**University of Kansas**
**Department of Aerospace Engineering**
**AE 508 Aerospace Structures II**
**Spring 2004**

**Instructor:**
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Office hours: 1:30-3:00 MWF, by appointment or as available

**GTA:**
Wanbo Liu
Office hours: 8:20-10:20 MWF, 2122 Learned

**Textbooks:**
Curtis, H.D. "Fundamentals of Aircraft Structural Analysis", Irwin, 1997.

**Course Objectives:**
The course objectives are to develop skills in conducting structural analysis and design for aerospace vehicles using modern computational tools.

**Course Topics:**
Applied Elasticity (Chapter 3)
Work-Energy Principles (Chapter 6)
Introduction to the finite element method (Chap. 9)
Introduction to MSC/NASTRAN finite element analysis
Line elements (rods, beams, trusses and frames; Chap. 10)
Plate elements (shear panels, plates and shells; Chap. 11)
Finite element buckling analysis (Chap. 12)
Applications for aerospace structural analysis and design

**Evaluation:**
Grades will be based on weekly homework assignments (30%), a midterm exam (20%), a design project (20%) and a final exam (30%). Each student is expected to actively participate in class discussions and design reviews.

Any student in this course who has a disability that may prevent him or her from demonstrating his or her full abilities should contact me personally as soon as possible to discuss necessary accommodations.

**Policies:**
Homework is usually due at the beginning of the class period one week after assigned. Late homework will not be accepted unless approved by the instructor or GTA ***prior to*** the homework due date.

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| lsn | date | day | topic | reading |
|---|---|---|---|---|
| 1 | Jan. 23 | F | Introduction | |
| 2 | Jan. 26 | M | Applied Elasticity | 3.1 - 3.16 |
| 3 | Jan. 28 | W | Applied Elasticity | |
| 4 | Jan. 30 | F | Applied Elasticity | |
| 5 | Feb. 2 | M | Basic Matrix Operations | 9.1-9.9 |
| 6 | Feb. 4 | W | Virtual Work, Min. Potential Energy | 6.1-6.4 |
| 7 | Feb. 6 | F | Virtual Work, Min. Potential Energy | 6.1-6.4 |
| 8 | Feb. 9 | M | Comp. Virtual Work & Potential Energy | 6.5-6.8 |
| 9 | Feb. 11 | W | Comp. Virtual Work & Potential Energy | 6.5-6.8 |
| 10 | Feb. 13 | F | Force Method: Rods, Trusses | 7.1-7.4 |
| 11 | Feb. 16 | M | Introduction to the stiffness method | 9.10 |
| 12 | Feb. 18 | W | Introduction to the stiffness method | |
| 13 | Feb. 20 | F | General formulation | 9.11,9.12 |
| 14 | Feb. 23 | M | Rod element | 10.2 |
| 15 | Feb. 25 | W | Rod element | 10.2 |
| -- | Feb. 27 | F | Engineering Expo. (No Class) | |
| 16 | Mar. 1 | M | Getting Started with Patran, NASTRAN | MSC 1-5 |
| 17 | Mar. 3 | W | Getting Started with Patran, NASTRAN | |
| 18 | Mar. 5 | F | Beam element | 10.3 |
| 19 | Mar. 8 | M | Beam element | 10.3 |
| 20 | Mar. 10 | W | 2D Frames | 10.4 |
| 21 | Mar. 12 | F | MSC/NASTRAN 2D Frames | |
| 22 | Mar. 15 | M | Line elements review | |
| 23 | Mar. 17 | W | Midterm Exam | |
| 24 | Mar. 19 | F | 3D Frames | 10.6 |
| -- | Mar. 22 | | Spring Break | |
| 25 | Mar. 29 | M | 3D Frames | 10.6 |
| 26 | Mar. 31 | W | MSC/NASTRAN 3D Frames | |
| 27 | Apr. 2 | F | Rectangular shear panel | 11.2 |
| 28 | Apr. 5 | M | Rectangular shear panel | 11.1 |
| 29 | Apr. 7 | W | MSC/NASTRAN shear panel | |
| 30 | Apr. 9 | F | Constant strain triangle | 11.3 |
| 31 | Apr. 12 | M | Constant strain triangle | |
| 32 | Apr. 14 | W | Substructuring | 11.4 |
| 33 | Apr. 16 | F | Substructuring | 11.4 |
| 34 | Apr. 19 | M | Beam columns | 12.1-12.3 |
| 35 | Apr. 21 | W | Design Project Introduction | |
| 36 | Apr. 23 | F | MSC/NASTRAN buckling | |
| 37 | Apr. 26 | M | Review, plate elements and buckling | |
| 38 | Apr. 28 | W | Meshing practices, Design Project Geometry | |
| 39 | Apr. 30 | F | Meshing practices | |
| 40 | May 3 | M | Higher order analytical models | |
| 41 | May 5 | W | Design Project Preliminary Analyses | |
| 42 | May 7 | F | Introduction to optimization | |
| 43 | May 10 | M | Design projects | |
| 44 | May 12 | W | Final Review, Design Project Reports | |
| | May 14 | F | Stop Day | |
| | May 17 | M | Finals Week Begins | |