Instructor: Prof. Eberhard Bamberg, 2124 MEB, bamberg@mech.utah.edu, (801) 585-0722
Office hours: 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
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.

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

<table>
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<tr>
<th>Assignments</th>
<th>1. and 2. Midterm</th>
<th>Final Exam</th>
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<td>20%</td>
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Table 1: Grading
<table>
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<tr>
<th>Week</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
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</table>
| 1    | January 8, 2007  
  Introduction, Statistical Considerations (Chapter 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  
  Load and Stress Analysis (Chapter 3)  
  Read 3-1, 3-2, 3-4 to 3-6, 3-9 to 3-13 |
| 3    | January 22, 2007  
  Deflection and Stiffness (Chapter 4)  
  *Read 4-1 to 4-5, 4-11 to 4-13* | January 24, 2007  
  Theories for Static Failure (Chapter 1 and 5)  
  Read 5-1 to 5-12  
  Theories for Static Failure |
| 4    | January 29, 2007  
  Fatigue (Chapter 6)  
  *Read 6-1 to 6-4, 6-7* | 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)  
  Read 2-1, 2-2, 2-15 to 2-20, 2-21 |
| 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)  
  Read 8-1 to 8-5 |
| 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)  
  *Read 11-1, 11-2, 11-6* | February 28, 2007  
  Rolling Contact Bearings | March 2, 2007  
  Rolling Contact Bearings |
### Table 2: Course Schedule Spring 2007

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
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</table>
| 9    | March 5, 2007  
Bearing Assemblies  
*Read 11-11, 11-12* | March 7, 2007  
Lubrication and Journal Bearings (Chapter 12)  
*Read 12-1, 12-15*  
PS 6: Rolling contact bearings. Due 03/14/2007 | March 9, 2007  
Lubrication and Journal Bearings |
|      | March 12, 2007  
Shafts and Shaft Components (Chapter 7)  
*Read 7-1 to 7-4, 7-5 to 7-6* | March 14, 2007  
Shafts and Shaft Components  
PS 7: Lubrication and journal bearings. Due 03/28/2007 | March 16, 2007  
Shafts and Shaft Components |
| 10   | March 19, 2007  
*Spring break - no class* | March 21, 2007  
*Spring break - no class* | March 23, 2007  
*Spring break - no class* |
| 11   | March 26, 2007  
Fits and Tolerances  
*Read 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 |
| 12   | April 2, 2007  
Fits and Tolerances | April 4, 2007  
Gears - General (Chapter 13)  
*Read 13-1 to 13-8, 13-6*  
Gears - General |
| 13   | April 9, 2007  
Spur and Helical Gears (Chapter 14)  
*Read 14-1 to 14-4* | April 11, 2007  
Spur and Helical Gears  
PS 10: Gears - general. Due 04/17/2006  
Bevel and Worm Gears (Chapter (15)  
*Read 15-11 to 15-5* |
| 14   | April 16, 2007  
Flexible Mechanical Elements (Chapter 17)  
*Read 17-1 to 17-5* | April 18, 2007  
Flexible Mechanical Elements  
Flexible Mechanical Elements |
| 15   | April 23, 2007  
Flexible Mechanical Elements | April 25, 2007  
Summary and Review for Final Exam | 

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