Fall 2019

ME 316-101: Machine Design

Trivikrama Pala

FALL 2019

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ME 316 Machine Design

CKB 317 Class Room

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OUTLINE

Required Text: Machine Design, 5th edition, Robert L. Norton, Pearson Prentice Hall 2014

Grading:

Exam 1	20%, Oct 17th, 2019
Exam 2	20%, Nov14th, 2019
Home Work	5%,

These dates are tentative and will be confirmed

Project	20%
Final Exam	35%

Permitted aids on exams: Course text and non-programmable calculators only

Design Project

You and your partner will undertake a detailed engineering design of a specified product (either problem #9-11 or #9-13. This will include:

- analysis of all functional requirement of the product
- consideration of various preliminary design options (possible solutions)
- detailed analysis of engineering performance (analytical and FEA); e.g. stress, deflection, stability (buckling etc.), fatigue, strength of joints (welds, bolts, screws, rivets, adhesives etc.)
- preliminary proposal of manufacturing methods and materials for custom components and overall assembly of the final product
- details of off-the-shelf components to be used
- cost estimate

Project dates: Registration of the project team and topic with me by **September 12th, 2019 by 6:00PM** (late penalty 2% per day). Register by sending me an email with the names and email addresses of two team members and the design topic. **Final report due on November 21st, 2019 at 6 PM** (late penalty 10% per day).

Make sure you discuss your plans and project progress with me regularly by emails and after the class hours.

Grading Scale: A if the average is 90% or above and Fail if the average is below 60%. The breakdown of the grades between A and F will be decided at the end of the semester.

Prerequisites: ME 215 Materials and Processes, ME231 Kinematics of Machinery and ME315 Stress Analysis

How to get a good grade:

Work on the assignment problems given corresponding to each lecture. Try them first on your own. Keep up with the lectures and ask me for help after the lecture class hours– don't let your questions pile up. It's a good idea to read carefully the sections of the text that complement or correspond to the lectures. The exams may refer to general information provided during the lectures but not found in the text. Attending the lectures will make it much easier for you understand the problems and focus on the most important material. Read the project report guideline for producing a proper design report.

Reading Assignment
To follow along with the lectures, it is recommended that you read: Ch.1 Sections 1.3-1.6, 1.10 and Ch.2 Sections 2.2-2.8. This material will also be covered in the exams.

Tentative Schedule for ME 316 Machine Design Fall 2019

Week	Topic	Date
1	Ch.3. Kinematics and Load Determination and Ch. 4	Sept 05, 2019
2	Ch.4 Stress, Strain, and Deflection	Sept 12, 2019
3	Ch4 and Ch.5 Static Failure Theories	Sept 19, 2019
4	Ch.5 Static Failure Theories Cont.	Sept 26, 2019
5	Ch.6 Fatigue Failure Theories	Oct 03, 2019
6	**Exam 1;**Ch. 6 Fatigue Cont.	**Oct 10, 2019**
7	Ch.10 Shafts Keys and Couplings	Oct 17, 2019
8	Ch.11 Bearings and Lubrication	Oct 24, 2019
9	Ch. 7 Surface Failure	Oct 31, 2019
10	**Exam 2** and Ch.15 Screws and Fasteners	**Nov,07, 2019**
11	Ch.12 Spur Gears and Ch. 13	Nov 14, 2019
12	Ch. 14 Spring Design	Nov 21, 2019
13	Ch. 17 Clutches and Brakes	Dec 05, 2019
14	Ch. 15 and Ch.16 Weldments	Dec 12, 2019
15	**Final Exam**	**Dec 19, 2019**

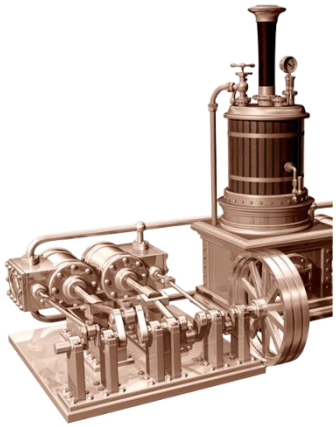

Image of an old steam engine obtained from www.asme.org
It shows some of the important components of machines. In this course, you will learn how to design such components.

NOTE: All the above items may be subject to change as per instructor's discretion. (For example, the Grading Scale may be adjusted to reflect the class average.)

Home Work	Problems
1	Ch. 1 and Ch.2 reading 2-1,2-4,2-5,2-13,2-15 3-1, 3-4, 3-5, 3-10, 3-17
2	3-7,3-8, 3-11, 3-15, 3-21,3-22, 4-3, 4-4, 4-7, 4-8,4-17,4-18, 4-19, 4-21, 4-22, 4-30a, 4-53, 4-67
3	5-1a,c,e, and j 5-3, 5-4, 5-7, 5-8, 5-10, 5-11, 5-17, 5-22, 5-49, 5-54
4	6-1b, c, and h, 6-2b, 6-3, 6-4a, 6-5a, 6-7, 6-20, 6-33a, 6-37,6-54, 6-55, 6-56, 6-57
5	6-19, 6-30, 6-34a, 6-38, 6-42
6	10-1a, 10-9a, 10-11a, 10-31a.
7	11-1,7a,7-2, 7-7, 7-13, 7-14, 7-16, 7-19, 7-24, 7-30