CIV 310 – Structural Engineering

Current Catalog Description: The role and ethical responsibilities of a structural engineer. Structures and their structural systems. Loads and load paths through structures. Analysis, behavior, and design of determinate and indeterminate beams, trusses and framed structures under static loads using various methods. Shear, moment, and deflection diagrams. Influence lines. Computer aided structural analysis

Prerequisite: MEC 363; CIV, MEC or ESG major

Corequisite: None

Textbooks and/or Other Required Material: Required Materials:
Hanson, J.H., "Structural Analysis – Skills for Practice," Pearson, 2020.
McCullough, D., "The Great Bridge: The Epic Story of the Building of the Brooklyn Bridge," Simon & Shuster, 1972.

This course is: Required

Topics Covered:

1. History of Structural Engineering
2. Role of the Structural Engineer
3. Structural Systems
4. Loads and Actions on Structures
5. Statics of Structures
6. Stability and Statical Determinacy
7. Determinacy and Indeterminacy
8. Internal Forces in Trusses
9. Internal Forces in Beams and Frames
10. Internal Force Diagrams in Beams and Frames
11. Qualitative Structural Systems Evaluation
12. Deformations in Beams
13. Work, Energy and Work-Energy Methods
14. Principle of Virtual Work
15. Deformations in Beams and Frames
16. Influence Lines and Response Envelopes
17. Computer Structural Analysis
18. Introduction to Analysis of Statically Indeterminate Structures

Course Learning and Student Outcomes:

Course Learning Objectives	ABET Student Outcomes
Understand the role and ethical responsibilities of the structural engineer in relation to the other participants in the construction process.	4, 5
Analyze and recognize historic and contemporary structural systems from the "human made world."	7
Identify structural systems and idealize those systems as mathematical models that can be analyzed to predict responses to loads.	4, 6
Determine the load sources for a structure, calculate their combined value, and trace the path those loads will take through the structure.	6
Differentiate between determinate and indeterminate structures.	6, 7
Compute the forces in determinate and indeterminate beams, columns, trusses, and frames using different methods.	1, 6

Discuss and apply engineering constraints with respect to the design of a truss bridge.	1, 2, 3
Use basic structural analysis software; understand the matrix methods used by the software, and recognize the limitations and assumptions of the software.	1, 6, 7

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