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Department of Mechanical Engineering
ME 437 – Structural Analysis
Elective

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Catalog Description: **ME 437 (3-0-3)**

Stresses and deflections of beams as well as the design of beams, columns, trusses, frames and connections of steel, reinforced concrete and timber structures.

Prerequisites: ME 315 – Stress Analysis

Textbook(s) Materials Required:
1. J. C. McCormac and J. K. Nelson, <u>Structural Analysis</u>, Fourth Edition, J. Wiley ` and Sons, Inc., 2006.
2. Handouts prepared by instructor.

References (Not Required):
1. A. C. Ugural and S. K. Fenster, <u>Advanced Strength and Applied Elasticity</u>, Fourth Edition, Prentice Hall, 2003.

Course Supervisor: Dr. B. Koplik

Pre-requisite by topic
1. Ordinary differential equations
2. Mechanical properties of materials
3. Concepts of stress, strain and strain energy

Course Objectives[1]:
1. To provide the student with knowledge of the basic concepts, methods and types of structural forms. (A,B,C)
2. To develop the student's skills in applying classical and computer-oriented matrix methods in the analysis of some common structures. (A,B,C)
3. To provide the student with knowledge of preliminary design procedures and applications to structural members. (A,B,C,D,E)

Topics[2] :
1. Types of structural forms. (3 hrs)
2. Force method; structural analysis and computers. (4 hrs)
3. Composite members, reinforced concrete beams. (4 hrs)
4. Displacements and forces by energy methods. (6 hrs)
5. Statically indeterminate members. (3 hrs)
6. Static and dynamic loadings, and influence lines. (3 hrs)
7. Analysis of frames by finite element method. (4 hrs)
8. Moment distribution method. (4 hrs)
9. Moment-area method. (4 hrs)
10. Design of steel, aluminum and timber columns. (4 hrs)

Evaluation Method:
1. Quizzes
2. Final Exam
3. Homework

Schedule: Lecture/Recitation: 3 hours, per week

Professional Component: Engineering Science/Engineering Design

Program Objectives Addressed: A, B, C, D, E

Course Outcomes[3] :

Objective 1
1.3 Students will demonstrate an ability to determine stresses and displacements of structures with various loads. (1,2,3) (a,e,i,k)
Objective 2
2.1 Students will demonstrate an ability to use software to solve a number of problems of practical importance. (3) (a,d,e,i,k)
Objective 3
3.1 Students will demonstrate an ability to apply structural methods and deal with real-life structural problems. (1,2,3) (a,b,c,d,e,i,k)

Prepared by: Dr. B. Koplik   Date: October 16, 2006

[1] Capital Letters in parenthesis refer to the Program Objectives of the Mechanical Engineering
Department. Listed in Sec 2 d Tables B-2-9, B-2-12. Table B-2-8 links Program Objectives with the ABET a-k Criterion.
[2] Topic numbers in parenthesis refer to lecture hours. (three hours is equivalent to 1 week)
[3] Outcome numbers in parenthesis refer to evaluation methods used to assess the student performance.
   Lower case letters in parenthesis refer to ABET a-k outcomes.