

**Professor Info****Dr. P. Boylan-Ashraf****office:** ENGR 272-B**email:** peggy.boylandashraf@sjsu.edu**website:** www.boylandashraf.com**office hours:** Monday, 9-10 a.m. and 1:30-3:00 p.m.; Wednesday, 9-10 a.m. and 12:00-1:30 p.m.**Credit**

3 units

Class

Monday and Wednesday, 10:30-11:45 a.m. in ENGR 164

Final Exam

Tuesday, May 24, 9:45 a.m.-12:00 noon in ENGR 164

PrerequisitesGrade of C- or better in MatE 25: *Introduction to Materials*Grade of C- or better in AE 112: *Aerospace Engineering Structural Analysis I***Textbook**David J. Peery: *Aircraft Structures*. ISBN 10: 0486485803.
Notes from Professor**Course Description**

The course emphasizes on basic structural theory and the application of the elementary principles of mechanics to the analysis of aircraft structures.

Course Goals

1. To deepen the learner's knowledge of fundamental concepts of elasticity and statically indeterminate structures.
2. To introduce the learner of axial deformation, torsional angle of twist, and bending deflection.

AE 114 Spring 2016 – Aerospace Engineering Structural Analysis II**Course Learning Objectives**

Students completing AE 114 should be able to:

1. Determine tensile and compressive members of a spacecraft truss structures using both method of joints and method of sections.
2. Calculate principal stresses and principal strains using transformation equations and Mohr's Circle of beam-column type wing and fuselage structures.
3. Calculate aircraft material specimen displacements due to thermal affects.
4. Analyze statically indeterminate axially-loaded aircraft assemblies and determine tensile and compressive elements.
5. Calculate deformations in axially-loaded wing assemblies.
6. Calculate stresses in thin-walled monocoque and semi-monocoque structures.
7. Analyze statically indeterminate torsional shafts and determine angle of twist.
8. Draw shear force and bending moment diagrams of fuselage beam structures.
9. Examine combined (axial, torsional, and bending) fuselage loading and analyze principal stresses.
10. Calculate bending deflection in wing and fuselage beam structures using integration and superposition methods.

Approximate Weekly Schedule

| <u>Week</u> | <u>Lecture Topic(s)</u> |
|-------------|--|
| 01 | Introduction and Review of AE 112 |
| 02 | Truss Structures |
| 03 | Truss Structures, Exam 1 |
| 04 | Strain Transformation Equations and Principal Strains |
| 05 | Strain Gauge Rosettes and Thermal Strains |
| 06 | Axial Loading, Deformation, Exam 2 |
| 07 | Statically Indeterminate Axial Loading |
| 08 | Joint and Fittings and Idealized Thin-Walled Structures |
| 09 | SPRING BREAK |
| 10 | Torsion, Angle of Twist, and Shear Loading |
| 11 | Statically Indeterminate Torsion, Exam 3 |
| 12 | Combined Axial and Torsional Loading |
| 13 | Beam Bending |
| 14 | General Combined Loading (Axial, Torsional, and Bending) |
| 15 | Deflection of Structures |
| 16 | Reflection and Review |

| Grading | | |
|----------------|------------|-----|
| | Exam 1 | 22% |
| | Exam 2 | 22% |
| | Exam 3 | 22% |
| | Final Exam | 22% |
| | Assignment | 12% |

AE 114 Spring 2016 – Aerospace Engineering Structural Analysis II

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|----|-------|----|-------|
| A | > 91% | C+ | > 75% |
| A- | > 88% | C | > 70% |
| B+ | > 85% | C- | > 68% |
| B | > 80% | D+ | > 65% |
| B- | > 78% | F | < 60% |

Note: Neatness and completeness count! Analysis that cannot be understood, interpreted, or checked by others is of little or no value. For **all** work that is submitted for grading, if part of the work is missing, or if the work is incomplete; or if the work cannot be read; or if the work cannot be understood, you will get little or no partial credit.

Exams

There are 4 exams (Exams 1, 2, 3, and the Final Exam) scattered throughout the semester. Make-up exams will be given only for very unusual circumstances and/or approved medical excuses. For anticipated conflicts with a scheduled exam, you must contact your professor before the exam to try to arrange an alternate exam. All requests for make-up exams must be submitted in writing (via email) and must include the reason for the request and a copy of your schedule of classes this semester.

Assignment

There will be 2-4 problems assigned as assignment each week (see Assignment Schedule under the Syllabus tab in Canvas). Please submit these problems before their deadline. Late assignment will not be accepted or will result in very little partial credit. All assignment must be submitted in PDF format via Dropbox. No paper assignment will be accepted. Assignment is worth 12% of your final course grade. While a correct answer is the goal of any problem solution, the teaching team (your professor and teaching assistants) is most interested in the path that you take to obtain the solution. When grading your assignment, it is very important that all of your work is clearly described in your solution. In the case of an incorrect final answer, this can help the teaching team determine where the conceptual or computational error is in the solution. The important elements of a good problem-solving technique are:

1. Correct problem set-up.
2. Correct analysis.
3. Correct numbers and units.
4. Correct interpretation of the answer (both units and direction).

These are the elements that earn major credit.

Extra Credits:

From time to time I will assign extra credits during lecture. Each extra credit is worth 1 point. No partial credit shall be awarded for extra-credits.

Canvas

Notes provided by your professor, exam and assignment solutions, and important class announcements will be posted on Canvas. For issues related to Canvas, please contact the eCampus Help Desk (phone: 408-924-2337), or submit a help ticket, or while logged into Canvas, click on the word **Help** on the upper right corner of the screen.