I. INTRODUCTION

A. Nonmetallic composite materials are one of the most important elements used in the design and construction of modern aircraft. This course will cover airframe composite structure inspection, fabrication and repair. Inspection and repair of fiberglass, honeycomb, and laminated structural materials, including doors, windows and bonded structures will be included in the instructional material. Aviation safety will be addressed in all facets of the course.

B. This is a required course of study for the Associate Degree of Applied Science in Aviation Maintenance Technology.

C. This course is occupationally related and serves as preparation for careers in the field of Aviation Maintenance.

D. Prerequisite: Successful completion of the general (G) aviation maintenance courses.

II. LEARNING OUTCOMES

Upon successful completion of this course, Aircraft Composites, the student will:

A. Inspect, fabricate and repair composite, fiberglass, honeycomb and laminated structures. (C18,F1,F3,F5, F10)

B. Install, repair and fabricate transparent plastics. (C18,F1, F3,F5,F10)

III. INSTRUCTIONAL MATERIALS

A. The instructional materials identified for this course are viewable through www.cted.edu/books

B. Supplemental Reading: None

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IV. COURSE REQUIREMENTS

The following will be required of each student for successful completion of this course:

A. Reading Assignment: Students are required to complete all reading assignments prior to the class in which the materials will be discussed. Students are subject to announced and unannounced written and oral examinations on assigned reading material.

B. Projects: The following projects will be completed by students prior to completion of the final examination. (Project will be assigned at the discretion of the instructor and availability of resources)

1. Select the proper twist drill and demonstrate the correct method to drill transparent acrylic plastic.

2. Repair a shallow scratch in a piece of transparent acrylic material.

3. Properly remove the finish from a fiberglass-reinforced aircraft structure so that repairs can be performed.

4. Distinguish between a piece of acrylic plastic and cellulose acetate plastic.

5. Repair a 1 inch hole in honeycomb structure.

C. Class performance: Students will earn a satisfactory grade in the course by attending and regularly participating in class, giving complete attention to class activities, completion of all assigned work and successfully completing the examinations. Students are required to maintain a minimum GPA of 2.0 to receive a passing grade for the class and are encouraged to compute and monitor their GPA as the class progresses.
D. Class Participation: Students will earn a satisfactory grade in the course by attending and regularly participating in class, giving complete attention to class activities, completion of all assigned work and successfully completing the examinations. Students are required to maintain a minimum GPA of 2.0 to receive a passing grade for the class and are encouraged to compute and monitor their GPA as the class progresses.

V. EXAMINATIONS

A. There will be one written examination for this course covering all lecture notes and reading material.

B. Practicum: Projects will be assigned by the instructor on an “as applicable” basis. Projects will be pertinent, up-to-date and helpful to the entire class. (Based on available resources)

VI. SEMESTER GRADE COMPUTATION

<table>
<thead>
<tr>
<th>EXAMINATIONS</th>
<th>POINTS</th>
<th>POINT TO GRADE RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAM 1</td>
<td>300</td>
<td>360-400 = A</td>
</tr>
<tr>
<td>Practicum/Projects 1-5</td>
<td>100</td>
<td>320-359 = B</td>
</tr>
<tr>
<td>TOTAL 400</td>
<td></td>
<td>280-319 = C</td>
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<tr>
<td></td>
<td></td>
<td>240-279 = D</td>
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<tr>
<td></td>
<td></td>
<td>0-239 = F</td>
</tr>
</tbody>
</table>

VII. NOTES AND ADDITIONAL INSTRUCTIONS FROM COURSE INSTRUCTOR

A. Course Withdrawal: It is the student’s responsibility to officially drop a class if circumstances prevent attendance. In order to be officially withdrawn from the course, a student must obtain, complete and file an Application for Withdrawal form with the College. The student’s transcript will show “W” or “F”, depending on whether the student was passing or failing at the time of withdrawal.

B. Administrative Withdrawal: Students not meeting course objectives or not making satisfactory progress may be withdrawn from the course at the discretion of the instructor.

C. Cellular Phones and Beeplers: Cellular phones and beepers will be turned off while the student is in the classroom or laboratory.

D. American’s with Disabilities Act (ADA): Disability Support Services provide services to students who have appropriate documentation of a disability.
Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at www.ctcd.edu/disability-support for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

E. **Instructor Discretion:** The instructor reserves the right of final decision in course requirements.

F. **Civility:** Individuals are expected to be cognizant of what a constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

VIII. **COURSE OUTLINE**

A. **Module One:** Composite structures and transparent plastics

1. **Learning Outcomes:** upon successful completion of this Module, the Student will:

   a. Differentiate between the types of composite materials and apply these materials in repairs.

   b. Explain types of manufacturing methods of fabricating composite structures

   c. Install, repair, and manipulate transparent plastics

2. **Learning Activities:**

   a. Successfully complete examination 1 covering material presented in this module. (F1,F5,F10)

   b. Complete projects: 1-5. (C18,F1,F5,F10)

3. **Equipment and Materials:**

   a. Samples of fiberglass, Kevlar, graphite and hybrid cloth.

   b. Disposable gloves (recommend protective hand gel), respirators, goggles, fiberglass cloth, resin (either polyester or epoxy), 320, 400 and 600 grit wet/dry
sandpaper, Micro-Mesh polishing kit, MSDS sheets for all hazardous materials.

c. Vacuum bag system with perforated parting film, bleeder material, sealing tape, vacuum bag, vacuum line, vacuum gage and pump.

d. Transparent acrylic plastics 0.125” thick, acrylic cement (methylene chloride or ethylene dichloride)

e. Band saw, special twist drills with 0° rake angle and water-soluble cutting oil, brad-point twist drills, spade type drill bits for drilling graphite material.

4. Module Outline One: Composite structures and transparent plastics

a. Composite Structures
   1. Composite Materials
      a) Reinforcing Materials
      b) Fiberglass
      c) Kevlar
      d) Graphite
      e) Hybrids
         Fiber Orientation
            (a) Unidirectional Fabric
            (b) Bidirectional Fabric
   2. Matrix Materials
      a) Polyester Resins
      b) Epoxy Resins
   3. Preimpregnated Materials
   4. Adhesives
   5. Core Materials
      a) Foam
      b) Honeycomb
      c) Fillers

6. Manufacturing Methods
   a) Matched Dies
   b) Vacuum Bag
   c) Autoclaves
   d) Filament winding
7. Composite Structure Inspection and Repair
   a) Inspection
   b) Repair
      1) Room-Temperature Cure
      2) Hot-Bond Repair
         Curing the Repair

8. Cutting and Sanding Composite Materials

9. Safety around composites
   a) Skin Care
   b) Eye Care
   c) Respiratory Care

b. Transparent Plastics
   1. Storing and Handling Transparent Plastic Materials
   2. Working with Transparent Plastic Materials
      a) Cutting
      b) Drilling
      c) Forming Acrylic Plastics
      d) Cementing Transparent Plastic Materials
      e) Curing Transparent Plastic Materials
   3. Cleaning Transparent Plastic Materials
      Polishing and Protecting
   4. Installing Plastic Windshields and Windows
   5. Repairing Transparent Plastic Materials
      a) Crazing
      b) Holes
      c) Cracks