

Course Description**ETI1830C | Materials and Processes 1 | 3.00 credits**

In this course, students explore the physical properties and characteristics of materials and commodities commonly utilized in the aerospace industry. It delves into materials compatibility, basics of metallurgy, and treatment processes, offering a foundation of how these elements interact and are applied within aerospace contexts.

Course Competencies

Competency 1: The student will describe the characteristics of materials and commodities by:

1. Identifying the processes for material selection and design
2. Analyzing material specifications and standards
3. Outlining the processes of chemical bonding
4. Identifying the mechanical properties of materials, such as stress and strain
5. Identifying the physical and chemical properties of materials, including thermal and electrical characteristics

Competency 2: The student will identify materials and commodities used in the aerospace industry by:

1. Identifying materials unique to the space industry
2. Determining the applications of specific materials in the aerospace sector
3. Recognizing hazardous materials used in the aerospace industry

Competency 3: The student will explain foundational metallurgy concepts by:

1. Comparing the properties and applications of ferrous alloys
2. Comparing the characteristics and uses of aluminum and its alloys
3. Understanding the properties and functionalities of non-ferrous metals, including titanium and copper
4. Detailing the processes and effects of heat treatment on ferrous and aluminum alloys

Competency 4: The student will identify and analyze materials for compatibility and incompatibility by:

1. Explaining the causes and effects of corrosion
2. Distinguishing between various forms of corrosion
3. Describing the economic, environmental, and safety impacts of corrosion
4. Defining and recognizing key terms in basic electrochemistry
5. Demonstrating an understanding of electrochemical processes and concepts
6. Identifying the various environments that contribute to corrosion
7. Describing primary methods for controlling corrosion
8. Differentiating between inspection, monitoring, and testing techniques

Competency 5: The student will explain the methods used for testing materials by:

1. Explaining common non-destructive testing processes
2. Explaining common destructive testing processes

Competency 6: The student will explain the principles and applications of various metal joining techniques by:

1. Comparing and contrasting various welding processes, emphasizing their advantages and limitations
2. Identifying and describing typical welding defects, including their causes and implications
3. Differentiating between soldering and brazing operations, highlighting their unique characteristics and applications
4. Illustrating and explaining common mechanical joining techniques for metals, detailing their uses and benefits

Learning Outcomes:

- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information