Advanced CAE Simulation for Structural Design

MECHENG 6661

Credit Hours:
4.00 - 4.00

Course Levels:
Graduate (5000-8000 level)

Course Components:
Recitation
Lecture
Lab

Course Description:
Advanced FE modeling of nonlinear structural problems; min. weight design and topology optimization. Includes boundary, geometric and material nonlinearaties, both rate independent and dependent. The emphasis is on modeling decision making and validation. This is not a traditional FE theory class but a hands-on, software-intensive modeling and simulation class with a significant lab component.

Prerequisites and Co-requisites:
Prereq: 5139; or Grad standing in AeroEng, CivilEn, MatScEn, or MechEng.

Course Goals / Objectives:
- Students will gain practical numerical experience in modeling decision making and validation of simulation results for nonlinear, dynamic structural analysis problems.

Course Topics:
- Linear analysis review
- Selection of boundary conditions
- Validation & verification techniques
- Types of nonlinear analysis: BNL, MNL, GNL
- BNL problems
- Non rate dependent MNL problems
- Rate dependent MNL problems
- Resolving Convergence
- Eigen buckling; NL buckling; post buckling
- Topology optimization
- Size optimization
- Sub-modeling techniques
- Multi-physics simulation
- Surface design & analysis in CATIA

Designation:
Elective