ENG ME 311 Engineering Design Using CAD

2008 - 2009 Catalog Data:

ENG ME 311 Engineering Design Using Prereq: ENG EK 301. Introduction to computer-aided design. Technical drawing in two and three dimensions. Threads and fasteners. Electromechanical interfaces and controls. Power transmission. Dimensions, tolerances, and manufacturing processes. Design analysis. Two required design projects. 2 cr.

Class/Lab Schedule: 2 lecture hours per week

Status in the Curriculum: Required

Textbook(s) and/or Other Required Material: Bethune, James D., Engineering Graphics with SolidWorks, Prentice-Hall Inc., 2008.

Coordinator: James D. Bethune, Associate Professor, Mechanical Engineering

Prerequisites by topic: None

Goals:

This course is intended to introduce students to the design process. Specific goals are:
1. Teach students how to work with both two-dimensional and three-dimensional engineering drawing using CAD (SolidWorks)
2. Teach correct dimensioning and tolerancing techniques
3. Complete two design projects: (1) Design and build a dynamometer; use the dynamometer to obtain results; then use those results to determine the performance of the design. All aspects of the design must be documented using drawings. (2) Design a cam to fit a set of parameters; take the design to the shop where it is cut according to the drawing; and test the cam to evaluate its performance.

Course Learning Outcomes:

As an outcome of completing this course, students will:

i. Become proficient in using a CAD system to design and document engineering design projects - students will use SolidWorks to create solid models, orthographic views with dimensions and tolerances, assembly drawings with parts lists, select fasteners and analyze the results. (A, E, K)

ii. Gain experience in understanding how to create and analyze solutions to design problems - create and evaluate concept sketches, convert the concept sketches into working drawings, manufacture prototypes from the drawings, test and modify the prototypes, revise the drawing to create accurate documentation of the final design solution. (A, B, E)

iii. Gain experience in interfacing with the manufacturing process - as part of a design project, create a drawing that can be used by a shop to manufacture a finished part. (C)

iv. Gain experience working in a design group - two design projects completed by teams. (D)

v. Gain experience in preparing technical documentation - each design project will require written documentation including drawings, performance data and analysis of the performance versus the original design requirements. (G)

Course Learning Outcomes mapped to Program Outcomes:

Program:	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Course:	i, ii	ii	ii, iii	iv	i, ii	-	v	-	-	ii	i	ii	-	ii, iii
Emphasis:	2	4	4	3	4	1	3	1	1	2	5	3	1	4

Topics (time spent in weeks):
1. Introduction (1). Design project, DC motors, gears, 2D drawing.
2. 3D drawing (1). Gear loads, concept sketching.
3. Orthographic views. (1). Motor tester, sectional views.
4. Assembly drawings (1).
5. Threads and fasteners (1).
6. Dimensions (1). ANSI, ISO.
7. CAMS (1). Displacement diagrams.
8. Bearings and shafts (1). Speed and load considerations.
9. Tolerances (2).
10. Design projects reports and performances (2).
11. Exam (1).

Contribution of Course to Meeting the Professional Requirement:
Engineering Topics: 100%

Status of Continuous Improvement Review of this Course:
Date: July 15, 2008 **Reviewed by:** Design Committee
Prepared by: James D. Bethune **Date**: March 5, 2009