MECH 5884 - Finite Element Analysis

Fall 2026 Syllabus, Section 01, CRN 41156,

Credit hours: 3

Instructor

Brian Friedrich

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Public Instructor Information

Instructor Title: Dr.
Instructor Professional Qualifications: Ph. D., Materials Science and Engineering, Youngstown State University, 2022
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Course Description

5884. Finite Element Analysis. Fundamental principles of finite element analysis with emphasis on applications to design in areas of stress analysis, vibrations, and heat transfer. Use of commercial software. Prereq.: MECH 3708, MECH 3725, MECH 3751. 3 s.h.

Course Readings

Group	Title	Author	ISBN
Required	Finite Element Simulations with ANSYS Workbench 2025, Theory, Applications, Case Studies	Huei-Huang Lee, Paul J. Schilling	13:978-1-63057-764-3
Required	A First Course in the Finite Element Method	Daryl L. Logan	13: 978-1-305-63511-1

Finite Element Simulations with Ansys Workbench 2025 will be utilized for its detailed, step-by-step instruction for using ANSYS Workbench.

A First Course in the Finite Element Method will be utilized for the theory and general methods employed in finite element method software.

The course readings are subject to change in the event of extenuating circumstances, research developments, current events, and/or to ensure better learning.

Schedule of Topics and Assignments

Week of	Proposed Topic	Due/To Prepare for Class
8/24	Syllabus Review Introduction to the Stiffness Method and FEA	
8/31	Introduction to the Stiffness Method and FEA	
9/7	Truss Element Formulation and Solutions	Homework 1
9/14	Truss Element Formulation and Solutions	
9/21	Truss Element Formulation and Solutions	Homework 2
9/28	Beam Element Formulation and Solutions	Homework 3
10/5	Beam Element Formulation and Solutions Frame and Grid Equations	
10/12	Plain Stress and Plain Strain Elements and Solutions	Exam 1 Homework 4
10/19	Plain Stress and Plain Strain Elements and Solutions	
10/26	Practical Modeling Considerations	Homework 5
11/2	Axisymmetric Elements and Solutions	

11/9	Three Dimensional Stress Analysis	Homework 6
11/16	Three Dimensional Stress Analysis	
11/23	Buckling and Stress Stiffening	Exam 2 Homework 7
11/30	Modal Analysis Thermal Stress Analysis and Solutions (tentative)	Homework 8
12/7	Final Exam	

The course schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better learning.