

# **EAS423 Design and Manufacture of Composites**

**Level:** 4

**Credit Units:** 5 Credit Units

**Language:** ENGLISH

**Presentation Pattern:** EVERY JAN

## **Synopsis:**

The course will provide students with an understanding of the production and quality control issues relating to the use of composites in aerospace applications. The second part introduces the concepts of laminate design using 'laminate design' software.

## **Topics:**

- Production of composite components 1- This part will examine the selection of reinforcing fibres and matrix materials for different applications within an aerospace environment.
- Production of composite components 2- Manufacturing routes, including manual and automated lay-up, filament winding and resin-infusion technology will be discussed.
- Production of composite components 3- The problems associated with joining composite materials will be introduced, along with the common NDT techniques used in quality control inspection.
- Production of composite components 4- The basic concepts of 'smart' sensing of cure state and damage detection will also be examined.
- Laminate design 1- This will introduce the principles of laminate design and the necessary failure criteria, enabling the student to proposed suitable lay-up sequences for a variety of applications.
- Laminate design 2- Once the principles have been introduced, laminate design software will be presented and more complex design tasks will be undertaken, in the form of a design laboratory assignment.

## **Textbooks:**

: Introduction to Composite Materials Design (e-text) 3rd CRC Press  
ISBN-13: 9781315296470

**Learning Outcome:**

- Describe the selection methods used in selecting reinforcing fibres and matrix materials for different applications in the aerospace industry.
- Discuss and explain different manufacturing routes including manual and automated lay-up filament winding and resininfusion technology to be used in selected aircraft design case studies.
- Explain the problems associated with joining composite materials and the use of common NDT techniques for quality control inspection.
- Apply the basic concepts of “smart” sensing of cure state and damage detection in selected aircraft design case studies.
- Use the principles of laminate design and the necessary failure criteria to propose suitable lay-up sequences in selected case studies.
- Carry out selected laminate design case studies with laminate design software as part of a design laboratory experiment.

**Assessment Strategies (Evening Class):**

<b>Components</b>	<b>Description</b>	<b>Weightage Allocation (%)</b>
Overall Continuous Assessment	TUTOR-MARKED ASSIGNMENT 1	15
	LAB REPORT 1	15
Overall Examinable Components	Written Exam	70
<b>Total</b>		<b>100</b>