ABET Course Syllabus

ENAE 420 Computational Structural Mechanics

Credits & Contact Hours: 3 credits (3 hours of lecture)

Course Status: Not required

Schedule: Offered every Spring semester

Course Description: Introductory of finite element methods for aerospace engineering modeling and analysis; equips students with ability to understand manuals of commercial finite element analysis software.

Pre-Requisites: ENES220, MATH241, Linear Algebra.

Co-Requisites: None

Textbooks: None

Other Required Material: Course lecture notes and handouts

Course Oversight: Structures and Vibration Committee

Syllabus Prepared By/Date: Dr. Lee on June, 2011

Course Objectives/Student Learning Outcomes:
1. Thorough understanding of the fundamentals of the finite element method
2. Introduction of a commercial finite element analysis software package (Solidworks)
3. Ability to read and understand the manuals of any commercial finite element software

Topics Covered:
1. Introduction to FE Modeling:
   a. Axially loaded slender body,
   b. Virtual work,
   c. Construction of element stiffness matrix and load vector,
   d. Assembly of global stiffness matrix and global load vector,
   e. Determination of displacement and stress
2. Truss Structures: Truss structures in 3D space
3. Beam Bending: Construction of the 4-DOF element
4. Temperature Effect: Load vector due to temperature change
5. Structural Dynamics:
   a. Consistent mass matrix,
   b. Modal analysis,
   c. Numerical integration,

Relationship of Course Objectives to Program Outcomes
This course addresses program outcomes: