NYU Polytechnic School of Engineering
Civil and Urban Engineering Department
Course Outline – CE-UY 3133 – Analysis of Structures
Spring 2017
Roula Maloof, PhD
Monday and Wednesday RH317

To contact professor: rmaloof@nyu.edu
RH 408
Phone: 646-997-4045
Office Hours: Tu., Thu. (11:00AM – 1:00 PM)

Course Pre-requisite: CE-UY 2113
Course Co-requisite: CE-UY 2123

Course Description: the course covers in-depth the structural analysis techniques. Topics covered include: analysis of statically determinate beams, frames and trusses; deflection calculations using geometrical and energy methods; influence lines; analysis of statically indeterminate structures using superposition; slope deflection, moment distribution and matrix analysis of structures.


Grade Basis: Attendance and class participation 5 %, Homework 10%, Quizzes 10%, Test1 18%, Test 2 25%, Final 32%

Course Objectives:
1- To provide students with a clear and thorough presentation of the theory and application of structural analysis as it applies to trusses, beams and frames.
2- To allow the student to develop the ability to both model and analyze a structure.
3- To prepare students to provide realistic and effective solutions to problems they may encounter in their professional career.

TOPICS:

1. Analysis of statically determinate structures: (Chapter 2)
   i. Types, Stability and determinacy.
   ii. Applications to the equilibrium equations.
2. Analysis of statically determinate trusses (Chapter 3)
   i. Types and classification
   ii. Analysis of plane trusses (method of sections, method of joints)
   iii. Zero-force members.
3. Internal loading developed in structural members (Chapter 4)
   i. Shear force and bending moment diagrams.
   ii. Method of superposition.
4. Deflections (Chapter 8 & 9)
   i. Moment-area method: derivation and application to beams
   ii. Conjugate-beam: derivation and application to beams
   iii. Virtual work method: principle and derivation, applications to trusses, beams and frames – unit load method
   iv. Castigliano’s theorem: derivation and applications to trusses, beams and frames.
   v. Sketching the deflected shape.

5. Influence lines for determinate structures (Chapter 6)
   i. Principles; applications to beams and trusses
   ii. Moving loads; maximum shear and moment in beams.

6. Method of consistent deformations or Force Method (Chapter 10)
   i. Maxwell’s theorem of reciprocal displacements
   ii. Applications to trusses, beams and frames.

7. Displacement method: Slope-Deflection (Chapter 11)
   i. Derivation and application to beams and frames
   ii. Sidesway.

8. Displacement method: Moment Distribution: (Chapter 12)
   i. Principles and definitions
   ii. Analysis of beams and frames
   iii. Sidesway.

9. Stiffness method: Truss analysis (Chapter 14)
   i. Fundamentals of the stiffness method
   ii. Application to trusses

10. Stiffness method: Beam and Frame analysis (Chapters 15 & 16)
    i. Generalization of the stiffness method
    ii. Application to beams and frames.

11. Approximate analysis of indeterminate structures (Chapter 7)
    i. Analysis of trusses.
    ii. Analysis of frames: vertical and lateral loads; Portal and Cantilever method.

**ABET Competencies:**
   e. An ability to identify, formulate, and solve engineering problems.

**Requirements:**
1- No Late homework will be accepted without a valid reason.
2- Homework should be submitted at the beginning of the class period at which it’s due. Make sure handwriting is legible. Neatness and presentation will be taken into account.
3- Solution of homework problems will be posted but few problems will be graded.
4- An unweighted average of exams must be at least 30.
5- 50% minimum on homework grade is required to pass the class.
6- More than 25% absences without a valid reason will result in failing the class.
7- Missing a quiz will result in a zero grade.
8- Cheating or any academic dishonesty will be penalize in refer to the SOE Code of Conduct “engineering.nyu.edu/academics/code-of-conduct/academic-misconduct”