ME 3250, Mechanics of Materials, Winter 2018, CRN 13339, TR 10:00 ~ 11:47, UC2 129

Designation : A required course for all ME students.

Course Description – CATALOG DATA ME 3250 Mechanics of Materials (4)

Introduction to the mechanics of deformable bodies: distribution of stress and strain in beams, shafts, columns, pressure vessels and other structural elements, factor of safety, yield criteria of materials with applications to design. With laboratory.

Instructor : Yin-ping Chang
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Office hours : TR 9:30 ~10:00 and after the class at MUC.
After the lectures on TR, Prof. Chang will be the last one who leaves the classroom.

TA : Mr. Chris Chen, lchen2345678910@oakland.edu,
Mechanics of Materials Lab, MUC UC2 133 & OU EC 454

Textbook : "Mechanics of Materials," by F.P. Beer, E.R. Johnston, Jr., J. T. Dewolf, and D. Mazurek, 7th Ed., McGraw Hill.

Pre-requisite : EGR 2800 (>2.0) and major standing

Pre or Co-requisite : ME 3200

HW/ Exam and Grading Policy : The HW include various textbook problems is due at the beginning of the class on the due date. Use letter size paper, one side of each page, and box the final answers. HW solutions will be provided and discussed (on due dates or when it's returned). **NO LATE HW WILL BE ACCEPTED!** Any questions about the grading should be addressed to the professor, **NOT the TA,** within one week after it's been returned. The final course grade will be calculated as follows:

HW assignments	17.5%	
Laboratories and Reports	17.5%	
Mid-term exam #1	65/3%	(open one page)
Mid-term exam #2	65/3%	(open one page)
Final Exam (comprehensive)	65/3%	(open two pages)

(According to OU rules, if your lab part failed, the class failed automatically.)

>95--4, >80--3, >65--2, >50--1, <50--0. (Grading scales) Any questions about the grading of all the papers should be addressed to the professor, **not the TA**, within one week after it's been returned.

Academic Conduct : Students are encouraged to discuss HW assignments in a studying group, BUT everyone NEEDS to turn in individual work; and are expected to read, understand, and comply with the "Academic Conduct Policy" as explained in Oakland University Undergraduate and Graduate catalogs. If you cheat, you are not only hurting yourself, but also taking unfair advantage of the other students in the class. Violations and suspicions of cheating or plagiarism will be brought to the attention of the Academic Conduct Committee (ACC) for investigation. Students found guilty of academic misconduct in this course will receive a grade of 0.0 in addition to the sanction imposed by ACC.

It is required that all cell phone be put on silent or vibration during the class sessions. If you need to take a phone call, please excuse yourself quietly out of the classroom and take the call in the hallway.

Laptops/iPads are allowed in the class session for taking notes or presenting information to the class. Emailing, working on assignments or viewing sites unrelated to the course are prohibited.

TENTATIVE LECTURE CONTENTS & SCHEDULE

Dates	Lecture Topics	Reading Materials
1/4	Introduction	
1/9 & 1/11	Stress & Strain Definitions and Relations	Ch.1
1/16 & 1/18	Axial Loading	Ch.2
1/23 & 1/25	Torsion	Ch.3
1/30 & 2/1	Bending	Ch.4
2/6 & 2/8	Beam Shear Force and Bending Moment Diagram	Ch.5
2/13 & 2/15	Shearing	Ch.6
2/20 & 2/22	**Winter recess**	
2/27 Tuesday	**Mid-Term review, EXTRA office hours, Q & A**	
3/1 Thursday	**Mid-Term#1 (Ch.1 ~ 5)**	
3/6 & 3/8	Stress Transformations – Mohr's Circle	Ch.7
3/13 & 3/15	Strain Transformations – Mohr's Circle	Ch.7
3/20 & 3/22	Beam deflections	Ch.9
3/27 & 3/29	Columns	Ch.10
4/3 & 4/5	Energy Methods	Ch.11
4/10 Tuesday	**Mid-Term#2 (Ch.6 & 7)**	
4/12 Thursday	**wrap-up & review**	
4/17 Tuesday	**Final Exam review, EXTRA office hours, Q & A**	
4/19 Thursday	**Final Exam (accumulative, Ch.1 ~ 11, ~~Ch.8~~) 8:00-11:00 AM**	

CLASS ATTENDANCE IS STRONGLY RECOMMENDED

Objectives : By the end of the course, in corresponding to the **ABET Program Outcomes** (a) to (k) stated at the end of the syllabus, the successful student will be able to:

1. Calculate normal, shear and bearing stress in deformable solid bodies. (a, e)
2. Apply stress and strain transformation equations and Mohr's circle to determine stress and strain on different planes in solid bodies. (a, e)
3. Interpret the generalized Hooke's law and apply to deformable solid body problems. (a, e)
4. Determine the critical load conditions for column structures. (a, e)
5. Calculate the stress states on thin walled pressure vessels. (a, b, e, g, k)
6. Calculate the stress and angular deformation of circular shafts under torsional load. (a, b, e, g, k)
7. Calculate normal and shearing stresses in beams under bending and transverse loads. (a, e)
8. Calculate deflection of beams under various transverse load systems. (a, b, e, g, k)
9. Apply energy methods to the solution of various structures. (a, e)
10. Apply the principle of superposition to deformable solid bodies. (a, e)
11. Perform experiments, analyze experimental data and write and/or present technical reports. (a, b, g, k)

HELP ME HELP YOU!!

Laboratories :

Groups consisting of 7 ~ 9 students will be given approximately 1 hour to conduct an experiment and submit the report for each laboratory project. There are totally 4 labs listed as follows:

Lab #1: Stresses due to torsional and transverse loads
Lab #2: Bending moment in beams
Lab #3: Stresses in thin walled pressure vessels
Lab #4: Beams deflections

Lab #1 & Lab #3 will NEED to go back to OU main campus for the experiments. Lab #2 & Lab #4 stay at MUC. The lab schedule is different from the designated time/location, every team can make your own decision about load distribution. Participation and attendance is still definitely highly recommended.

Lab Report :

Laboratory report is due **two weeks** after the experiment is completed. Only one report is needed for each group. The students need to follow the **Lab Report Guidelines & Grading Criteria** format posted on moodle to compile the lab reports. The reports should be typed with proper-sized fronts. Be precise, neat, and organized.

Laboratory Individual Assessments for Teamwork:

All students will need to submit evaluations via moodle of how well they and their teammates performed in the team. These evaluations will be incorporated into the assignment of lab grades as stated in **Individual Lab Grade Adjustment** & **Peer Rating Form** posted on moodle.

ABET Program Outcomes :

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environ., social, political, ethical, health, safety, manufactured ability, sustainability
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global economical, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Prepared by / Date Prepared :

Prof. Yin-ping Chang / January 2, 2018