Course Outcomes Guide (COG)

Course Title: EGR 103 Introduction to Engineering Design **Update Date:** 6/8/2014

Course Team: Ed Sigler

Expected Learning Outcomes

1. Apply knowledge of mathematics, science and engineering to identify, formulate, and solve engineering problems,
2. Design and conduct experiments and analyze and interpret data.
3. Function in multi-disciplinary teams and develop an understanding of group dynamics
4. Develop computer skills including spreadsheets, mathematics software, word processors, graphical presentation software, and engineering drawing software and the use of the internet and online databases for research,
5. Develop basic computer programming skills.
6. Develop an understanding of the role engineers play in our modern society, and engineering ethics.
7. Develop communicate skills including oral, written and visual (engineering drawing).

Assessment

1. Students apply knowledge of mathematics, science, and engineering by the completion of engineering homework problems and the completion of in class exams.

2. Engineering design project requires students to design a robot to complete a specified function, test the design, analyze test data, and modify the design based upon the data generated.

3. Robotics project and Mission to Mars design project are team assignments Students will be evaluated by the instructor and their peers on their ability to work effectively in a team.

4. Students will conduct online research to develop flight components for the mission to mars project. Students will use word processing and presentation software to develop Robot and Mission to Mars final reports and presentation packages. Students will learn and be evaluated on their ability to effectively use CREO Parametric software to generate computer models and the use of MATLAB to solve engineering problems.

5. Students will be evaluated on their computer programming ability during the design project. i They will be require to develop, write, and troubleshoot computer programs required to control robot functions.

6. Students are evaluated on their understanding of the role of engineers in society and engineering ethics by the writing of short research papers on the topics.

7. Students interact within the Robot and Mission to Mars design project teams where they communicate within their teams. Students prepare a written report detailing development, design and results for both projects. Further, each member of the Mission to Mars teams is required to prepare and present to the class.

Validation

Exams for each section will contain the same questions. Exams will be analyzed to see if students, on average, demonstrate common area of weaknesses.

Projects are assessed against the consistent criteria for each section and semester.

Results

Data from Fall 2012, Fall 2013 and Spring 2014 has been analyzed. See Table below.

Major findings:

1. Initially, students were required to develop a research paper individually and present to the class. The general feedback from the students indicated general disinterested in the assignment. The Mission to Mars project was instituted to replace the individual paper and requires the students to work as a team, develop communications and interpersonal skills and also follow the design process.
2. A large majority of students have not had computer programming in high school. The concepts require time to grasp and re-enforcement through inclusion within other activities.
3. Basic Trigonometry and Vector mathematics is an issue for some students.

Follow-up

1. For Finding 1 -- The individual research assignment was changed in SP 14 to a group research and design project -- Mission to Mars where multi-member teams (3-4) students are assigned a component of an envisioned Mission to Mars spacecraft where the students must perform research, collaborate internal to the team and also external with other teams, generate a detailed report and present the findings to the class. The reception to this project was much improved over the individual assignment.

2. For Finding 2 -- MATLAB will become a focus for re-enforcement within EGR 103 and other engineering courses.

3. A trig and vector review will be incorporated into the initial course lectures for review of concepts to assist students as these concepts are fundamental to the solution of many engineering problems.

Course: EGR 103 **SLOA Data** **Faculty Team: E. Sigler**

	SU 2012	FA 2012	SP 2013	SU 2013	FA 2013	SP 2014	SU 2014	FA 2014	SP 2015	SU 2015	FA 2016	SP 2016	SU 2016
# Active students	N/A	33	?	N/A	32	13	N/A						
%W		15%	?		10%	0%							
*# walk-away Fs No final exam/grade = F		4	?		2	0							
% Success (A,B,C)		78.6	?		90	100**							
Common Comprehensive Final Exam Score Average		73.3 N=24	?		74.7 N=	72.2 N= 13							
Mean course grade		2.43	?		2.83	3.00							
Item Analysis **Weakest Content Areas**		Problem Solving (Electrical Circuits)	?		Problem Solving (Electrical Circuits)	Problem Solving (Statics)							

*% Walk-away Fs = Did not take the final exam and received a grade of F.

** - 1 student changed to AU prior to end of class.