

Introduction to Composites

MECH3400

3 credits

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Class schedule: Tuesday (16:30 to 17:50) and Thursday (16:30 to 17:50)

Tutorial schedule: Thursday (18:00 to 18:50)

Course Description:

This course introduces fundamentals of composite materials, which will cover the definitions of composites, their classifications and characteristics, the basic mechanics of their reinforcement mechanisms and common applications in science and engineering, especially in aerospace engineering. One important objective of the course is to underlie the concepts of rule of mixtures and laws of solid mechanics, by which the composite materials can be designed with desirable characteristics for engineering applications.

Assessment:

30% Homework

20% Midterm exam

40% Final Project (Presentation + report)

10% Lab

Topics:

- Introduction to composite (Definition, types, manufacturing, applications and constituents)
- Lamina micromechanics (Micromechanics, rule of mixture, parallel/series model, Halpin-Tsai model)
- Lamina macromechanics (General elasticity, stiffness/compliance matrix, rotation matrix, orthotropic, transverse isotropic)
- Lamina strength (Strength under different loading, failure theories and modes)
- Nondestructive evaluation/structural health monitoring of composites (Ultrasonic detection and characterisation of damages in composites)

Required textbook: Engineering Mechanics of Composite Materials, IM Daniel & O Ishai, 2nd, 2006

Class policies

<http://ugadmin.ust.hk/ug-guide/index.html>