

ENGR 3300: Mechanism Design I
Monday, Wednesday, 9:05 – 9:55 AM
(Lab) Friday: Pro-E/Mechanics and Matlab, 10:10 – 11:00

Fall 2008
Room 316A
Room 219

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Office Hours: By appointment

Text: Mechanical Engineering Design, seventh edition, by Joseph Shigley, Charles Mischke and Richard Budynas, McGraw Hill.

Hand Outs: Pro-E and Matlab

Course Objectives

This course provides an introduction to the basic design principles for machine design, and serves as the first course in the two part series on Mechanism Design. This course will provide the students with skills that are applicable to all aspects of engineering design. In-class examples and case studies will bring in applications of the principles and concepts covered. An opportunity for real world application of the concepts covered in this class will be gained from the design project using Pro-E CAD software and Matlab engineering analysis software. Students are encouraged to investigate areas related to biomedical and agriculture engineering, embodying machine design principles and related tools such as CAD, FEA and CAE. Efforts will be made to arrange an industry visit of a local company engaged in engineering activities that reflect aspects of machine design and CAD tools etc.

Exams and quizzes will be closed book, and closed notes.

Course Prerequisites:

ENGR 2130 Dynamics
ENGR 2140 Strength of Materials

Courses that require this course as a prerequisite:

ENGR 4300 Mechanism Design II

Course Topics

Part I: Introduction and Concepts

- Introduction to design
- Statistical Considerations
- Materials and processes
- Design Project kickoff and Start of Matlab & Pro-E tutorials

Part II: Loading and Stress Analysis

- Load analysis in 2-D and 3-D
- Beam loading
- Torsion loading
- Stresses in pressurized cylinders rotating rings and temperature effects

Part IV: Deflections and Stiffness

- Springs
- Torsion
- Beams
- Strain energy
- Columns
- Impact

Part V: Failure Resulting from Static and Variable Loading

- Ductile and brittle materials
- Fracture mechanics
- Fatigue failure theory
- Surface failures

Part VI: Final Exam Course Review and Design Project Presentations

Course Grading

Homework	15%
Matlab exercises	5%
Quizzes	5%
Design project	20%
Tests (2)	30%
Final Exam	25%

Grading Scale

A	94.0-100
A-	90.0-93.9
B+	87.0-89.9
B	84.0-86.9
B-	80.0-83.9
C+	77.0-79.9
C	74.0-76.9
C-	70.0-73.9
D	60.0-69.9
E	0-59.9

General Course Policies

- **Attendance.** *Classroom attendance is mandatory.* Absences are only allowed in case of illness, emergencies, or special circumstances. In case of absence, a written notice or explanation must be submitted to the lecturer. Lectures will serve as an overall summary of the topic. You will be held responsible for any material discussed in the lecture, whether treated in the textbook or not. *There will be no opportunity to make up missed assignments, quizzes or classroom exercises.* In case of serious illness or emergency, your grades will be prorated.

A student may be withdrawn from this course by the instructor without notification to the student for excessive absences or for failure to complete necessary prerequisites. For this course, "excessive absences" is defined as absences from all of the first three class meetings or five (5) or more absences from any contiguous ten (10) scheduled class meetings.

- **Preparation.** You will be expected to come to class prepared for each lecture. This includes reading the relevant sections in the text to be covered before coming to lecture.
- **Participation.** You are encouraged to ask questions during the lecture regarding any aspects of the readings, homework or lectures that are unclear to you. This will keep the class interesting for all and aid in learning by all. In addition, you may be called upon to answer questions, to comment on problem solutions, and/or lead discussions related to the lecture material. Demonstrating reasonable participation will require daily preparation and staying current with assignments.
- **In Class Assignments.** In class exercises will be done either individually or in small groups. These generally will be worked through together in groups, but some may be given as a quiz. Exercises may be required to be finished at home and turned in next class session. **Bring calculator and extra paper to class each day to be prepared.**
- **Homework.** Homework will be given on occasion and may be a continuation of the in-class studies.
- **Performance Review.** As preparation for an engineering career, each student will be required to schedule a brief “performance review” during the semester. During this interview you will be asked to honestly summarize how well you are mastering the material and keeping up with the class. We will then discuss how to adjust your work to perform the best possible for the remainder of the course.
- **Study Projects.** Two projects will be conducted for this course. One will be a group design effort for a special purpose machine in conjunction with the agricultural extension. A second will be an individual study investigation paper to be written during the course of the semester. This paper will allow you to investigate in more detail a real world problem from a selection of suggested topics. A separate handout will describe the intent and format for this assignment, which will be in lieu of a mid-term examination.
- **Exams and Quizzes.** In-lieu of a midterm exam, a midterm practice session will be held. This will be in essence a class discussion, review and practice problem session of topics covered to date and will count as part of the in-class portion of the final grade. A final exam will be given which will be open book, open notes. Quizzes will be held at various times during the semester to provide feedback and as an aid in learning the subject matter.
- **Communication Quality.** The general UGA policy of having 30% of the grade reflect the quality of written and oral communication will be applied. For this investigation study paper, approximately ½ of the assignment grade will be on the written communication. For this course, the primary written and oral communication is expressed in terms of the organization presented on your project and investigation paper assignments and orally, such as during the performance reviews. Why is this important? In industry and the workplace if you can not effectively communicate your results to your supervisor, clients, or co-workers, then you have not completed the task and it never happened.
- **Grading.** Grading will be curved based on overall class breakdown.
- **Ethical Conduct.** Communication between students in working on in-class exercises and other work beside the exams is encouraged. Students are expected to maintain the high ethics of the engineering profession during the course; unethical behavior such as cheating on an exam or copying other’s work will be dealt with severely according to the policies and procedures on academic honesty of the University of Georgia.
- **General.** Hats are not to be worn in the class. As a courtesy to all, please turn off all cell phones, pagers, etc. are to be turned off before class starts.

University and Departmental Policies

ACADEMIC HONESTY

The University of Georgia seeks to promote and ensure academic honesty and personal integrity among students and other members of the University Community. A policy on academic honesty has been developed to serve these goals. All members of the academic community are responsible for knowing the policy and procedures on academic honesty. The document for academic honesty may be found at the web site for The University of Georgia Office of Senior Vice President for Academic Affairs and Provost.

ENGINEERING PROFESSIONALISM POLICY

The engineering profession is governed by a code of ethics that have developed alongside the rigors of the practice and its many contributions to society. Engineering students at UGA are responsible for maintaining the highest standards of professionalism and professional practice. Engineering faculty at UGA expect students to act in a professional manner at all times.

DEPARTMENTAL GRADING POLICY REGARDING COMMUNICATION SKILLS

Thirty percent of the grade on all written assignments (lab reports and papers) and oral presentations will be based on quality of communication. Spelling, grammar, punctuation, and clarity of writing are evidence of written communication quality. Enunciation, voice projection, clarity and logical order of the presentation and effective use of visual aids are evidence of oral communication quality.