ENG ME 415 Product Design

2008-2009 Catalog Data:
ENG ME 415 Product Design Prereq: ENG ME 345, ENG EK 409, and ENG ME 407. Emphasizes the conversion of product ideas into attractive products needed by customers. Course consists of a series of design projects, of increasing complexity, culminating in the development of an operating plan for product design and delivery. Exercises include both product design and product manufacturing considerations. Resources for the exercises are presented in working studio sessions. 4 cr. first semester.

Class/Lab Schedule: 4 lecture hours per week

Status in the Curriculum: Required in Manufacturing Program

Textbook(s) and/or Other Required Materials: Ulrich, K. and Eppinger, S. "Product Design and Development" (4th Ed.), McGraw-Hill 2007.

References: (a) Jensen, C. , Helsel, J. D. and Short, D. R., "Engineering Drawing and Design" (7th Edition), McGraw-Hill, 2008.
(b) Mikell P. Groover, *Fundamentals of Modern Manufacturing*, 3rd Ed., 2006.

Coordinator: Daniel Cole, Associate Professor, Mechanical Engineering

Prerequisites by topic:
1. An understanding of manufacturing costing principles and operating statements as taught in EK 409 Engineering Economy.
2. An understanding of materials and processes as taught in EK 156 Design and Manufacture.
3. Experience in using CAD systems for drafting and design as taught in ME 407.
4. Experience in using FEA software for analyzing designs of parts as taught in ME 407.
5. Experience with the concepts and practice of automation as taught in MN 345 Automated Manufacturing.

Goals:
This course is a summary design experience for manufacturing engineering seniors. It is intended to draw together the various earlier courses in the curriculum with direct practical training in planning and design. The eight assignments are progressively more difficult and constructed so as to blend both engineering design and product development.

Computer Usage:
This course uses the SolidWorks CAD software plus either COSMOSWorks or COMSOL FEA software running on desktop PC's for all of its design assignments. Average time per student per week on the design stations is 6 hours.

Course Learning Outcomes:

As an outcome of completing this course, students will:

i. Gain an increased understanding of production and service operations in product development and manufacturing companies.
ii. Develop an increased facility in using a major CAD system to do engineering design.
iii. Gain experience with product and process design for for various types of parts including sheet metal and plastic parts.
iv. Develop experience with business ideation, demand confirmation and resource specification for manufactured products.
v. Gain experience in creating an operating plan for a manufactured product that is balanced in specification of product and process.
vi. Gain experience and confidence in working in a team environment.
vii. Gain a facility for producing well-organized and clearly written engineering reports, and for presenting aspects of work to the class.

Course Learning Outcomes mapped to Program Outcomes:

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

Topics:

1. Web-based review of a manufacturing company
2. Development of a product plan for a selected product
3. Confirmation of market demand for a selected product
4. Design of a plastic part
5. Design of a mold base for a plastic part
6. Design/redesign: Maintain an 8.5”x11” sketch notebook. Include sketches of good/bad designs, plus assignments in class.
7. Redesign project
8. Preparation of a manufacturing operations plan
9. Design of innovative new product, plus market analysis.

Contribution of Course to Meeting the Professional Component:
Engineering topics: 100%

Status of Continuous Improvement Review of this Course:
Prepared by: Assoc. Prof. Daniel Cole **Date:** 5/23/09