

**Course Description****ETI1855C | Aerospace Structural Fabrication 1 | 3.00 credits**

This course covers essential skills in metalworking, machining, and aerospace fastener applications. Students will learn blueprint interpretation, sheet metal repair, and the use of tools like brakes, shears, and rivets, while gaining hands-on experience in project construction and layout design, following industry standards. Prerequisites: ETI1830C and ETI1851C

**Course Competencies**

**Competency 1:** The student will demonstrate proficient shop practices and ensure safe operation of equipment by:

1. Emphasizing the mandatory use of personal protective equipment
2. Differentiating clearly between safe and unsafe work practices
3. Identifying and mitigating shop hazards efficiently
4. Promoting and maintaining excellent housekeeping standards

**Competency 2:** The student will characterize in detail the components of an aerospace vehicle by:

1. Identifying and describing the structures of aerospace vehicles, including spars, ribs, and related components
2. Accurately identifying and explaining the types of joints used in aerospace vehicles, including tapping and laying
3. Identifying aerospace vehicle control surfaces

**Competency 3:** The student will characterize the properties and applications of metals used in aerospace vehicles by:

1. Identifying and classifying aluminum by its alloy types
2. Recognizing combinations of materials that are incompatible
3. Explaining methods to separate incompatible materials and prevent corrosion
4. Identifying material strengths including bearing, stress, and tensile

**Competency 4:** The student will utilize fundamental knowledge of tools essential for constructing aerospace vehicle components by:

1. Selecting suitable hand tools for specific tasks
2. Choosing appropriate pneumatic tools for various applications
3. Identifying and utilizing the correct bench or floor tools, such as drill presses, band saws, brakes, and shears, for specific jobs
4. Maintaining comprehensive tool inventory and control systems

**Competency 5:** The student will demonstrate fundamental knowledge of metalworking including subtractive machining and additive manufacturing by:

1. Identifying key characteristics of basic aluminum alloys
2. Calculating setback and bend allowances to accurately size metal components
3. Recommending compatible materials based on application needs
4. Utilizing brake and shear tools to shape metal
5. Utilizing a CNC machine to create parts from drawings
6. Building parts through 3D printing

**Competency 6:** The student will utilize aerospace fasteners by:

1. Describing the requirements for interference fits in fasteners
2. Differentiating between blind and solid rivets
3. Comparing flush head and universal head rivets
4. Distinguishing between structural and non-structural rivets

5. Installing solid and blind rivets according to industry standards
6. Understanding and applying rivet installation criteria, including length, edge spacing, pitch, and other specifications
7. Identifying and installing specialized aerospace fasteners, such as Hi-Loks and other blind vs. conventional fasteners

**Competency 7:** The student will interpret basic drawings and blueprints by:

1. Recognizing lines, symbols, and notations used in technical drawings
2. Understanding and applying dimensioning and tolerancing conventions
3. Differentiating between metric and imperial measurement systems
4. Selecting appropriate materials and fasteners based on blueprint specifications
5. Interpreting notes and information blocks on blueprints
6. Demonstrating the ability to interpret blueprints for fabrication tasks
7. Applying standards, such as National Aerospace Standards (NAS), in blueprint interpretation

**Competency 8:** The student will produce layouts or templates by:

1. Taking accurate precision measurements for layout creation
2. Calculating part dimensions and geometry using basic mathematics and trigonometry
3. Creating precise graphical representations of the design
4. Transferring layout designs accurately onto construction materials

**Competency 9:** The student will construct an assigned project component by:

1. Taking ownership of the assigned project construction
2. Assembling the project according to provided specifications and drawings
3. Inspecting the project for conformity to design specifications
4. Collaborating effectively with team members during project assembly

**Competency 10:** The student will perform sheet metal repairs by:

1. Assessing projects for damage, including issues such as oil canning
2. Removing damaged materials, including rivets and metal components
3. Inspecting riveted joints for damage, including the shop head, manufactured head, and surrounding skin
4. Designing and fabricating replacement or repair materials as needed
5. Installing flush and surface patches to repair damaged sections
6. Effectively installing replacement materials

**Learning Outcomes:**

- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information