

## Syllabus

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ME 481

Design Project 1

Fall 2014

M 1:30-4:20 Holmes Hall 309

W 1:30-3:20 Holmes Hall 309

Instructor: A Zachary Trimble, Ph.D.

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Office: Holmes Hall 304

Office Hours: MW 10:00-11:00

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### Overview

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

### Objectives

- Introduce students to a structured engineering design process that emphasizes developing creative designs that are based on scientific, engineering analysis.
- Heuristic learning of a structured design process through application to a two-semester, open-ended, group design project. Students are assembled into groups based on their project selections. Each academic year there is a selection of design projects provided by the instructor, but students are also strongly encouraged to suggest ideas for design projects. Within the first few weeks students will submit a list of their top three choices. One to five groups are then assembled of at least three students per group based on these student's choices. For the next two weeks the students are assigned prior art studies and group exercise. During this time switching between groups is allowed. After that time, the groups are finalized and switching between groups is only allowed by a formal "severance/hiring" process.
- 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. Students will enhance their written communication skills through several professional (typed, computer generated graphics, etc.) technical reports. 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.
- Additionally, students will develop oral communication skills through frequent technical presentations.

## Prerequisites

- ME 372
- ME 375 (or concurrent)

## Staff:

Instructor	Teaching Assistant
Zac Trimble Holmes Hall 304 +1(808)956-7597 <a href="mailto:atrimble@hawaii.edu">atrimble@hawaii.edu</a>	Brennan Yamamoto Holmes Hall 309  brennane@hawaii.edu

## 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
- Brian Bingham's writing resources page for ME 402  
[http://www4.eng.hawaii.edu/~bsb/me402/writing\\_references.html](http://www4.eng.hawaii.edu/~bsb/me402/writing_references.html)

## Assignments and Grading

Homework/workshops	20%
Solidworks and FEA	
Design Project	80%
Project Proposal	10%
Project Statement/Functional Requirements	
Team Mission Statement	
Preliminary Project Planning	
Literature Review	
Preliminary Design Report	10%
Detailed Project Planning	
Strategies	
Concepts	
Modules	
Client Proposal	10%
Sales Pitch	
Final Report	30%
Design Process	
Project Planning	
Analysis	
Design Details	
Design Notebooks	10%
Design Documentation	
Weekly meetings and peer reviews	
Presentations	10%
An oral presentation accompanies each report	

## Fall 2014 Schedule:

Schedule is subject to change as circumstances during the course of the semester demand.

**Bold items denote workshops or reports that MUST be turned in for credit.**

Week	Monday	Wednesday	Weekly Tasks/Milestones
1	8/25 <ul style="list-style-type: none"> <li>•Welcome/Introduction</li> <li>•Project Presentations</li> <li>•Ethics</li> </ul>	8/27 <ul style="list-style-type: none"> <li>•FUNdaMENTALS</li> <li>•Design Process Overview</li> <li>•Project Selection</li> </ul>	<ul style="list-style-type: none"> <li>•<b>Computer Lab Sign-up/Responsibilities</b></li> <li>•<b>Assumption of Risk and Release</b></li> </ul>
2	9/1 <ul style="list-style-type: none"> <li>•NO CLASS - Labor Day</li> </ul>	9/3 <ul style="list-style-type: none"> <li>•Project Planning</li> <li>•Technical Communication</li> <li>•Hawaii Student Entrepreneurs</li> </ul>	<ul style="list-style-type: none"> <li>•Schedule Meeting Times</li> <li>•Literature Search</li> </ul>
3	9/8 <ul style="list-style-type: none"> <li>•Team Meetings</li> </ul>	9/10 <ul style="list-style-type: none"> <li>•Team Meetings</li> </ul>	<ul style="list-style-type: none"> <li>•Project Statements/Functional Requirements</li> </ul>
4	9/15 <ul style="list-style-type: none"> <li>•Technical Communication</li> </ul>	9/17 <ul style="list-style-type: none"> <li>•Solid modeling workshop</li> </ul>	<ul style="list-style-type: none"> <li>•Literature Search</li> <li>•<b>Solid Modeling Workshop</b></li> </ul>
5	9/22 <ul style="list-style-type: none"> <li>•Team Meetings</li> </ul>	9/24 <ul style="list-style-type: none"> <li>•Team Meetings</li> </ul>	<ul style="list-style-type: none"> <li>•Strategies</li> <li>•<b>Project Proposal</b></li> </ul>
6	9/29 <ul style="list-style-type: none"> <li>•Design Process Examples</li> <li>•Decision Making</li> <li>•Design Analysis</li> </ul>	10/1 <ul style="list-style-type: none"> <li>•Material Selection</li> <li>•Economics</li> </ul>	<ul style="list-style-type: none"> <li>•Concepts</li> </ul>
7	10/6 <ul style="list-style-type: none"> <li>•Team Meetings</li> </ul>	10/8 <ul style="list-style-type: none"> <li>•Team Meetings</li> </ul>	<ul style="list-style-type: none"> <li>•Concept Selection</li> <li>•Modules</li> </ul>

8	10/13	•Boeing Presentations	10/15	•FEA Lecture and Workshop	•MCM •Proof of Concept
9	10/20	•Team Meetings	10/22	•Team Meetings	•Preliminary Design Report
10	10/27	•Team Meetings	10/29	•Team Meetings	•Analysis and Modeling
11	11/3	•Team Meetings	11/5	•Team Meetings	•Client Proposal
12	11/10	•NO CLASS - Veterans' Day	11/12	•FEA workshop	•Detailing and Material Selection •FEA Workshop
13	11/17	•Team Meetings	11/19	•Team Meetings	•Panic --- Then finish loose ends!
14	11/24	•Team Meetings	11/26	•Team Meetings	•Final Report Draft
15	12/1	•Team Meetings	12/3	•Team Meetings	•Revise/iterate
16	12/8	•Team Meetings	12/10	•Team Meetings	•Final Report