AE 6100- Syllabus

Advanced Structural Analysis I. 3 Credit Hours.

General Information

Description

Stability of elastic systems under quasi-static loads. Classical, kinetic, and potential energy approaches through rigid member models. Buckling of elastic bars and frames. Energy methods.

Pre- &/or Co-Requisites

AE 3140

Course Goals and Learning Outcomes

Upon successful completion of this course, you should be able to:

- Determine the critical load of rigid-model structures and deformable beams
- Study the post-buckling behavior of rigid-model structures
- Determine if a rigid-model structural system is sensitive to imperfections
- Apply energy-based methods to derive an approximation to the critical load of deformable structures

Course Requirements & Grading

Note: Graded components of a course may vary with each offering. The example below is typical but subject to change.

Description of Graded Components

Exams

Grading Scale

Your final grade will be typicaly assigned as a letter grade according to the following scale (scale refers to exam grading from 0-100):

A	90-100
B	70-89
C	50-69
D	30-49
F	0-29

Thresholds can change depending on the year (exam difficulty) or other considerations

Topics Covered

Note: The exact topics covered in a course may vary with each offering. The example below is typical but subject to change.

The Concept of Instability and Buckling/Postbuckling
Adjacent equilibrium and bifurcation
Snapthrough buckling
Mechanical Rigid Member Models
One and two degree of freedom models
Imperfect geometry model
Elastic Buckling of Columns
Effect of boundary conditions / Effect of imperfections and eccentricities
Effect of transverse shear
The Southwell plot
Buckling of Frames
Beam-column theory
Symmetric and antisymmetric buckling modes
Energy-Based Methods / Timoshenko's Method
Rayleigh and Timoshenko Quotient
Introduction to Postbuckling
The Elastica Theory
Introduction to Plastic Buckling

Course Materials

Note: Course materials may vary with each offering. The example below is typical but subject to change.

Textbook

An Introduction to the Elastic Stability, **G.J. SIMITSES**, Krieger, 1986; or

Fundamentals of Structural Stability, **G.J. SIMITSES and D. HODGES**, Elsevier, 2005

Course notes

Course notes will be provided as needed