ME 4250 Mechanical Engineering Design I
Course Syllabus
Mechanical Engineering Department
Wayne State University

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Term: Winter 2005
Class Schedule: T TH, 3.30 PM - 5.20, Room 0121 MAIN.
Course Reference Number: 22639
Office hours; T TH, 1.00 PM - 3.00 PM, others times by appointment

Prerequisites: ME 3480 (Design of machine Elements), ME 3450 (MFG Processes 1),
ENG 3050 (Technical Communication 1).
Prerequisites by topics: Statics, Mechanics of Materials, Design of Basic Machine Elements,
Manufacturing Processes, Principles of Design for Manufacturing, Computer
Aided Design.


Overall Course Goal: Students who successfully complete ME 4250 will be able to:
Design and analyze basic machine elements and synthesize machine elements in complex
mechanical designs using principles of Design for Manufacture.

Course learning objectives:
(Letters in brackets refer to BSME Program Outcomes A – J. Numbers in brackets refer to method of
evaluation, with 1=Homework; 2=Exams; 3=Design Project; 4=Computer Aided Design;
5=Presentations).
Students who successfully complete ME 4250 will be able to:
   a) Develop and analyze technical solutions for mechanical assemblies, capable to efficiently
      perform a specific task {A, C, G, I, J; 1, 2, 3}.
   b) Identify loading of machine elements and perform stress and deformation calculations to
      design safe machines and machine parts {A, C, D, F; 1, 2, 3, 4}.
   c) Judiciously select the material for machine parts considering operating conditions and cost
      effectiveness {A, I; 1, 2, 3}.
   d) Consider environmental impacts of the design and take measures to avoid environment
      deterioration {F, I; 3}.
   e) Use computers to produce Technical Drawings necessary for manufacturing and assembly
      {B, D, G; 1, 3, 4}.
   f) Develop creativity, communication skills, and ability to work in teams {B, G, H; 3}.

Relation of Course to Program Educational Outcomes:
Strongly contributes to the BSME Program Educational Outcomes that successful students will:
• be able to understand scientific principles and apply them to the practice of engineering [A];
• be able to communicate effectively [B];
• posses the problem-solving skills, background, and confidence necessary to educate
  themselves continually throughout their careers [C];
• be able to practice engineering with ethical standards and a responsibility to society [F];
• be able to develop creative solutions to engineering problems [G]
• be able to work well as part of a team [H]
• be able to apply the design process to engineering problems, including the consideration of different technical alternatives while bearing in mind cost, environmental concerns, safety, and other constraints [I].

Contributes to the BSME Program Educational Outcomes that successful students will:
• be able to apply computers as tools for engineering [D];
• be able, based on first-hand design experience, to analyze, (construct, test), and evaluate an engineering design [J].

Grade: Two Tests 40% (20%, 20%), Homework 10%, Design Project (Written Report) 25%, Design Project Presentation 15%, In Class Activity 10%.
Grades are computed as follows: A = 90%+, A- = 87%+, B+ = 83%+, B = 80%+, B- = 77%+, C+ = 73%+, C = 70%+, C- = 67%+, D+ = 63%+, D = 60%+, D- = 55%+, E = less than 55%.

Interim Tests: Two interim tests are scheduled for Thursday, February 10 and Thursday March 10, 2005. They will be open book, open notes tests.

Design Project: In the fifth week of class, teams of four students will be constituted and each team will receive the specifications for the design of a mechanical device. During 10 weeks the student teams shall complete the design project, write the final report and develop the technical drawings for the assembly and the main parts of the mechanical device. In the last week of the semester, a session will be organized for the presentation of the design projects.

Attendance Policy: All students are required to attend classes and participate actively to the discussions and solutions of the presented problems.

Homework Policy: The students will have to solve problems related to the topics presented in class. Each week their homework will be collected and rated.

Incomplete Work: A grade of "I" (i.e., incomplete) will not be given for any reason. A final grade will be given on work completed by the end of the semester.

Policy of Withdrawal: Last day for tuition cancellation for courses officially dropped is the end of the second week of classes. The last day to withdraw from the class, without a notation of W on the transcript is the end of the fourth week of classes. All drop/add activity during the first 4 weeks should be done through Pipeline. Between the end of the fourth and fifth weeks, withdrawals require permission of the instructor and must be submitted on a Drop/Add form to the Registrar’s Office. It is the policy of the College of Engineering not to allow withdrawals from courses after the end of the 5th week except under exceptional circumstances. Failing a class is not an acceptable excuse for withdrawal after the 5th week. Withdrawals after this time require the permission of the Associate Dean for Academic Affairs.

For the Winter 2005 semester, the following are the important dates pertaining to registration:
1. Monday, January 24, 2005, the LAST day to drop a class with a tuition refund.
2. Withdrawals within the first four weeks of class (through Friday, February 4), should be done via Pipeline.
3. Between February 4 and February 11, withdrawal from a course requires approval from the course instructor. This approval should be provided on a Drop/Add form that is then presented to the Registrar’s Office.
4. The College of Engineering DOES NOT ALLOW withdrawal from courses
after the FIFTH week of classes (Friday, February 11) except under exceptional circumstances. FAILING of a class is NOT an acceptable excuse for withdrawal after the 5th week. All requests for withdrawals after the 5th week must be made to the Associate Dean for Academic Affairs.

### Course Outline

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<tr>
<th>Week</th>
<th>Lecture</th>
<th>Design Project</th>
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<tr>
<td>1. Jan. 11 &amp; 13</td>
<td>Basics of Mechanical Design (recap.)</td>
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<td>2. Jan. 18 &amp; 20</td>
<td>Gearing-general (geometry of gears)</td>
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<td>4. February 1 &amp; 3</td>
<td>Design of Bevel &amp; Worm Gears.</td>
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<tr>
<td>5. February 8 &amp; 10</td>
<td>Test #1(gear-sets). Design of Shafts.</td>
<td>Formation of the student teams and specifications of the Design Projects</td>
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<td>8. March 1 &amp; 3</td>
<td>Design of Flexible Mechanical Elements (Belts &amp; Chains).</td>
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<td>11. March 29 &amp; 31</td>
<td>Selection of the Rolling Bearings &amp; Sealing Elements, Lubrication of the speed reducer</td>
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<td>12. April 5 &amp; 7</td>
<td>Develop Technical Drawings and Written Report.</td>
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<td>14. April 21</td>
<td>Design Project Due for Grading.</td>
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<tr>
<td>15. April 28</td>
<td>Presentation of the Design Project.</td>
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### Student Conduct

It is the responsibility of each student to adhere to the principles of academic integrity. Academic integrity means that a student is honest with himself/herself, fellow students, instructors, and the University in matters concerning his or her educational endeavors. Thus, a student should not falsely claim the work of another as one’s own, or misrepresent him/herself so that the measures of one’s academic performance do not reflect his/her own work or personal knowledge. In this regard, cheating will not be tolerated. Cheating includes (but is not limited to) any communication (written or oral) during examinations and shearing of work, such as using the same models or computer programs or copying work. All homework must be an individual effort and the design project should reflect the specific contribution of each student in the team. **STUDENTS WHO CHEAT ON ANY ASSIGNMENT OR DURING ANY EXAMINATION WILL BE ASSIGNED A FAILING GRADE FOR THE COURSE.** Therefore avoid all appearance of improper behavior! Students who witness cheating should report the incident to the instructor as soon as possible. Students are also welcome to discuss any concerns related to cheating with Dr. Kline, Chair of Mechanical Engineering.