ENG ME 413 Machine Design I

2008-2009 Catalogue Data:
ENG ME 413 Machine Design I
Prereq: (strictly enforced) ENG ME 302, ME 305, ME 306 ME 311, ME 312, ME 419. First part of the Mechanical Engineering capstone design sequence. Machine elements including fasteners, bearings, seals, gears and other power transmission elements. Static and dynamic failure analysis, including fatigue, and factors of safety. Engineering design (product realization) process including customer requirements and problem definition, conceptual design and creativity, feasibility and decision analyses. Cognitive styles and group dynamics. Oral and written communication. Start of capstone design project. 4 cr. 1st sem

Course Schedule: 4 lecture hour per week

Status in the Curriculum: Required

Textbook(s):
Dieter, G.E. and L.C. Schmidt, Engineering Design, 4th ed., McGraw-Hill, 2009
Juvinall, R.C. and K.M. Marshek, Fundamentals of Machine Component Design, 4th ed., Wiley, 2006
Composition Notebook RR77255

Coordinator: Morton S. Isaacson, Associate Professor, Mechanical Engineering

Prerequisites by Topic:
1. Statics and Dynamics
2. Strengths of materials
3. Material Science
4. Fluid Mechanics
5. Thermodynamics
6. Heat Transfer

Goals:
This course in designed to guide students through the beginning of the transition from being students of engineering to being practitioners of engineering. Specific goals are:
1. To guide them in the application of basic structural mechanics to the analysis and design of machine components
2. To help them combine the engineering science they have already learned with the creative, organizational, and professional skills needed for successful innovative engineering design
3. To give them experience in applying these skills to the beginning of a major design experience incorporating appropriate engineering standards and multiple realistic constraints

Course Learning Outcomes:
As an outcome of completing this course, students will:

i. Master the application of basic structural mechanics learned in previous courses to the analysis and design of machine components, including fasteners, shafts, bearings, seals and gears. This includes static and dynamic (impact and fatigue) failure analysis and factors of safety. (A, B, E, L)

ii. Gain an appreciation for and become proficient in applying the initial steps of the engineering design process to significant, systems-level mechanical engineering design problems, including customer requirements and problem definition, creativity and concept generation, determination of the state of the art and applicable patents, feasibility analysis and decision making among alternatives. (C, H, K, ME:M,N)

iii. Become proficient in proper professional written documentation, including design journals, formal engineering reports and engineering drawings. (G, K)

iv. Become proficient in the oral communication of technical concepts. (G)

v. Become proficient in functioning in a multi-functional team environment, including an understanding of cognitive styles and group dynamics. (D

vi. Gain an appreciation for and familiarity with engineering as a profession. (F, H, I, J)

Course Learning Outcomes mapped to Program Outcomes:
(For Program Outcomes, please see attached page or Department Web Site)

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

Topics (time spent in weeks):

1. Mechanical Design Process (3)
2. Group dynamics, professionalism, communications and creativity (1.5)
3. Structural failure and machine element modeling and analysis (5.5)
4. Project time: In-class team meetings, presentations, feedback sessions, and work time (4)

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

Status of Continuous Improvement Review of this Course:
Date reviewed: July 15, 2008 **Reviewed by:** Design Committee
Prepared by: Morton S. Isaacson **Date prepared:** January 12, 2009