Code and Name: CE 412 – Indeterminate Structural Analysis
Credit Hours: 3 (Lecture: 3, Tutorial: 1)

Textbook:
- Structural Analysis: Hibbeler, R.C., 7th Edition, Pearson, 2012
Other References:
- *Course handouts: distributed on a regular basis to provide more information on the topic.*

Course Description:
Analysis of indeterminate structures by the force and displacement methods, Maxwell's method for indeterminate trusses; analysis of members with non-prismatic members; approximate analysis of indeterminate structures; stiffness method of structural analysis; fundamentals and algorithms; numerical analysis of plane trusses, grids and frames using matrix method; introduction to the finite element method for plane stress and plane strain; application of gravity and lateral loads on structures according to SBC/IBC.

Pre-requisites: MATH 345 Numerical Methods, CE313 Reinforced Concrete Design
Co-requisites: None

Course Learning Outcomes:
With relation to ABET Student Outcomes (From Fall 2019-SOs: 1-7)
1. Outline the concepts of structural stability and static and kinematic indeterminacies (1)
2. Determine the support reactions using force method of analysis (1)
3. Analyze statically indeterminate beams and plane frames using slope-deflection method (1)
4. Use the moment distribution method for analyzing statically indeterminate beams and plane frames (1)
5. Use approximate methods to evaluate the statically indeterminate structural responses (1)
6. Understand and employ the stiffness method to solve complex trusses, beams, and frames (1)
7. Compute the effect of gravity and lateral loads on structures according to SBC/IBC (1)
8. Introduction to Finite Element Method for structural analysis (1)

Topics to be covered:
- Force method and displacement method
- Analysis of indeterminate structures by force and displacement method,
- Non-prismatic members and their analysis
- Approximate methods to analyze indeterminate structures
- The concept of Stiffness method – introduction to matrix methods for analysis of beams, trusses and frames
- The principle of finite element method for plane stress and plane strain
- The effect of gravity and lateral loads on structures according to SBC/IBC

Grading Policy:
The grading for the course is: 60% coursework and 40% Final Exam. The course work consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes quizzes for the remaining 20%.