

Department of Mechanical Engineering

ME EN 3910 - Design Methodology

Syllabus

Instructor:	Prof. Eberhard Bamberg, 2124 MEB, bamberg@mech.utah.edu, (801) 585-0722		
Office hours:	Irs: Monday, Wednesday, 2:00 - 3:30 pm and by appointment		
Lectures:	Monday, Wednesday, and Friday, 9:40 - 10:30 am, EMCB 105		
Course website:	http://www.mech.utah.edu/~me3910		
Required Text:	Mechanical Engineering Design, J.E. Shigley, C.R. Mischke and R.G. Budynas, McGraw-Hill, 8th Edition		
Prerequisites:	ME EN 2650, 2450, and Upper Division ME EN Status		
Co-requisites:	ME EN 3210, 3300		
Teaching Assistant:	Sumet Heamawatanachai. Office hours: Friday, 12:00 - 3:00 pm, 2410 MEB		

Course Summary

ME EN 3910 is the first course in the Senior Design Sequence - ME EN 3910, 4000, 4010. The course introduces a wide range of standard, mechanical elements that are extensively used in today's engineering world. The topics include statistics, fatigue, reliability, safety, selections of bearings, gears, fasteners, shafts, fits and tolerances, materials, etc.

Course Objectives

Students will be introduced to a number of different, standard machine elements and learn about the science behind their selection. At the completion of this course, students will have learned to solve complex design problems that involve machine elements with the use of a textbook.

Team Projects

A senior design team taking ME EN 4000 and 4010 consists of a minimum of 4 students and needs to have a faculty advisor from the Department of Mechanical Engineering. The team is primarily funded through the members' course fees and may apply for additional funds from the College of Engineering and the Department of Mechanical Engineering. Additional funding may come from outside sources (industry sponsors, ASUU, etc.).

Team projects are found in one of four basic ways:

- 1. A group of students has an idea for a novel product/design and also found a ME faculty member as an advisor.
- 2. An industry sponsored project presented by a ME faculty member.
- 3. A research project funded and advised by a ME faculty member.
- 4. A student competition team (Formula SAE, Mini-Baja, Solar Car, Human Powered Vehicle, Walking Machine, etc.).

Students with ideas for potential senior design projects are encouraged to contact the course instructor. Suitable projects from students, faculty, and industry sponsors will be added to the course website throughout the semester.

Late Submission Policy

Assignments submitted after the due date but before solutions have been posted will receive a 20% deduction. After the solutions have been posted on the course website, assignments can no longer be accepted.

Midterms and Final Exam

There will be two midterms and one final exam. The material covered in all exams is cumulative, i.e. all exams will cover all material from the beginning of the semester up until the exam. All exams are open book and open notes. However, solved problems, homework, and solutions to homework are not permitted.

Assignments	1. and 2. Midterm	Final Exam
20%	40%	40%

The final exam is scheduled for Tuesday, May 1, 2007 from 8:00am to 10:00am in EMCB 105.

Week	Monday	Wednesday	Friday
1	January 8, 2007 Introduction, Statistical Considerations (Chap- ter 20)	January 10, 2007 Statistics and Probability Read 20-1 to 20-5	January 12, 2007 Probability Functions
2	January 15, 2007 Martin Luther King Day - no class	January 17, 2007 Probability Functions PS 1: Statistical considerations. Due 01/24/ 2007	January 19, 2007 Load and Stress Analysis (Chapter 3) <i>Read 3-1, 3-2, 3-4 to 3-6, 3-9 to 3-13</i>
3	January 22, 2007 Deflection and Stiffness (Chapter 4) <i>Read 4-1 to 4-5, 4-11 to 4-13</i>	January 24, 2007 Theories for Static Failure (Chapter 1 and 5) Read 5-1 to 5-12 PS 2: Load and stress analysis + deflection and stiffness. Due 01/31/2007	January 26, 2007 Theories for Static Failure
4	January 29, 2007 Fatigue (Chapter 6) <i>Read 6-1 to 6-4, 6-7</i>	January 31, 2007 Design to Avoid Fatigue Failure / Reliability PS 3: Static failure and fatigue. Due 02/07/ 2007	February 2, 2007 Material Selection (Chapter 2) <i>Read 2-1, 2-2, 2-15 to 2-20, 2-21</i>
5	February 5, 2007 Material Selection	February 7, 2007 Material Selection PS 4: Material selection. Due 02/14/2007	February 9, 2007 Screws, Fasteners and Connections (Chapter 8) <i>Read 8-1 to 8-5</i>
6	February 12, 2007 Screws, Fasteners and Connections	February 14, 2007 Screws, Fasteners and Connections	February 16, 2007 Screws, Fasteners and Connections
7	February 19, 2007 President's Day - no class	February 21, 2007 Summary and review for 1. Midterm PS 5: Screws, fasteners and connections. Due 02/28/2007	February 23, 2007 1. Midterm
8	February 26, 2007 Rolling Contact Bearings (Chapter 11) <i>Read 11-1, 11-2,11-6</i>	February 28, 2007 Rolling Contact Bearings	March 2, 2007 Rolling Contact Bearings

Table 2:	Course	Schedule	Spring	2007
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Week	Monday	Wednesday	Friday
9	March 5, 2007 Bearing Assemblies Read 11-11, 11-12	March 7, 2007 Lubrication and Journal Bearings (Chapter 12) <i>Read 12-1, 12-15</i> PS 6: Rolling contact bearings. Due 03/14/ 2007	March 9, 2007 Lubrication and Journal Bearings
10	March 12, 2007 Shafts and Shaft Components (Chapter 7) <i>Read 7-1 to 7-4, 7-5 to 7-6</i>	March 14, 2007 Shafts and Shaft Components PS 7: Lubrication and journal bearings. Due 03/28/2007	March 16, 2007 Shafts and Shaft Components
11	March 19, 2007 Spring break - no class	March 21, 2007 Spring break - no class	March 23, 2007 Spring break - no class
12	March 26, 2007 Fits and Tolerances <i>Read</i> 7-8	March 28, 2007 Summary and review for 2. Midterm PS 8: Shafts and shaft components. Due 04/ 04/2007	March 30, 2007 2. Midterm
13	April 2, 2007 Fits and Tolerances	April 4, 2007 Gears - General (Chapter 13) <i>Read 13-1 to 13-8, 13-6</i> PS 9: Fits and tolerances. Due 04/11/2007	April 6, 2007 Gears - General
14	April 9, 2007 Spur and Helical Gears (Chapter 14) <i>Read 14-1 to 14-4</i>	April 11, 2007 Spur and Helical Gears PS 10: Gears - general. Due 04/17/2006 PS 11: Senior Design Project Selection. Due 04/17/2006	April 13, 2007 Bevel and Worm Gears (Chapter (15) <i>Read 15-11 to 15-5</i>
15	April 16, 2007 Flexible Mechanical Elements (Chapter 17) <i>Read 17-1 to 17-5</i>	April 18, 2007 Flexible Mechanical Elements PS 12: Design of gears. Due 04/25/2007	April 20, 2007 Flexible Mechanical Elements
16	April 23, 2007 Flexible Mechanical Elements	April 25, 2007 Summary and Review for Final Exam	