ASEN 3112 – Fall 2017

Structures

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* to discuss personal matters, students can request a one-to-one meeting with one of the instructors

Laboratory Coordinator: Trudy Schwartz
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Teaching Assistants: Mary Bastawrous
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Rubin Mathew
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Lab Assistant: Andrew Arnold, email: anar0908@colorado.edu

Course Assistants: Alan Sanchez, email: Alan.Sanchez@colorado.edu

Lectures: T/Th: 12:30 – 1:45 pm, FLMG 155

Recitations & Labs: Section 011 F: 1:00 – 2 :50 pm, ITLL 1B50**
Section 012 F: 3:00 – 4 :50 pm, ITLL 1B50**
Section 013 M: 3 :00 – 4 :50 pm, ITLL 1B50**

** if location for particular labs differs from the one stated above, the alternate location will be announced on D2L.

Class Web Site: DL2: https://learn.colorado.edu/ , ASEN3112

Class e-mail list: Through D2L only

Texts: Lecture notes are posted on D2L

Prerequisites: ASEN 2001-2003-2004 and APPM 2360, with grade of C or better in each.

Course Objectives: The main objective of the course is to introduce modern structural analysis techniques based on understanding of the development of internal forces, stresses and deformations. These are essential to the design and verification of advanced aerospace structures and systems. The course offers an introduction to matrix and finite element methods for skeletal (truss and frame) structures, as well as to fundamental concepts in mechanical vibrations, structural dynamics, and structural stability.

Major Course Topics and Schedule:

Week	Topic
1	The concept of stress and average stress
2	Pressure Vessels, Strain measures, Elastic behavior of materials I
3	Elastic behavior of materials II, Plane stress
4	Torsion I
5	Torsion II & III
6	Deformation of Beams I & II
7	Deformation of Beams III
8	Finite Element Method I & II
9	Finite Element Method III & IV
10	Structural Dynamics and Vibration I
11	Structural Dynamics and Vibration II & III
12	Structural Dynamics and Vibration IV & V
13	Fall Break
14	Structural Dynamics and Vibration VI
15	Stability of Structures I & II
16	Stability of Structures III & IV

Course Work:

Coursework consists of reading assignments, in-class clicker quizzes, homework, recitations, experimental/ computer labs, four midterm exams and one final exam. Attendance to recitation and labs is expected and may affect the student's score. Exams cover all material including lectures, recitations, laboratory work and homework.

Recitations: Recitations are offered on Fridays and Mondays (depending on the student's lab section) at the Active Learning Center of ITLL 1B50, in three sections of 1 hr. 50 min each. The main objective is to review material covered during the week, especially that helpful for the currently assigned homework. Recitations may also include additional exercise material, not covered in class, useful for midterm exam preparation. Recitations are replaced by lab demos (conducted at the same time, but in the ITLL Plaza area nearby) when laboratory and/or computer work is scheduled for the following week.

Reading Assignments: Reading assignments are to be completed before the lecture/discussion. The lecture/discussions should help to clarify and supplement what students have read.

Homework: Homework assignments are given most weeks on Thursdays and are due at the start of the following class on Thursday, as specified in the assignment. No homework assignments are posted due in the week of midterm exams. Assignments generally cover 4 to 5 problems and are designed to help students become proficient in a subject. Before doing any homework, students should read the posted lectures and try to follow worked-out examples. This should give the student an idea of the principles involved and the solution method. Homework problems may be also discussed in the recitation prior to the due date. All homework should be done on Engineering paper (the green-on-white ruled paper available at the bookstore). No electronic versions (e.g. PDF or WORD) is accepted. No late homework submissions are accepted.

Written work should be neat and readable with adequate space and margins. Messy work will be returned ungraded and a zero-score recorded. The main and essential steps of the solution approach need to be shown; failing to do so will result in a lower score. The final result needs to be indicated by an arrow, underline or box. Multiple answers when one is required will be counted as incorrect. Copying material from any resource (including solutions manuals) and submitting it as one's own are considered plagiarism and are an Honor Code violation.

Labs: Safety is the first priority for lab work involving experiments or use of computers. If you have not done so, students are required to attend an orientation and safety course presented by the ITLL staff in the first week of the semester. Anyone violating rules of safe conduct may be restricted from accessing the ITLL facilities. The three experimental labs are carried out in groups of five or six students. The groups are created randomly among student of the same lab section. Attendance is mandatory; missing part of a lab (demo, experiment) without cause or notification results in 50% of the student's report score being deducted. A student should contact one of the instructors or TAs in advance if the student cannot make attend part of a lab to make appropriate arrangements.

Computer Use: Several assignments and labs may require computer access and basic programming skills in languages such as MATLAB and Excel. As part of the introduction to finite element methods the use of the commercial FEM package ANSYS is taught for the computer component of Lab 2. Students will have access to the ITLL Plaza computers to do computer work.

Grading Guidelines:

Group work: *	4 Lab reports	25% (= 5% + 10% + 5% + 5%)
Individual:	Clicker Quizzes	10%
	Homework	20%
	4 Midterm Exams	30% (= 4 times 7.5%)
	Final Exam	15%
		100%

*Group work only counts toward final grade if the total individual grade is C or better. If the individual grade is below C, the final grade equals the total individual grade.

Notes:

- Clicker quizzes gauge the student's level of preparation of a lecture and the conceptual understanding of course material. The scores of the two lowest clicker quizzes are dropped. The quiz questions are discussed after the quiz during the lecture. No makeup quizzes are offered.
- Each homework assignment includes a set of several problems. The assignment is partially graded for completeness (10pts), while two randomly selected problems are graded in detail for technical content and presentation (10pts each, 20pts total). Thus, the final score for each homework set is out of a total of 50pts and computed based upon the numeric breakdown below:

$$HW\,\frac{Score}{50} = 20pts\ (Rand.P1) + 20pts\ (Rand.P2) + 10pts \times \frac{\#\ of\ Remaining\ Problems\ Completed}{\#\ of\ Remaing\ Problems\ in\ Set}$$

  Solutions for all homework problems are posted on D2L after the due date.
- Midterms cover material covered in the weeks prior to the exam. They provide a gauge to determine what an individual student has learned. The midterm exams are given at regular lecture hours in FLMG 155. All midterm exams are closed-book but a crib sheet is permitted. The maximum number of pages of the crib sheet will be announced separately for each midterm. No exam grades will be dropped.
- The final exam spans the entire course but with additional emphasis on material covered since the fourth midterm.
- All your scores and grades will be posted on D2L and need to be checked within 2 weeks after they are posted; requests to change a score need to be made within this period.
- We reserve the right to make minor changes to this distribution of weights based on variations in assignments.

Letter Grading Scheme:

Letter grades will be assigned as follows:

Letter	Grade Percent Grade	4.00 Scale
A	93.00 – 100.00	4.00
A-	90.00 – 92.99	3.67
B+	87.00 – 89.99	3.33
B	83.00 – 86.99	3.00
B-	80.00 – 82.99	2.67
C+	77.00 – 79.99	2.33
C	73.00 – 76.99	2.00
C-	70.00 – 72.99	1.67
D+	67.00 – 69.00	1.33
D	63.00 – 66.99	1.00
F	Below 63.00	0.00

Exam Times and Locations:

1. Midterm 1: 09/21, in class
2. Midterm 2: 10/12, in class
3. Midterm 3: 11/2, in class
4. Midterm 4: 11/30, in class
5. Final exam: 12/19, 4:30 pm – 7:00 pm, in FLMG 155

Course Policies and Procedures:

1. The instructors reserve the right to reply to email questions only in business hours, i.e. Monday through Friday, 8:00 am – 5:00 pm. Emails received 24 hours or less before the exams are not guaranteed to be responded to.
2. The instructors reserve the right to make changes to the weekly course schedule based on occurring events that require different dispositions. The instructors will give sufficient advanced notice through announcements in class and posting on D2L. Changes to this syllabus and assignments may be announced at any time during class periods. The instructors will post the current syllabus and assignments on D2L. Both are dated in the footnote.
3. This course exclusively uses D2L to send out announcements, to provide comments to students daily on class activities, and to provide general information about course assignments. It is strongly recommended that all students setup their D2L account such that they receive automatically a notification about new postings and updates to the D2L course page.
4. Acceptable excuses, such as medical certification of an emergency, are required to make up any exam. However, there is NO opportunity to make up clicker quizzes. Any other medical or academic-related absences need to be communicated and approved ahead of the expected absence. **These requests must be made in email to the instructor.**
5. If a student qualifies for accommodations because of a disability, the student is asked to submit an

accommodation letter from Disability Services to the instructors in a timely manner so that the student's needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website (www.colorado.edu/disabilityservices/students). Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If a student has a temporary medical condition or injury, see Temporary Medical Conditions under the Students tab on the Disability Services website and discuss your needs with your professor.

6. Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, students must let the instructors know of any such conflicts within the first two weeks of the semester so that reasonable arrangements can be worked out. See campus policy regarding religious observances for full details.

7. Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Class rosters are provided to the instructor with the student's legal name. The instructors will gladly honor requests to address the student by an alternate name or gender pronoun. Students are asked to advise the instructor of this preference early in the semester so that the instructors may make appropriate changes to the student's records. For more information, see the policies on classroom behavior and the Student Code of Conduct.

8. The University of Colorado Boulder (CU Boulder) is committed to maintaining a positive learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct, discrimination, harassment or related retaliation against or by any employee or student. CU's Sexual Misconduct Policy prohibits sexual assault, sexual exploitation, sexual harassment, intimate partner abuse (dating or domestic violence), stalking or related retaliation. CU Boulder's Discrimination and Harassment Policy prohibits discrimination, harassment or related retaliation based on race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Individuals who believe they have been subject to misconduct under either policy should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127. Information about the OIEC, the above referenced policies, and the campus resources available to assist individuals regarding sexual misconduct, discrimination, harassment or related retaliation can be found at the OIEC website.

9. All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the academic integrity policy. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, resubmission, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code Council as well as academic sanctions from the faculty member. Additional information regarding the academic integrity policy can be found at the Honor Code Office website.

Final Comments

The grading scheme in this course is not assigned to reward or punish. It is designed to indicate the student's level of competency compared to the standards set by the AES faculty. Does the student meet the minimum level of competency? Does the student exceed the minimum? Is the student below the minimum? This should be indicated by the final grade. The instructors are professionals and it is their job to set and maintain standards. The instructors are expected to use our education, experience, and interactions with industry, government laboratories, others in academe, etc., to determine the content of these standards. Because the CU Aerospace Engineering program is accredited by ABET (Accreditation Board for Engineering and Technology), the AES curriculum meets that board's requirements. As with any other professionals (doctors, lawyers, etc.) the students must trust that the instructors know what they are doing and that they are obliged to uphold standards.

The final grade indicates the student's readiness to continue to the next level of courses. Meeting the minimum requirements indicates that the student is prepared to continue at least at the minimum level required for the next in the sequence of courses. Exceeding the minimum means the student is ready to enter the next course and that the student has mastery of material beyond the minimum, i.e., the student shows some level of proficiency.