

ASEN 3112 – Fall 2021

Structures

Instructor: Francisco López Jiménez
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Office Hours*: Tuesday 8:30 AM – 9:30 AM, AERO 303

* to discuss personal matters, students may request a one-to-one meeting with the instructor

Laboratory Coordinator: Katie Rae Williamson
Office: AERO 141E
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Teaching Assistants: Ishaan Kochhar isko2695@colorado.edu
Office hours: Thursday 5:00 PM – 6:00 PM, AERO 302
Friday 10:00 AM – 11:00 AM, Zoom

Clara Bader

Peter DiCerbo peter.dicerbo@colorado.edu

Office hours compiled: Monday 10:00 AM – 11:00 AM, AERO 302

Lectures: M/W/F: 02:20 PM – 3:10 PM, AERO 120

Recitations & Labs: Section 011 TH: 12:50 PM - 02:40 PM, AERO N100
Section 012 TH: 3:00 PM - 04:50 PM, AERO N100

Zoom link:

Class website: CANVAS, <https://canvas.colorado.edu/>, ASEN3112

Class e-mail list: Through Canvas only

Online discussion forum:

Note: All technical questions about homework assignments, lab assignments, etc., must be posted on public channels in Slack first. The instructor and the TA/TFs will not reply to these questions over email or private messages on Slack and Canvas. Students are **strongly encouraged** to answer each other's questions. This is a great way to work together to solve problems, and not have to wait for an instructor or TA/TF response.

Texts: Lecture notes are posted on Canvas

Prerequisites: ASEN 2001-2003-2004 and APPM 2360, with grades of C or better in each; if course was taken Spring 2020: with grades of C- (P+) 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	Stress and Strain
2	Stress and Strain – Material laws
3	Material laws – 2D Elasticity
4	Stress Transformation

6	Energy Methods
7	Energy Methods
8	Finite Element Method
9	Finite Element Method
10	Finite Element Method – Structural Dynamics and Vibration
11	Structural Dynamics and Vibration
12	Structural Dynamics and Vibration
13	Structural Dynamics and Vibration – Stability of Structures
14	Fall Break
15	Stability of Structures – Design Problems
16	Design Problems

Coursework consists of reading assignments, in-class clicker quizzes, homework, recitations, experimental/ computer labs, three midterm exams, and one final exam. Attendance to recitation is expected; **attendance to labs is mandatory**. Exams cover all material including lectures, recitations, laboratory work and homework.

Recitations: Recitations are offered on Thursdays in AERO N100, in two 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 (xseci iy 3E (t)-6 (h)-4 4 (s)-4 (am)-e (at)-6 (i).

Coordinator if you have trouble completing the guide. Anyone violating rules of safe conduct may be restricted from accessing the co-PILOT facilities. The four experimental labs are carried out in groups of varying size. 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 the instructor in advance if the student cannot make attend part of a lab to make appropriate arrangements (see also section on Course Policies and Procedures).

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 P*91 (L 604TJ-0.0-2 2 (s)-1 t)-2ad()Tj0.05 duMtttd P

- x Midterms cover material discussed 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 AERO 120. 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 makeup exams will be offered.
- x The final exam spans the entire course but with additional emphasis on material covered since the third midterm.
- All your scores and grades will be posted on CANVAS and need to be checked within **2 weeks** after they are posted; requests to change a score on CANVAS need to be made within this period. These requests must be made in email to the instructor. The subject line of the email should read:

ASEN 3112 – Request for score change for <exam/lab/homework> <ld>

- Graded homework and lab reports are returned via Gradescope; see information below. Students should check the assignment for grading correctness and request a change of score via Gradescope if incorrect grading is found.
- Midterms are returned during recitations and office hours. Students can check the assignment for grading correctness during these times and request a change of score if incorrect grading is found. Once a graded assignment is taken outside the recitation class room (co-PILOT) or the room used for office hours, no change of score can be requested.
- About Gradescope: Students will receive an email to sign up. Students will need to upload their assignment. In case of hand-written assignments, students can use a smartphone or use scanners at the CU library. Should a student not have access to either, please, contact the instructor within the first two weeks of the semester. Instructions on how to upload assignments can be found at help.gradescope.com.

Instructions on uploading assignments can be found at:

https://www.youtube.com/watch?v=KMPoby5g_nE.

Instructions on viewing scores and feedback after an assignment is graded can be found at:

https://www.youtube.com/watch?time_continue=2&v=TOHCKI12mh0.

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:

- Midterm 1: Friday, September 24nd, during lecture time
- Midterm 2: Monday, October 18th, during lecture time
- Midterm 3: Wednesday, November 17th, during lecture time
- Final exam*: Tuesday, December 14, 4:30 PM – 7 PM

* date is not confirmed yet by CU campus and may change.

Course Policies and Procedures:

1. The instructor and TAs/TFs reserve the right to reply to

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. For more information, see the policies on [classroom behavior clSnk \(-\)-10 ud-2 \(i\)-2 \(on C\(e\)TJ-duo i\)-2 \(ndi\)-1.15 Ttat \(s\)&c 0.00C\(.](#)

dishonesty. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu); 303-492-5550). Students found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found on the [Honor Code website](#).

- 11. Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation:** The University of Colorado Boulder (CU Boulder) is committed to fostering an inclusive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, or protected-class discrimination or harassment by or against members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or email cureport@colorado.edu. Information about OIEC, university policies, [reporting options](#), and the campus resources can be found on the [OIEC website](#).

Please know that faculty and graduate instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, dating and domestic violence, stalking, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about their rights, support resources, and reporting options.

- 12. Religious Holidays:** 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 instructor know of any such conflicts within the first two weeks of the semester so that reasonable arrangements can be worked out. See the [campus policy regarding religious observances](#) for full details.

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 their 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.

In addition to technical competence, professionalism, initiative, and self-sufficiency are expected from students. Deadlines (for assignments, for regrading requests, to give notice of conflicts) will be enforced, if nothing else to ensure fairness among students. Students are encouraged to attend office hours and receive all the help needed to complete assignments; however, they will be expected to come with specific questions after having already attempted to solve the assignments.

However.

I understand that life happens, particularly during a pandemic, which will certainly still apply to the Fall of 2021. If you have an emergency (loss of job, sickness in family, mental health issues, unforeseen COVID related difficulties), please let the instructor know as soon as possible. Even if you are just overwhelmed by your life situation, please let me know as soon as possible. I expect professional, serious, focused students, not robots. But I can only help you if you give me enough warning, and we can take action when it is still possible to do so (not, say, after the solution for an assignment is posted). So, if something happens, let me know, and we will figure something out.

Let's try to have the best semester possible.