ME 325
Machine Design (Section B)

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Monday, Wednesday, Friday
1:10 pm to 2:00 pm
Classroom: Hoover 1312

OFFICE HOURS:  Monday and Wednesday 4:00 pm to 5:00 pm, and by appointment


PREREQUISITES:  EM 324, Engr 170, Stat 305

COURSE CONTENTS

The course will emphasize the philosophy of design and design methodology. Consideration of stresses and failure models useful for static and fatigue loading. Analysis, selection and synthesis of machine elements.

- Gears: gear types, force analysis, and gear failure and design
- Static Analysis: load and stress analysis, and static failure theories
- Fatigue Analysis: fatigue strength, characterizing fluctuating stress, fatigue in combined loading
- Machine Components: bearings, fasteners, shafts, etc.
- Mechanical Drawing and Tolerancing

COURSE OBJECTIVES AND ASSESSMENT

Upon completion of ME 325, students should be able to:
1. Generate and self-assess design alternatives
2. Identify the functional characteristics of various machine elements
3. Evaluate design alternatives using a utility function
4. Select and apply basic mechanical components (e.g., gears, bearings, fasteners, etc.)
5. Select and apply failure theories to the design of machine components
6. Work effectively with team members in achieving final design results
7. Interpret and communicate design results through mechanical drawings and oral presentation
8. Appreciate machine design in the context of contemporary issues and the interplay of technological, social, and political factors in resolving or exacerbating problems facing society

GRADING

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Quizzes</td>
<td>56%</td>
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<tr>
<td>Design Project</td>
<td>25%</td>
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<tr>
<td>Progress Report (5%)</td>
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<tr>
<td>Group Presentation (10%)</td>
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<tr>
<td>Final Report (10%)</td>
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<tr>
<td>Homework</td>
<td>9%</td>
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<tr>
<td>Peer Evaluation</td>
<td>10%</td>
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The final grade is based on overall performance measured by points assigned to quizzes, design project, homework and peer evaluation. A letter grade will be assigned based on the performance of the individual and the overall performance of the class: A, A-, B+, B, B-, C+, C, D and F. A **tentative scale** for the assignment of the letter grades is listed as follows: (Class average is assigned B.)

- A (92 – 100)
- A- (89 – 92)
- B+ (86 – 89)
- B (83 – 86)
- B- (80 – 83)
- C+ (77 – 80)
- C (74 – 77)
- D (70 – 74)
- F (below 70)

The class will be divided into groups of 5–6 students. Each group will work together on assigned homework and the design project. Listed below is the breakdown by category between the group and individual assignments.

**Group Assignments**
- Homework
- Design Project

**Individual Assignments**
- Quizzes
- Peer Evaluation
COURSE POLICIES

WebCT course webpage
- The course will be administered through WebCT.
- All the lecture slides, handouts, solutions and grades will be posted on the course webpage on WebCT.
- No printed handouts will be distributed during the class.

Quiz policies
- Four to five 50 min quizzes will be administered.
- One side of a letter sheet with “only hand-written notes” is allowed.
- No make-up quizzes will be given.

Homework policies
- Homework is due in class on the due date.
- Each group will submit only one homework.
- Homework solutions will be posted on the course webpage.
- No make-up homework will be given.

Note: Please discuss any special needs or special accommodations with me at the beginning of the semester or as soon as you become aware of your needs. Those seeking accommodations based on disabilities should obtain a Student Academic Accommodation Request (SAAR) form from the Disability Resources (DR) office (515-294-7220). DR is located on the main floor of the Student Services Building, Room 1076.
## Tentative Schedule

<table>
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<tr>
<th>Week</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
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| 01/11 – 01/15 | Introduction / Basics of Materials  
Chapters 1.1-6; 1.9; 1.11; 1.14; 2.1; 2.3-5 | Gears (1)  
Chapters 13.1-5 | Gears (2)  
Chapters 13.6-8; 13.4 |
| 01/18 – 01/22 | **No class (Holiday)** | Gears (3)  
Chapters 13.10 | Gears (4)  
Chapters 14.1-2 |
| 01/25 – 01/29 | Gears (5), Introduce Design Project  
Chapters 14.3-17 | Gears (5)  
14.3-7 | Gears (6)  
Chapters 14.3-7 |
| 02/01 – 02/05 | Gears(7), Stress Analysis (1)  
|HW #1, Quiz I Review| **Quiz I**: Gear Failure and Design |
| 02/08 – 02/12 | Stress Analysis (1)  
Chapters 3.1-3; 3.9; 3.10; 3.12 | Stress Analysis (2)  
Chapters 3.11; 3.13 | Stress Analysis (3)  
Chapters 3.4-7 |
| 02/15 – 02/19 | **No Class (Traveling)**  
Work on conceptual design | **No Class (Traveling)**  
Work on conceptual design | Static Failure (1)  
Chapters 5.1-4 |
| 02/22 – 02/26 | Static Failure (2)  
Chapter 5.5 | Static Failure (3)  
Chapter 5.6-10 | Static Failure (4)  
Chapters 5.6-10 |
| 03/01 – 03/05 | **HW#2, Quiz II Review**  
Quiz II: Stress Analysis, Static Failure | Quiz II: Stress Analysis, Static Failure | Fatigue Failure (1)  
Chapters 6.1-4; 6.7; 6.8 |
| 03/08 – 03/12 | Fatigue Failure (2)  
Chapters 6.9-12 | Shafts (1)  
Chapters 7.1-4 | **Progress Report**, Shafts (2)  
Chapters 7.6-7 |
| 03/15 – 03/19 | **No Class**  
**Spring Break** | **No Class**  
**Spring Break** | **No Class**  
**Spring Break** |
| 03/22 – 03/26 | **HW#3, Quiz III Review**  
Quiz III: Fatigue Failure, Shafts | Bears (1)  
Chapters 11.1-3 | Mechanical Drawings (Manual)  
**Presentation All PPT slides due** |
| 03/29 – 04/02 | Bearings (2)  
Chapters 11.4-6 | Tolerancing (1)  
Manual (Hand-out) | Tolerancing (2)  
Manual (Hand-out) |
| 04/05 – 04/09 | **No Class (Traveling), Fasteners (1)**  
Chapters 8.1; 8.3-4; 8.6-8 | **No Class (Traveling), Fasteners (2)**  
Chapters 8.2 | **HW #4, Quiz IV Review** |
| 04/12 – 04/16 | **Quiz IV**: Bearings, Tolerancing,  
Fasteners  
| **No Class (Traveling)**  
Work on final presentation | Mechanical Drawings (Manual) |
| 04/19 – 04/23 | Mechanical Drawings (Manual) | Case Studies | **Presentation**  
**Peer Evaluations** |
| 04/26 – 04/30 | **Presentation** | **Presentation** | **Presentation**  
**Peer Evaluations** |
| 05/03 – 05/07 | **Final Week (Presentation)**  
**Final Report** | | |