CIV 411 - Matrix Structural Analysis

Current Catalog Description:	Development of matrix methods of structural analysis from first principles. Application of the direct stiffness method to calculate deflections and forces in beams, and two- and three-dimensional trusses and frames
Prerequisite:	CIV 310
Corequisite:	None
Textbooks and/or Other Required Material:	None
This course is:	Not Required; Technical Elective Option

Topics Covered:

1. Fundamental Mechanics Concepts
2. Qualitative Structural Systems Evaluation
3. Linear Algebra and Matrix Operations
4. Statical and Kinematical Determinacy and Indeterminacy
5. Force Method of Analysis
6. Displacement Method of Analysis
7. Symmetry and Asymmetry
8. Analysis for Effects of Temperature, Settlement, and Construction Errors
9. Matlab Programming
10. Direct Stiffness Method
11. Influence Lines for Statically Indeterminate Structures

Course Learning Objectives:

Understand the difference between energy-based flexibility approaches and matrix-based stiffness approaches to structural analysis
Determine deflections and forces in statically determinate and indeterminate structures using strain-energy methods.
Determine deflections and forces in statically determinate and indeterminate structures using the direct stiffness method
Use a physical interpretation of stiffness matrices to assemble stiffness matrices analytically
Write and use computer programs which implement the direct stiffness method using matrix operations

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