Class Sites:

Lecture – 1312 Hoover, M 4:10-5 (all sections)

Laboratory – 0257 Howe. Meet on Tuesday (Section 2: 2:10-4; Section 3: 12:10-2) or Thursday (Section 1: 2:10-4; Section 4: 12:10-2) of the weeks as listed in the Schedule below

Website: http://thermal.cnde.iastate.edu/aere322

Teaching Staff:

Instructor – C. Thomas Chiou, cchiou@iastate.edu
https://www.cnde.iastate.edu/directory/?user_page=cchiou,
https://www.cnde.iastate.edu/research/terahertz-imaging

Teaching assistants – Bishoy Dawood (Sections 2 and 3), bdawood@iastate.edu;
Do-Kyung (David) Pyun (Sections 1 and 4), dpyun@iastate.edu

Office Hours:

Chiou – 2361 Howe M 2:00-3:30; Dawood – 0237 Howe TU 11-12; Pyun – 0241 Howe F 11-12
or by appointment

Prerequisite: credit or enrollment in Aer E 321

Student Learning Outcomes/Objectives:

The lecture portion is designed to improve the knowledge in experimental techniques and review the theory and procedure of the laboratory experiments for studying aerospace structures. The laboratory portion provides hands-on experience and practice in engineering analysis and design. The topics that are covered in the lecture portion and laboratory portion of this aerospace structures laboratory course are listed below under Lab Topics.

Policy of Prerequisite:

It is the policy of the Department of Aerospace Engineering and the College of Engineering to require all students enrolled in this course to have satisfied all of the course's prerequisite requirements. If it is discovered that a student has not met any applicable prerequisite requirements, he/she will be required to immediately drop the course. The failure to drop the course will result in a final course grade of 'F', regardless of course performance. Students who discover they have improperly enrolled in a course without meeting the applicable prerequisite requirements are strongly encouraged to meet with advising staff to promptly drop the course and make alternative scheduling arrangements or discuss if an official waiver of the pre-requisite requirements may be applicable.

Laboratory Work and Reports and Homework:

Laboratory work are carried out in groups of 3-4 students. Every group member must be present and bring his/her *worked* pre-lab to the lab. The students will be asked to show their work in terms of worksheets, notes, etc. at the end of lab session. Each group is required to submit one report or summary for each laboratory experiment. **Unless stated otherwise, the report/summary will be due online the Friday in the following week (after all sections complete the lab) for Thursday sections and the following Wednesday (after Thursday sections are due) for Tuesday sections**. See Schedule below for lab dates.

Most lab reports and homework involve computer programming assignments for which MATLAB, Java, Python, C/C++, Fortran, etc. are the recommended languages. If a student is new to computer programming, a help file for accessing MATLAB is available in class web site. For further assistance, please contact the teaching staff.

Pre-lab and homework must be individually worked. Plagiarism and academic dishonesty will not be tolerated.

Grading:

Pre-lab (individual) 15%,
Report (group) 40%,
Homework (individual): 20%,
In-class quiz/work (individual): 25%

Individual weighting factor will be applied to each pre-lab, homework, quiz and report. Based on lab TA evaluations and the Work Assignments section in lab reports, a multiplicative factor is to be generated for each student in determining his/her final grade. Please also note that in-class quizzes/work count for 25% of final grade – please take them seriously! The following grade scale will be used, but the final grade may be adjusted or rescaled at instructor's discretion.

Letter Grade	Percentage	Letter Grade	Percentage
A	>93%	C	>74%,=<77%
A-	>90%,=<93%	C-	>70%,=<74%
B+	>87%,=<90%	D+	>67%,=<70%
B	>84%,=<87%	D	>64%,=<67%
B-	>80%,=<84%	D-	>60%,=<64%
C+	>77%,=<80%	F	=<60%

References:

- T.H.G. Megson, Aircraft Structures for Engineering Students 6e, 2017
- D. J. Peery, Aircraft Structures, 1950 (Dover reprint)
- A. Kassimali, Matrix Analysis of Structures 2e, 2012
- AerE 321 and EM 324 textbooks and class notes
- Other supplemental materials provided on lab basis

Safety:

As in any laboratory environment, **safety MUST come first**. **Please do not wear open-toed shoes to the lab. Each student MUST also bring his/her own safety glasses to the lab.** Safety glasses are available for purchase in the bookstore and also from a vending machine on the first floor of Hoover. **Each student MUST also take the following online safety training courses, and bring hardcopies of the certificates to the first lab session:**

1. *Personal Protective Equipment*
2. *Laboratory Safety: Core Concepts*
3. *Shop Safety Fundamentals*
4. *Fire Safety and Fire Extinguisher Training*

To take these courses, use web browser like Firefox, Chrome or Edge to access EH&S training site at https://training.ehs.iastate.edu/IowaSU/site/ (part of Learn@ISU). Set web browser to accept cookies and popups then sign in using your own ISU Net-ID and password. Search in Environmental Health and Safety catalog, scroll down to find the courses you need to take and click Launch. The online course will pop up in a few seconds in a separate window. If a student has already taken these classes, then he/she can re-print the certificates from My Learning Tracks on the lower right of screen.

Each lab will start with a safety briefing. Please pay attention!

Attendance:

Attendance in the laboratory work is mandatory. If a student misses a particular laboratory session due to an extenuating circumstance, he/she can make up for that laboratory work by attending another lab section during the same lab cycle. Consideration for makeups on lab work, prelab and report will only be given to those extenuating circumstances such as hospitalization, family emergency, military obligation and academic conference - proof will be required. **A student will receive automatic zero grade for any lab missed not under such extenuating circumstances.** Attendance in the lecture is not mandatory; however, **makeups for missing in-class quiz/work not under the extenuating circumstances mentioned above will not be considered**.

Academic Dishonesty

All acts of dishonesty in any work constitute academic misconduct. The Student Disciplinary Regulations will be followed in the event of academic misconduct. Depending on the act, a student could receive an F grade on the test/assignment, F grade for the course, and could be suspended or expelled from the University. Academic misconduct includes all acts of dishonesty in any academically-related matter and any knowing attempt to help another student commit an act of academic dishonesty that includes, but is not limited to (a) Obtaining unauthorized information, (b) Tendering of information, (c) Misrepresentation, and (d) Plagiarism, when performed in any type of academic or academically-related matter, exercise, or activity. See the Conduct Code at https://www.policy.iastate.edu/policy/SDR for more details (See 4.2.1) and a full explanation of the Academic Misconduct policies.

Accessibility

Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. Students requesting accommodations for a documented disability are required to work directly with staff in Student Accessibility Services (SAS) to establish eligibility and learn about related processes before accommodations will be identified. After eligibility is established, SAS staff will create and issue a Notification Letter for each course listing approved reasonable accommodations. This document will be made available to the student and instructor either electronically or in hard-copy every semester. Students and instructors are encouraged to review contents of the Notification Letters as early in the semester as possible to identify a specific, timely plan to deliver/receive the indicated accommodations. Reasonable accommodations are not retroactive in nature and are not intended to be an unfair advantage. Additional information or assistance is available online at www.sas.dso.iastate.edu, by contacting SAS staff by email at accessibility@iastate.edu, or by calling 515-294-7220. Student Accessibility Services is a unit in the Dean of Students Office located at 1076 Student Services Building.

Harassment, Discrimination and Equal participation

Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. It is the student's responsibility to ensure his/her own team participation and to involve all team members equally in the lab. **Exclusion, discrimination, and harassment will not be tolerated.** Any student who is experiencing or has concerns about such behavior should contact the instructor, Student Assistance at 515-294-1020, email dso-sas@iastate.edu, or the Office of Equal Opportunity and Compliance at 515-294-7612.

If an academic or work requirement conflicts with your religious practices and/or observances, you may request reasonable accommodations. Your request must be in writing, and your instructor or supervisor will review the request. More information may be found at: http://www.eoc.iastate.edu/discrimination/religious

Dead Week

This class follows the Iowa State University Dead Week policy as noted in section 10.6.4 of the Faculty Handbook: https://www.provost.iastate.edu/faculty-and-staff-resources/faculty-handbook *with the exceptions of Labs 9 and 10 and Homework 3 due.*

Academic Issues

If a student is experiencing, or has experienced, a problem with any of the above issues, please email academicissues@iastate.edu

Lab Topics

Practice experiment and data analysis: lab 1, HW 1

Stress concentration – photoelasticity: lab 2

Riveted joint design, fabrication and testing: lab 3

Strain gage applications and bending and tensile testing: lab 4a,b

Beam deflection and analysis: lab 5, HW 2

Composite laminate design: lab 6

Column buckling testing and analysis: lab 7

Thin-walled section and shear center: lab 8

Introduction to Nondestructive Evaluation: Lab 9

Structural vibration analysis: lab 10, HW3

3D structure model building: lab10

Schedule

No written prelab for Labs 1, 2, 4, 6, 9, 10

Week	Lecture date	Lab date TU Session	Lab date TH Session	Topics	Assignment
1	1-13	--	--	Course Introduction; no lab work	Homework 1
2	--	1-28	1-23	Lab 1 - Practice Experiment and Data Analysis January 20: university holiday, no lecture	Report 1
3	1-27	2-4	1-30	Lab 2 – Stress Concentration	Summary 2
4	2-3	2-11	2-6	Lab 3 - Riveted Joint Design, Fabrication and Testing	Summary 3 Prelab 3
5	2-10	2-18	2-13	Lab 4a - Strain Gage Installation	--
6	2-17	2-25	2-20	Lab 4b – Bending and Tensile Testing	Report 4
7	2-24	3-3	2-27	Lab 5 - Beam Deflection and Analysis	Summary 5 Prelab 5 Homework 2
8	3-2	--	--	Lab 6 - Composite Laminate Design (online; no lab work)	Summary 6
9	3-9	3-24	3-12	Lab 7 - Column Buckling Testing and Analysis	Summary 7 Prelab 7
				Spring Break (March 16-20)	
10	3-23	3-31	3-26	Lab 8 - Thin-Walled Section and Shear Center	Report 8 Prelab 8
11	3-30	4-7	4-2	Lab 9 – Introduction to Nondestructive Evaluation	Report 9
12	4-6	4-14	4-9	Lab 9 continued; Lab 10 - Structural Vibration Analysis/ *3D structure model building*	--
13	4-13	--	4-16	Lab 10 - Structural Vibration Analysis/ *3D structure model building*	Report 10 Homework 3
14	4-20	4-21	4-23	Lab 10 - continued	--
15	--	4-28	4-30	Lab 10 – continued (lab open on April 27 lecture time if needed)	--
16	--	--	--	No Final Exam (May 4-7)	--

This document is subject to change by the instructor during the semester.