

Syllabus for

AERO 4313 – Aerospace Structures II

Spring 2025

1.0 Overview

This 3-credit hour class is the second course in analysis and design of aerospace structures. Topics covered will include: Advanced topics in torsion, and bending, shear flow in thin walled structures, elastic buckling, composite failure and design. This course will rely heavily on the analysis of aerospace structures with conventional theory as well as using finite element methods.

2.0 Course Information

Instructor: Dr. Jack Chessa

Email: jfchessa@utep.edu

Office Hours: TBD

Office: A-124 or via MS Teams (jfchessa@utep.edu)

Required Textbook: “Aircraft Structures for Engineering Students”, 4th edition, T.H.G. Megson, Butterworth-Heinemann

Reference Textbooks: “Aircraft Structures”, David Perry, Dover; “Mechanics of Aircraft Structures”, C.T. Sun, Wiley; “Understanding Aircraft Structures”, John Cutler, Blackwell Publishing, “Analysis and Design of Flight Vehicle Structures”, E.F. Bruhn.

Prerequisites: AERO 3323 – Aerospace Structures II, MECH 2332 - Mechanics of Materials

Meeting Times: LART 107 - TTH 12:00-1:20 PM

2.1 Course Delivery

This course will be delivered fully face-to-face. Class will be held at the assigned meeting times and attendance is required. The course material will be mostly on the MS Team for this class. The course notes will be in a OneNote Notebook that is in the Team.

Each week you will be assigned the following:

- Reading in the textbook,
- A set of homework problems

These will be posted on MS Teams typically.

2.2 Course Topics

See the Course Lecture Plan Document, but the basic topics are as follows

1. Mathematical Basics
 - a. Vector space
 - b. Symmetric Eigenvalue problem
2. Finite Element / matrix methods

- a. Solution approach
- b. CROD, CBAR elements
- c. Shell elements
- 3. Material failure
 - a. Motivation
 - b. Max distortion energy
 - c. Tresca
 - d. Composite failure
 - e. Fatigue
- 4. Torsion
 - a. Prandtl method
 - b. Torsion of Prandtl solutions – triangle, ellipse, square
 - c. Effective J and c for non-circular sections
 - d. Torsion of a rectangle (thin)
 - e. Torsion of closed thin-walled sections
 - f. Torsion of open thin-walled sections
 - g. Branched sections
 - h. Multi-cell sections
- 5. Bending
 - a. Calculation of I tensor
 - b. Generalized bending
 - c. Shear center
- 6. Shear flow
 - a. Transverse shear
 - b. Thin-walled sections
- 7. Buckling
 - a. Beam buckling
 - b. Plate buckling
 - c. FEA of buckling
- 8. Composite design basics
 - a. Lamina design
 - b. Laminate/layup design

3.0 Grading

There will be two grading equations used to calculate two raw final grade scores. You will be given the higher of these two raw grades. The raw scores will be calculated as given in the table below

	Raw 1	Raw 2
In-class exams (3)	60%	30%
Quizzes and attendance	15%	20%
Project(s)	10%	25%
Homework	15%	25%

3.1 Exams

There will be three in class exams given during the semester with the third being given during the final. The final exam is not cumulative but has the same weight as the other exams.

3.2 Quizzes and Attendance

Attendance is required in this class. There will be unannounced short quizzes (approx. 15 minutes) periodically in class. The quiz material will be based on prior reading or homework. These are to be done individually, there will be no discussion between students on this.

3.3 Projects

There will be one to two projects assigned in this class. These projects will be assigned, and a specific report format will be required.

5.0 Course Policies

Most of these course policies are consistent with the Mechanical Engineering standard course policies. Please read them carefully.

5.1 Academic Honesty

During exams and quizzes, you are not allowed to use any form of wifi-enabled electronic device, including cell phones or other electronic communication devices or methods (wristwatches, earbuds, etc.).

If you are suspected of scholastic dishonesty you may or may not be directly confronted about your conduct by the instructor or proctor. You will, however, be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) and your exam may not be admissible. Your grade in the class may not be available until OSCCR makes a final ruling, this may adversely impact your ability to enroll in other classes.

Scholastic dishonesty on homework, lab assignments, and all other class assignments will be held to the same standards and requirements of academic honesty as quizzes and exams.

5.2 Class Attendance Policy

Attendance is mandatory. Anyone with 5 or more absences will be dropped from the class. A drop for not attending will count toward the State Allowed Six Drop Limit. If you are failing the class at the time of the drop you may also be given a WF designation. Be advised that a drop could adversely impact visa status, financial aid, and other programs.

As per UTEP rules, you may be asked to show a UTEP ID at any time during class. Anyone who is present and not registered in the class will be subject to disciplinary action unless the instructor gives prior approval.

5.3 Excused Absence for Exams

The UTEP catalog allows Exam Absence to be excused ONLY for university-recognized Activities and very specific other situations. Medical absence is NOT allowed in the UTEP catalog. For consistency with the catalog, students will NOT be excused from exams due to illness.

5.4 DSS

If you feel you may have a disability which will make it difficult for you to carry out the work as I have outlined and/or if you need special accommodations/assistance due to a disability, please contact the C

Center for Accommodations and Support Services (CASS) at 747-5148, go to Room 106E Union, or email cass@utep.edu.