MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 401: Stress Analysis (4) Elective

Course Description: (2019-20 Catalog)	Advanced strength of materials: behavior of disks, plates, and shells. Theory of elasticity. Energy methods. 3 lectures, 1 laboratory.
Prerequisite Courses:	CE 207, MATH 344, ME 328 or consent of instructor.
Prerequisites by Topic:	1. Intermediate mechanics of materials. 2. Ability to program routine problems for digital solution. 3. Elementary partial differential operations. 4. Fourier series.
Textbook: (and/or other required material)	Boresi and Schmidt, Advanced Mechanics of Materials, 6th Edition
References:	Supplemental materials and lecture notes are provided.
Course Coordinator/Instructor:	Mohammad Noori, Professor of ME
Course Learning Outcomes:	• Develop simplified mathematical models of real-world systems involving - beams or statically indeterminate structures - pressure vessels, press-fits, or spinning disks - torsion of thin-walled sections - off-axis and multi-axial loading - plate bending - axisymmetric shells • Assess alternative mathematical models for acceptability in a given situation. • Select and use appropriate mathematical models to predict stresses and/or deflections in a given design. • Develop alternative designs using stress or deflection prediction results. • Prepare appropriate design analysis reports to document results. • Compare analytical closed-form calculations to numerical predictions. • Critically evaluate proposed stress analysis results.
Relationship of Course to Mechanical Engineering Student Outcomes:	SO 1: Mastered (M) SO 2: SO 3: Mastered (M)

SO 4:
SO 5:
SO 6:
SO 7:

Topics Covered:

1. Basic Considerations of Stress, Both Two And Three Dimension Analysis, Strain, And Constitutive Relations
2. Strain, Deformations, Plane Stress, Stress Functions
3. Unsymmetrical Bending of Beams
4. Flexural Shear, Shear Center And Shear Flow
5. Thin Walled Sections And Beams With Stringers
6. Analysis of Curved Beams
7. Torsion of Non-Circular Bars
8. Numerical Methods (Topics: Torsion and Beams on Elastic Foundation)
9. Torsion of Thin-Walled Sections With Multi-Cells
10. Introduction To Bending of Plates & Other Topics As Appropriate

Laboratory Projects: Mini design/build projects and/or advanced research projects

Class/Lab Schedule: Three 50-minute lectures per week; One 170-minute lab per week.

Contribution of Course to Meeting the Professional Component:

(a)College-level mathematics and basic sciences:	0 credits
(b) Engineering Topics:	4 credits
Design	0 credits
(c)General Education:	0 credits
(d) Other:	0 credits

Revised by: M. Noori **Date:** 07/01/2020