribute key course materials
    • Syllabus, Lecture Notes, Solutions, Case Tools

• Software
  - Spreadsheet, preferably Excel
  - Cambridge Engineering Selector - will be distributed
  - Simapro - Life-cycle Analysis - negotiating license

Overview of Course

• Philosophy
  - Engineers are highly trained in analysis
  - Engineers receive little training in evaluation
  - Evaluation of real projects must consider technical performance as well as strategic goals (e.g., cost and environment)

• Learning Objectives
  - Awareness of evaluation theories and tools
  - Framework to reveal production (technology) cost
  - Ability to address analyses with incomplete data
  - Appreciation for multi conditional solutions
Layout of Course

- **Engineering Economics**
  - Approaches to determine equivalence of economic activities

- **“Classic” Materials Selection**
  - Screening method to evaluate numerous alternatives
  - Identifies potential solutions

Layout of Course (cont.)

- **Modeling Efficient Systems**
  - Process-based cost modeling
    - Generalized framework for understanding cash flows associated with production

- **Assessing Environmental Impact**
  - Life cycle assessment
    - Approaches for scoping environmental concern
    - Methods for quantifying impact
**Evaluation Methods Must Match Stage of Decision Making**

- Evaluation Methods: Screening, Cost Modeling, Life-Cycle Analysis
- # of Candidates: Concept, Embodiment, Detail
- Decision Stages: Concept, Embodiment, Detail

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**Major Assignments - Case Based Presentations**

- **Group Assignment**
  - 15 minutes presentation
- **Individual Assignment**
  - 3-5 page writeup
- **Specific topics**
  - **Engineering Economics** (Due October 6)
    - Compare the case for a Hybrid vs. XYZ car
  - **Materials Selection** (Due November 1)
  - **Cost Modeling** (Due November 15)
  - **Life cycle assessment** (Due December 13)
Grading Guidelines

• Problem Sets: 20%
• Unit projects
  - Eng econ 10%
  - Materials selection 10%
  - Cost modeling 15%
  - LCA (integrative) 15%
• Mid-semester quiz 1 - Engineering Econ: 15%
• Mid-semester quiz 2 - Material Selection & Cost modeling: 15%

Calendar

• Today: Intro and Overview
• Sept 13 - Oct 6: Engineering Economics
• Oct 13: EXAM: Engineering Economics
• Oct 18 - Nov 1: Materials Selection Methods
• Nov 3 - Nov 15: Process-based Cost Modeling
• Nov 17: EXAM: Matl Selection & Cost Modeling
• Nov 22 - Dec 13: Life-cycle Assessment