

EGM 6533 – ADVANCED STRENGTH OF MATERIALS
Common Course Syllabus

Catalog Description: 3 CREDITS. Elements of plane elasticity, failure theories and advanced topics in bending and torsion of structural elements. It serves as an introduction to finite element methods and applications in machine design.

Goals: The course is designed to introduce the students to the behavior of structural and mechanical systems subjected to various types of loading. They will evaluate the resulting stresses, strains and deflections as well as failure criteria of these systems.

Topics:

1. Review of elementary strength of materials.
- 2a. Theory and calculations of three-dimensional principal stresses and maximum shear stress.
- 2b. Stress-strain-temperature relations, and stress concentration
3. Failure criteria
4. Energy methods and their applications to straight and curved members and to statically indeterminate systems
5. Curved members
- 6a. Thick-walled cylinders, shrink-fits and compound cylinders
- 6b. Rotating disks and shafts
7. Torsion
8. Unsymmetrical bending
9. Buckling and critical speed

Course Outcomes:

1. The students will be able to develop a physical understanding of how mechanical and structural systems respond to a wide variety of loading.
2. The students will be able to analyze and compute the stresses and deflections, and failure criteria of a variety of mechanical and structural systems.
3. The students will be able to judge the computed results and use these results toward designing mechanical and structural systems.

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