

Course Description**ETI2856C | Aerospace Structural Fabrication 2 | 4.00 credits**

This course introduces the student to the theory, materials, and basic manufacturing processes of composite materials. The course focuses on basic composite theory, including fiber reinforcements, matrix systems, fabrication techniques, and safety. It also introduces common core materials that are used in composites manufacturing, and outlines inspection and repair of composites structures including damage detection and repair instructions.

Prerequisites: ETI1855C and ETI2832C

Course Competencies

Competency 1: The student will practice proper shop safety by:

1. Taking appropriate precautions when handling composite materials
2. Following emergency procedures effectively
3. Recognizing common safety hazards in the composites industry
4. Disposing of composite materials using approved procedures
5. Wearing suitable personal protective equipment (e.g., safety glasses, gloves, lab coats, respirators)
6. Mitigating common safety risks associated with the composites industry

Competency 2: The student will explain the use and processing of composite materials by:

1. Identifying foam core and honeycomb materials
2. Distinguishing sandwich panel structures
3. Describing various cell shapes used in composite structures

Competency 3: The student will identify core materials in composites manufacturing by:

1. Contrasting characteristics of different composite materials
2. Identifying various fibers and their applications in composites
3. Recognizing the matrix components of composite materials
4. Evaluating the properties of fiber/matrix interfaces

Competency 4: The student will utilize tools, its functions, and use of fasteners for composites manufacturing by:

1. Identifying types of materials used in various tools, such as molds
2. Differentiating resin infusion techniques used with tools
3. Demonstrating proper tool setup procedures
4. Removing parts safely from commonly used tools
5. Identifying types of fasteners used with composite materials
6. Choosing the appropriate fastener for components or assemblies involving composites
7. Selecting the appropriate equipment for fastener installation

Competency 5: The student will perform machining operations on composite materials by:

1. Differentiating characteristics of joining and bonding methods
2. Applying proper surface treatment techniques
3. Determining accurate hole sizing for fasteners
4. Using correct drilling methods for composite materials

Competency 6: The student will construct composite components according to specifications by:

1. Understanding characteristics of cohesive bonding
2. Demonstrating methods of vacuum bagging
3. Applying resin transfer molding processes
4. Recognizing characteristics of sheet molding compounds
5. Using release films effectively

6. Operating a Platen Press according to procedures
7. Describing characteristics of filament winding processes
8. Identifying key aspects of pultrusion methods
9. Understanding the characteristics of the autoclave process

Competency 7: The student will conduct a repair project per drawings and specifications by:

1. Identifying appropriate repair methods and tools
2. Performing a step sand repair process
3. Setting up and executing a hot bond repair
4. Applying techniques for paint removal
5. Differentiating between various curing methods

Competency 8: The student will conduct a repair project per drawings and specifications by:

1. Applying non-destructive testing techniques, including tap tests, visual inspections, pulse echo, and dye penetrant tests
2. Identifying characteristics of destructive testing methods
3. Detecting and assessing damage

Learning Outcomes:

- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information
- Describe how natural systems function and recognize the impact of humans on the environment