MEMS 5605 Mechanical Behavior of Composites – Syllabus

Grades and Homework

1.0 Composite Materials
   1.1 Composite Features
   1.2 Fibers
   1.3 Carbon Fiber Materials
   1.4 Matrix (Resin)
   1.5 Matrix Materials
   1.6 Material Forms
   1.7 Prepreg

2.0 Composite Applications

3.0 Micromechanical Behavior of a Lamina

4.0 Laminate Analysis
   4.1 Macromechanical Behavior of a Lamina
   4.2 Classical Lamination Theory
   4.3 Determination of Laminate Properties
   4.4 Inverting the A, B, D Matrices

5.0 Consequences of Stacking Sequence

6.0 Finite Element Examples

7.0 Determination of Ply-by-Ply Strains

8.0 Extension of Lamination Theory to Include Environmental Effects

9.0 Combined Mechanical Loading and Environmental Loading Strains

10.0 Honeycomb Sandwich

11.0 Interlaminar Shear Stress

12.0 Interlaminar Normal Tensile Stress

13.0 Bending and Buckling of Laminated Plates
   13.1 Governing Differential Equation
   13.2 Buckling
   13.3 Bending

14.0 Typical Analysis Procedure – Laminate

15.0 Design Considerations

16.0 Joints
   16.1 Bolted Joints
   16.2 Bonded Joints

17.0 Composite Material Test Methods – Allowables

18.0 Introduction to Composite Manufacturing Processes

Homework