ME 3070 - Foundations of Mechanical Systems
Online Summer II 2015
Professor: Lonny Thompson

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Class website: Blackboard

Course information: On-Line course.

Course Description: Introduction to physical elements and mechanisms that define basic mechanical engineering systems. Application of kinematic and kinetic analysis to mechanisms and the role of design in mechanisms.

Prerequisites: ME 2010, and ME 2040 (or concurrent enrollment).

Required Textbook:

R. Norton, **Machine Design: An Integrated Approach**, 5th Ed., Prentice Hall, 2014

Required Course Notes:

Lonny Thompson, **Kinematics and Dynamics of Mechanisms and Machines**, 2015 (available for purchase from Campus Copy Shop).

On-Line Course Structure:

The course is entirely on-line including exams.   The course will have a structured time-line and is not self-paced. There will be regularly scheduled reading from the required textbook and course notes. There will be several assignments due each week. The due date times will be posted for each assignment; assignments can be submitted early. All on-line submissions will be conducted using Blackboard. Help questions and discussions will be done at all hours using email and Blackboard Discussion boards. The midterm exams and final exam will be conducted entirely on-line using Blackboard. Midterm exams and final exam are given on-line in the evening hours; typically after 6:00 pm.

Assignments:

- There will be several assignments due several times each week (the course is not self-paced, but instead will follow a time-line).
- Problem solutions should be of professional quality (clear, concise, correct, and conscientious).
- Include clear sketches and illustrations, annotations to describe work flow, assumptions.
- Include enough space around problem solution for clarity; usually 1 or 2 problems per page.
- For assignments requiring Matlab, include copy of source code report (not separate files).

- Problem sets and assignments will be posted on Blackboard (BB). If you do not have access to BB, it is your responsibility to ensure that these assignments are obtained from another student in the class or written request to instructor.
- Some assignments will be worked in groups of students, one assignment to be submitted per group. When group work is assigned, the number of students in a group will be specified.
- Analysis and design will usually involve symbolic variables in order to establish relationships, with numerical values for input parameters assigned for a particular instance during motion.
- Assignments must be submitted Electronically as PDF file(s) directly using Blackboard. ***Only assignments submitted on Blackboard will be accepted for grading. Assignments sent by email or other means will not be accepted or graded, regardless of circumstances.*** Scan handwritten work as necessary as PDF Files. Clemson photocopy machines in the Library can send as PDF file to your email account at no charge. Other options include: SmartPhone Apps: On iPhone, use apps such as "JotNot", "TinyScan" or "DocScanner". On Android phone you can also try "CamScanner." These apps will function as a scanner using the built-in camera phone. To use them you put your work on a flat surface with good lighting and the take a picture of it using the camera phone. The captured image can be cropped and then emailed or sent to Dropbox and other media as a PDF file. Use the App and/or PDF software to combine multiple scanned pages into one file.
- Here are some ideas on how to merge (combine) PDF files into one file.
- Many mobile apps have this feature already built-in.
- For Library copy machines, feed pages through tray, then all pages should be in same PDF file.
- On Mac computers, use Preview application provided by Apple.
- http://www.pdfmerge.com
- http://foxyutils.com/mergepdf/
- http://codesforus.blogspot.com/2010/06/software-for-attaching-pdf-files.html
- http://www.wikihow.com/Merge-PDF-Files-With-PDF-Merger
- http://www.wikihow.com/Merge-PDF-Files
- http://tv.adobe.com/watch/acrobat-xi-tips-tricks/how-to-combine-pdf-files-using-adobe-reader/

To combine PDF files into a single file on Mac; in Preview, View Thumbnails for both open files. Drag the Thumbnail in the left window pain from one file Prevew and drop in the thumbnail window pain of the second file Preview; this combines Thumbnails; when you close the Preview, the file is combined.

Academic Integrity, Honesty and Ethical Issues:

- Ethical behavior and professional standards are expected in this class. All work submitted is to be that of the individual student unless cooperative effort is authorized in specific instances. The College of Engineering and Science Honor Code will be observed.   Refer to your student handbook regarding University policies on academic dishonesty.
- As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning." Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.

- During a test, any use of a cell phone or other wireless device, any discussion by any means, any copying or using unauthorized written sources constitutes cheating. Discovery of cheating will result in immediately failure of the course (not just of a particular test) followed by making a charge of academic dishonesty with the University. There is NO Forgiveness of failures that are associated with academic dishonesty cases.

Computer Usage:

Word processing (MS Office), and mathematical computation utilities including Matlab and Excel spreadsheets may be used by the students throughout the course for analysis, plotting graphs, and automation for design, and for documenting results. Students should have Microsoft Word, Powerpoint, and Excel Spreadsheet loaded on there local computers. Matlab should be installed on your computer. on your computer. A software mechanism is available using Virtual connection to Clemson Network (VPN) to access University software licences required by Matlab (use of a local student version of Matlab is another option).

Weighting for Grade:

Description	Weighting
Assignments	20%
Two Midterm Exams	2x(20)=40%
Final Exam	40%
Total	**100%**
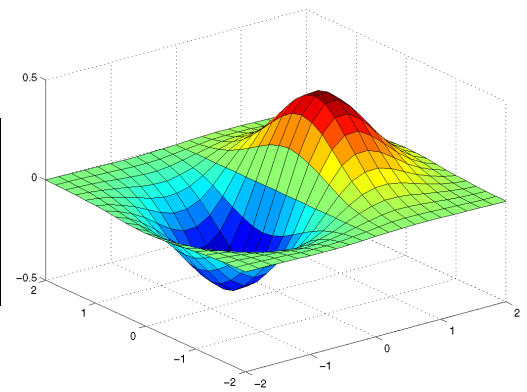
Midterm exams and final exam are given on-line in the evening hours; typically after 6:00 pm. The assignments are weighted; each assignment will have a different amount of points possible. The total number of points earned summing all assignments determines your Assignments score. The final exams will not be returned to students.

Course grades will be assigned as follows: A=90-100, B=80-89, C=70-79, D=60-69, F=0-59. No curving will be done based on class average. No make up tests will be given. There will be no "extra credit" work.

Title IX: Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator and Director of Access and Equity, located at 111 Holtzendorff Hall, 864-656-3181 (voice) or 864-565-0899 (TDD).

Topical Outline

1. Introduction to machine elements and mechanical systems – terminology, functionality, basic operation and application, design considerations.
2. Kinematic and force analysis of linkages.
3. Kinematic and force analysis and selection of gears.
4. Kinematic and force analysis of cams.
5. Kinematic and force analysis of belts and chain drives.
6. Kinematic and force analysis of power screws.
7. Power transmission shafting.
8. Mechanical springs selection and force analysis.
9. Dynamic force analysis - rotating equipment.
10. Rolling elements and bearings.
11. Braking and clutching systems.