EMD441 **DESIGN 4** **2 Credits**

Instructor: Professor Horizon Gitano

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.

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

Grading (number):	**% of final grade**
Group Reports (2) :	40%
Individual Reports (4):	20%
Presentations (2)	20%
Viva (2)	20%

WARNING:

The following is a percentage breakdown of the letter grades (not what you are used to!):

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

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
  - Failure Mode and Effect Analysis
  - Testing: How will the solution be evaluated
    - Develop the test schedule BEFORE fabricating the solution
  - Optimization
  - Design for manufacturability
- 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

- Engineering Communications: Writing guide and public speaking
- Time Lining and Human Resource Management
- Costing
- Documentation
- Environmental Concerns

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

Initial Project Proposal	Presentation and Viva	22-July
Project Proposal	Individual Report	22-July
Groups Assigned		29-July
Progress Report #1: Constraints and Criteria	Group Report	19-Aug
Individual Report#1	Individual Report	26-Aug
Mid-Term Progress Presentation	Group Presentation	9-Sep
Project Poster	Individual Report	7-Oct
Interview	Individual Viva	7-Oct
Final Presentation	Group Presentation	14 & 21-Oct
Final Report	Group Report	28-Oct
Group Member Rating/Feed back	Individual Report	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?