Course Outline for Engr 428: Applied Stress Analysis

Elective
Civil and Mechanical Engineering

Bulletin Description
ENGR 428: Applied Stress Analysis (3 units)
Prerequisites: ENGR 302 and ENGR 309. Solutions of practical stress analysis problems related to mechanical and structural design. Various experimental and computer based stress analysis techniques considered. Computational and experimental techniques are used in a major stress analysis project. Class work, 2 units; laboratory 1 unit.

Textbooks

References

Coordinator
Prof. Dipendra K. Sinha, Professor of Engineering

Prerequisites by Topic
2. Simple bending of beams, torsion of circular cross-sections, shear stress in beams, buckling of columns.
3. Two-dimensional stresses and strains; stress and strain transformation; principal stresses, Mohr circle.
4. Theories of failure.
Course Objectives

1. Ability to conduct stress-analysis in real life situations [A.1, A.2, B.1]
2. Acquire a thorough knowledge of a popular commercial stress-analysis package [A.1, B.3]
3. Present results of analysis orally and in writing [A.5]

Topics

1. Review of strain transformation
2. Review of principal stresses and failure theories
3. Fatigue, plastic and limit design
4. Stress analysis of common shapes
5. Thick-walled cylinders, interference fits, bearing stresses
6. Buckling in rods, plates and shells
7. Energy methods
8. Advanced beam theory, shear flow, shear center, torsion, curved beams
9. Plates and shells; membrane theory, cylinder edge conditions, large deformation of plates.

Professional Component

Engineering Science 67%
Engineering Design 33%

Evaluation

1. 1 hr. mid term test 20 %
2. Final Examination 40 %
3. Class participation 10 %
4. Laboratory work 30% (including major project)

Performance Criteria

Objective 1
The students will demonstrate the:
1.1 Ability to conduct stress-analysis in real life situations. (1,2,3)

Objective 2
The students will demonstrate that they have:
2.1 Acquired thorough knowledge of a popular commercial stress-analysis Package. (4)

Objective 3
3.1 The student demonstrates the ability to present and defend his/her interpretation of stress analysis problems and find reasonable solutions. (3)

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1 Numbers in brackets refer to the educational objectives and outcomes of the School of Engineering.
2 Numbers in brackets refer to the evaluation methods used to assess student performances.
Spring Semester, 2005
Instructor: Dipendra Sinha
Office: SCI 133
Phone: (415) 338-7737
Email: dsinha@sfsu.edu

Class/Laboratory Schedule
Two 50-minute lecture sessions/week
One 2-hour-45-minute lab session/week

Prepared by
Dipendra Sinha, Spring, 2005