

C E 411 - Structural Analysis

Fall and Spring Semester 2008

2008 Catalog Data: Structural analysis of trusses, beams, and frames using classical and matrix methods. Virtual work, influence lines, and system stability. Stiffness matrices for rods, beams, and frames. Introduction to structure dynamics. Computer applications. Pre-requisite: Engr 312: Mechanics of Materials. (3).

Credit Hours: 3

Prerequisites: Engr 312: Mechanics of Materials

Co-requisites: None

Designation (Required or Elective):

Required in semester 5 for CE.

Prerequisite by Topic:

None

Textbook:

Structural Analysis Using Classical and Matrix Methods, Jack C. McCormac, 4th edition, ISBN 978-0-470-03608-2.

Coordinator:

Ahmed Al-Ostaz, Civil Engineering

Objectives:

- Students will learn about establishing different types of structures and degree of determinacy, calculating reactions and internal forces (axial force, shear, and bending moment) for determinate and indeterminate structures and its components.
- Students will have an ability identify, formulate, and determine stability of structures, including external reactions, internal forces, and deflections
- Students will be able to solve for truss member forces by hand.
- Students will learn about calculating deflections and constructing influence lines for beams and trusses.
- Students will learn at least one classical method for resolving indeterminate structures.
- Students will learn how to use structural analysis software for analysis of multidegree of indeterminate structures.

Topics:

1. Review of Basic Concepts
 - a. Linear Algebra
 - b. Indeterminacy and stability
 - c. Reactions
 - d. Shearing Force and Bending Moment
 - e. Plane Trusses
2. Influence Lines and superposition principle
3. Deflection and Angle Changes-Energy Methods
4. Analysis of indeterminate systems using
 - a. Approximate methods for trusses, continuous beams and frames
 - b. Matrix method or trusses, continuous beams and frames
5. Introduction to structure dynamics
6. Computer Applications
 - a. SAP 2000 (beam, Trusses, plane Frame and space frame)
 - b. Matlab

Class/Laboratory Schedule - Time Duration:

Three class periods a week, 50 minutes per period.

Computer Usage:

Extensive

Design:

Multiple analysis projects

Contribution of course to professional component:

Engineering Topics

Relationship of course to program objectives/outcomes:

- This course contributes at least in part to achieving program objectives [1, 2, 4] and program outcomes [a, c, e, g, h, k, l].

Prepared by: Dr. Ahmed Al-Ostaz, Civil Engineering

Date: October 18th 2008

Reviewed by: Dr. Alex Cheng, Chair, Civil Engineering