Course:

Advanced Mechanics of Composite Materials

Instructor: Dr. M. Asgari

Time: Saturday and Monday, 15:00-16:15.

Office hours: Mondays, 9:00-10:30

Web site: http://wp.kntu.ac.ir/asgari/courses.html

Syllabus (Main Topics):
- Introduction to Composite Materials
  Classifications, Terminology, Applications and Manufacturing methods

- Macro-mechanics of a Lamina
  Basic equations of tensor algebra and solid mechanics
  Constitutive equations of composite materials
  Thermal and Moisture effects

- Micro-mechanical Analysis of a Lamina
  Prediction of mechanical properties based on fiber and matrix
  Stiffness, strength and coefficients of thermal and moisture expansion

- Analysis of Discontinuous Fiber-Reinforced Lamina

- Macro-mechanical Analysis of Laminates
  Classical Lamination Theory
  Shear Deformation Theories
  Laminate constitutive relations
  Symmetric, Unsymmetrical, Balanced and Specially Orthotropic Laminates
  Hygrothermal Lamination theory

- Failure Theories for Fiber-Reinforced Materials
  Failure criteria and Damage in composites

- Design of Laminated Composite Structures
  Sandwich Panel composites
  Laminated beam, laminated plate and shell, laminated tubes

- Standards and Tests Methods

- Layerwise, Zigzag and Higher order Shear Deformation Theories

- Interlaminar Stresses
Recommended Text:
- Class Notes on Selected Subjects.

Additional References

Grading
- Homeworks
- Midterm Exam
- Final Exam
- Research Project
- Practical Software Project

Interested Topics for Research Project and Seminars
- Finite element modeling and analysis of composite panels
- Standards and Tests Methods
- Layerwise, Zigzag and Higher order Shear Deformation Theories
- Interlaminar Stresses
- Delamination Analysis
- Micromechanics Theories
- Composite Joints
- Nano Composites
- Cohesive Zone Models for Composite Structures Joints
- Buckling and Vibration of Composite Structures
- Structural health monitoring and non-destructive testing method
- Impact mechanics of composite structures
- Crushing and energy absorption in Composite materials

"Everything should be made as simple as possible, but not simpler ".
Albert Einstein