Applied Mechanics of Composite Materials

Instructors: **Assistant Prof. Alexandros Antoniou**
alexandros_antoniou@mail.ntua.gr

Class:
Office Hours:

Textbook: NO Textbook
Recommended Reading:

CONTENTS

1. Intro
    a. Composites History
    b. Long-fiber Composite constituents (Fibers, resins, core materials, adhesives)
    c. Applications
    d. Challenges with emphasis in recycling
2. Manufacturing with composites
3. Micro- and Macro- mechanics of a single ply (State-of-the-Art & Krimmer model)
4. Classical Laminate Plate Theory (Laminate annotation, Constituve Equations, Stress-Strain calculations, Equivalent Stiffness and Strength calculations, Glass and Carbon reinforced laminates)
5. Hygro-thermal effects
6. Failure criteria
7. Experimental Material Characterization (Mechanical, Thermal, and Physical testing)
8. Fatigue Testing and Analysis
9. Adhesive joints
10. Design of an adhesive bond-line under complex stress states
11. Project 1: Develop a numerical tool for the stiffness and strength derivation of a composite laminate under in-plane stress (or strain) state. Comparison with experimental data
12. Project 2: Develop a numerical tool for the design of a composite beam