

USM Mechanical Engineering

EMD441 Design 4

Prof. Horizon Gitano

FALL 2009

Syllabus

Rev. 1

www.skyshorz.com/university/resource.php

EMD441

DESIGN 4

2 Credits

Instructors: Horizon, Ikhwan, Rahim

Objectives:

The course provides an overview of the mechanical design process. Students should be able to analyze a given mechanical design problem using standard engineering principals, taking the initial specifications to a conceptual design, developing a detailed design and proposing a well defined solution including manufacturing, assembly and testing details. The student should be familiar with and be able to appropriately apply tools such as the decision matrix, and FMEA as well as the typical mechanical analysis (ie. strain, power) and other aspects such as cost, and environmental concerns. The student will be required to communicate details of mechanical designs both written and orally. Students will be required to write reports, give presentations, answer questions en vivo and design an informational poster. **The Final presentation MUST include a graphic animation showing how the project/product will operate.**

Material presented in this course will be predominantly in the form of “case studies” applying the various design techniques to real-world problems in order to help build insight into the design process. The class will consist of lecture, group discussions and individual/group work sessions as well as poster, and oral presentations both individually and in groups.

Prerequisites: Design 1, 2, and 3

Additional Resources: www.skyshorz.com , USM ME Website, Solidworks Intervarsity Student Design Competition 2009

Grading (number):	% of final grade
Group Reports (2)	40%
Individual Reports (2)	20%
Group Presentations (2)	20%
Viva (2)	20%

WARNING:

The following is a percentage breakdown of the letter grades (FOR HORIZON'S GROUP):

A	90 to 100%
B	80 to 89.9%
C	70 to 79.9%
D	60 to 69.9%
F	59.9 and below

Also Note: **PLAGIARISM = FAIL.** If you are caught copying you will fail the class.

Course Outline

Introduction to Design 4

Course explanation, expectations and grading scheme

Engineering Communications: Writing guide and public speaking

Steps in the Design Process

Identifying the customer

Problem Statement

Identifying the Constraints

Identifying the Criteria for Evaluation of Solutions

Data gathering

Customer Side Data

Literature Search

Analysis

Modeling and Data Analysis Tools

Developing Ideas for a Solution

The Decision Matrix (eg. On Excel)

Failure Mode and Effect Analysis (eg. Automotive Electrical Power Connector)

Testing: How will the solution be evaluated

Develop the test schedule BEFORE fabricating the solution

Optimization (eg. OmniluX Blade Design)

Design for manufacturability / Industrial Design (Symmetry, common components)

Prototyping and Fabrication

Testing

Modification and feed back to design/fabrication process

Volume Production

Continuous Verification and testing

Statistical Process Control

Customer Feedback

End Of Life Considerations

Additional Aspects

Time Lining and Human Resource Management

Costing

Documentation

Environmental Concerns

Design 4

Schedule: (Note – The dates are subject to change.)

Initial Project Proposal	Individual Presentation	14-July
Groups Assigned		21-July
Progress Report #1: Constraints and Criteria	Group Report	4-Aug
Mid-Term Progress Presentation	Group Presentation	9-Sep
Project Poster	Individual Report	29-Sep
Interview	Individual Viva	29-Sep
Final Presentation	Group Presentation	20-Oct
Final Report	Group Report	27-Oct
Group Member Rating/Feed back	Individual Viva	28-Oct

A Typical Report Grading Rubicon goes something like this:

Percentage	Aspect	
15%	Introduction	Is it clear, accurate, sufficient and understandable? Is there a problem statement? Do they say what the group will be doing?
20%	Individual	What did THIS individual contribute? Can I tell?
15%	Progress to date	Has the done to date sufficient? Are they on track? Is the work quality work, or just fluff?
15%	Calculations	Correct Application of Analytical Techniques? Are there math/analytical errors?
10%	Time Line	Accuracy, timeliness.
10%	Goals	Is it clear what needs to be done, and how it will be done?
15%	Conclusions	Are they really understanding the problem, and creating a useful solution? Do they know? How have they measured their progress?