

# Syllabus

## ME 481 – Design Project I

### Fall 2017

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#### Overview

- Lectures on: Engineering design methodology, design process, project planning and management, decision making, materials selection, economic analysis, quality control, finite element analysis, and Engineering Ethics. Initiation of an open-ended design project

#### Objectives

- Heuristic learning of a structured engineering design process that emphasizes developing creative designs that are conscious of social, ethical, environmental, and political issues and based on rigorous scientific and/or engineering analysis through a two-semester, open-ended, group design project.
- Students will learn to apply engineering analysis tools to an open-ended design problem, including pertinent application of Computer Aided Design Tools such as Computer Aided Modeling (CAM – SolidWorks) and Finite Element Analysis (FEA).
- Effective, engineering specific, written communication. There is a significant communication component to this course. In particular, this is a writing intensive (WI) course, and thus, students are required to do a substantial amount of written communication (the equivalent of at least 16 pages per student) intended to mimic report formats often used in industry. Drafts of these reports will be discussed during weekly team meetings to provide an opportunity for improvement before the due dates, and written feedback will be provided for all reports after grading.
- This course has a Contemporary Ethical Issues (E) Focus designation. Contemporary ethical issues are fully integrated into the main course material and will constitute at least 30% of the content. At least 8 hours of class time will be spent discussing ethical issues. Through the use of lectures, discussions and assignments, students will develop basic competency in recognizing and analyzing ethical issues; responsibly deliberating on ethical issues; and making ethically determined judgments. Ethical content is covered in lectures and incorporated into the design process. Students will develop an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Students will develop oral communication skills through frequent technical presentations.

#### Prerequisites

- ME 322, ME 341, ME 372, ME 375

## References:

- Course Websites:
  - <http://rip.eng.hawaii.edu/courses/me-481482-design-project-iii/>
  - Laulima
- McCauley, J. C., et al. "Machinery's handbook." (2012)
- Slocum, Alexander, (2008). *FUNdaMENTALS of Design*, Alexander Slocum, <http://pergatory.mit.edu/resources/FUNdaMENTALS.html>
- Dieter, George E. (1991). *ENGINEERING DESIGN: A Materials and Processing Approach*. New York: McGraw-Hill, Inc. ISBN: 0-07-016906-3
- Ulrich, Karl T. & Eppinger, Steven D. (2004). *Product Design and Development, Third Edition*, Boston: McGraw-Hill, Inc. ISBN: 0-07-247146-8
- Wertz, James R., David F. Everett, and Jeffery J. Puschell. *Space mission engineering: the new SMAD*. Microcosm Press, 2011.

## Staff:

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## Assignments and Grading

Homework/workshops	10%
Solidworks and FEA	
Design Project	90%
Project Proposal	10%
Project Statement/Functional Requirements	
Team Mission Statement	
Preliminary Project Planning	
Literature Review	
Sales Pitch	10%
Marketing Materials	
Website	
Elevator Pitch	
Preliminary Design Report (PDR)	15%
Systems Analysis	
Detailed Project Planning	
Strategies	
Concepts	
Modules	
Comprehensive Design Review (CDR)	30%
Design Process	
Project Planning	
Analysis	
Design Details	
Design Notebooks	15%
Design Documentation	
Weekly meetings and peer reviews	
Presentations	10%
An oral presentation accompanies each report	
Peer Evaluations	0.5-1.1
Multiplier on group grade	