Course Outcomes Guide (COG)

Course Title: EGR 108 Statics **Update Date: 5/22/2015**

Course Team: Ed Sigler

Expected Learning Outcomes

1. Utilize vector components and vector mathematics (addition, subtraction, dot and cross product) to analyze forces and moments
2. Perform a thorough force analysis of rigid bodies and simple structures in equilibrium.
3. Draw clear and appropriate free-body diagrams.
4. Analyze trusses, beams, frames and machines.
5. Determine the centroids, centers of gravity and moments of inertia of simple geometric shapes and understand the physical applications of these properties.
6. Perform calculations related to friction forces in various engineering applications.
7. Determine internal forces and produce shear and moment diagrams for beams subjected to various loadings.

Assessment

Learning outcomes are assessed through homework problems, midterm exams, and the final exam. A design project will be developed and introduced with in FA 2104. Common questions for each exam are given to each section of the course. Data collected from these exams will be used to identify areas of weakness and to adjust instruction accordingly.

Validation

Assessments are constructed to test student's knowledge and expertise against the expected learning outcomes. Validation occurs when review of assessments are compared to the learning outcomes.

AMAT 203 (Calc 1) is a co-requisite for this course. Unfortunately, EGR 108 'hits' certain topics requiring familiarity with calculus concepts such as integrals prior to instruction of these concepts in MAT 203. For such students, the instructor must make time to provide additional assistance during class and more importantly outside of the classroom. Calculus is used in the derivation of centroids, moments of inertia and in the derivation of important formulas involving friction. Course assessments are constructed such that calculus is not needed in completion of the problems.

Results

Spring 2014:

Student assessments demonstrated that student learning objectives were met. However, based on detailed analysis, improvement can be made in four areas: trusses, distributed loads, friction and internal shear and moment diagrams.

Fall 2014/Spring 2015:

Student assessments for the Fall 2014 were regarding trusses, shear moment diagrams and block friction. Performance was not as good with frames and belt friction. Assessments in the Spring 2015 included improvement with belt friction but decrease in performance with shear moment diagrams. Spring 2015 added a suspended cable problem where most students did not recognize the type of loading and used incorrect analysis methods.

Additionally, a design project was added in Fall 2014 and continued into Spring 2015 which required student teams to select a truss design to hold at least 25 lbs with a span of 23 inches and be constructed of balsa wood and superglue. The project included calculation and analysis, bridge construction and demonstration with a report that documented all steps of the process. The project was very well received and will be continued.

Follow-up

Improvement will be implemented via the following:

1. Additional instruction and examples for friction, potentially with in-class demonstrations using new friction demonstration equipment.

2. Additional instruction in the concepts of frames and machines with emphasis on recognition of “2 force” members to aid in analysis.

3. Additional instruction and examples for internal shear and moment diagrams, potentially using computer analysis demonstrations.

4. Utilize new engineering demonstration equipment to reinforce concepts. Incorporate use of demo equipment into semester design.

I also plan to hold review sessions prior to the conduct of each exam. These were held in both Fall 2014 and Spring 2015 and were well attended.

Budget Justification

No additional requirements at this time.

Course: EGR 108 SLOA Data **Faculty Team: E. Sigler**

	FA 2012	SP 2013	FA 2013	SP 2014	FA 2014	SP 2015	FA 2016	SP 2016	FA 2016	SP 2016	FA 2017	SP 2017
# Active students	N/A	20	N/A	31	12	12						
%W		25%		0%	0%	0%						
*# walk-away Fs No final exam/grade = F		2		1	1	2						
% Success (A,B,C)		53%		87.1%	66.7%	66.7%						
Common Comprehensive Final Exam Score Average		72.5% N=13		79.3 N=30	71.7% N=11	63.4% N=9**						
Mean course grade		1.87		2.81	2.00	2.17						
Item Analysis **Weakest Content Areas**		Vector math		1) Trusses 2) Dist. Loads 3) Friction 4) Shear/ Moment Diagrams	1) Frames 2) Friction 3) Centroids	1) Frames 2) Friction 3) Shear/ Moment Diagrams 4) Cable loading						

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

** - One student took final exam but did so poorly that it was not counted in overall statistics