



BROWARD COMMUNITY COLLEGE

COURSE OUTLINE

LAST REVIEW: 2007-2008

(i.e. 2003-2004)

NEXT REVIEW: 2012-2013

(i.e. 2008-2009)

STATUS: A

(A, I, D)

COURSE TITLE: Sheet Metal Structures

COMMON COURSE NUMBER: AMT 1130

CREDIT HOURS: 4

CONTACT HOUR BREAKDOWN

(per 16 week term)

CLOCK HOURS: 157

(Voc. Course ONLY)

Lecture: 41 Lab: 116

Clinic: Other:

PREREQUISITE(S): None

COREQUISITE(S): None

PRE/COREQUISITE(S): None

COURSE DESCRIPTION *(750 characters, maximum)*: The student is provided with the opportunity to assimilate the knowledge and skills needed to inspect, maintain, and repair sheet metal structures and components. The course covers the fundamentals of aircraft sheet metal tools and equipment, lay-out work, development and use of templates, bend allowance, set back and mold lines, rivets and riveting, screws and fasteners, bumping and forming methods, repair of airframe structures and stressed skin, use of stainless steel and titanium in aircraft structures. Student fee charged.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s): Area

General Education Requirements – Associate in Science Degree (AS), meets Area(s): Area

General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s): Area

UNIT TITLES

1. Rivets and Fasteners
2. Bonded Structures
3. Plastics, Honeycomb, and Laminated Structures
4. Windows, Doors, and Interior Furnishings
5. Sheet Metal Structures
6. Conventional Rivets
7. Sheet Metal



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ASSESSMENT:

Please provide a brief description (250 characters maximum) that details how students will be assessed on the course outcomes.

1. Quizzes, Test, and/or Final Exam (cumulative/comprehensive);
2. Selected faculty may assess homework, projects, class participation/attendance, and/or extra credit projects. Upon successful completion of this course, the student should be able to accomplish required inspections and maintain and repair sheet metal structures and components.

**** Complete the following only if course is seeking general education status ****

GENERAL EDUCATION Competencies and Skills*:

Please highlight in green font all Competencies/Skills from the list below that apply to this course. In the box to the right of the Competency/Skill, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 5.12) that apply.

1. Read with critical comprehension	
2. Speak and listen effectively	
3. Speak and listen effectively	
4. Think creatively, logically, critically, and reflectively (analyze, synthesize, apply, and evaluate)	
5. Demonstrate and apply literacy in its various forms: (highlight in green ALL that apply) (1. technological, 2. informational, 3. mathematical, 4. scientific, 5. cultural, 6. historical, 7. aesthetic and/or 8. environmental)	
6. Apply problem solving techniques to real-world experiences	
7. Apply methods of scientific inquiry	
8. Demonstrate an understanding of the physical and biological environment and how it is impacted by human beings	
9. Demonstrate an understanding of and appreciation for human diversities and commonalities	
10. Collaborate with others to achieve common goals.	
11. Research, synthesize and produce original work	
12. Practice ethical behavior	
13. Demonstrate self-direction and self motivation	
14. Assume responsibility for and understand the impact of personal behaviors on self and society	
15. Contribute to the welfare of the community	

** General Education Competencies and Skills endorsed by '05-'06 General Education Task Force*



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UNITS

Unit 1 Rivets and Fasteners

General Outcome:

- 1.0 The student shall:** The students should be able to select, install and remove special fasteners for metallic, bonded and composite structures.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 1.1** Determine correct rivet length and diameter
- 1.2** Install a hi-shear rivet.
- 1.3** Describe the precautions concerning rivet fit.
- 1.4** Install deicer boot fasteners.
- 1.5** Install blind Rivets.
- 1.6** Describe the stresses that a rivet is designed to resist.



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Unit 2 Bonded Structures

General Outcome:

- 2.0 The student shall:** The students should be able to inspect bonded structures.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 2.1** Describe the reason for using metal sandwich panels in high-speed aircraft construction.
- 2.2** Explain the use of the metallic "ring" test to inspect for delamination damage of bonded structures.
- 2.3** Evaluate the extent of damage to a bonded structure and determine the type repair needed.



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Unit 3 Plastics, Honeycomb and Laminated Structures

General Outcome:

- 3.0 The student shall:** The students should be able to inspect and repair plastics, honeycomb and laminated structures.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 3.1 Distinguish between transparent plastic and plateglass enclosures.
- 3.2 Protect plastics during handling and repair operations.
- 3.3 Remove scratches and surface crazing from plastic enclosures.
- 3.4 Drill shallow or medium depth holes in plastic materials.
- 3.5 Explain the effect of moisture entrapped in honeycomb structures.
- 3.6 Use a router to remove damage area from honeycomb panels.
- 3.7 Clean honeycomb panels prior to patching.



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Unit 4 Windows, Doors and Interior Furnishings

General Outcome:

- 4.0 The student shall:** The students should be able to inspect, check, service, and repair windows, doors, and interior furnishings.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 4.1 Clean transparent plastic window and windshield materials.
- 4.2 Inspection procedures and airworthiness requirements for safety belts.
- 4.3 Explain the characteristics of acrylic plastic enclosure materials.
- 4.4 Maintain safety belts.
- 4.5 Secure transparent plastic enclosures to the aircraft structure.
- 4.6 Protect transparent plastic enclosure materials during handling and storage.
- 4.7 Describe the physical characteristics of transparent plastic enclosure materials.
- 4.8 Form and shape acrylic plastic.
- 4.9 Repair shallow surface scratches in transparent plastic enclosures.



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Unit 5 Sheet metal Structures

General Outcome:

5.0 The student shall: The students should be able to inspect and repair sheet metal structures.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 5.1 Select and use twist drills.
- 5.2 Select and use a hand file for soft metals.
- 5.3 Prepare dissimilar metals for assembly.
- 5.4 Determine the type, size, and number of rivets for use in structural repairs.
- 5.5 Repair sheet metal flight control surfaces.
- 5.6 Describe the loads acting upon a semimonocoque fuselage.
- 5.7 Describe the construction characteristics of monocoque and semimonocoque structures.
- 5.8 Describe the construction characteristics of cantilever wing structures.
- 5.9 Explain the types of loads carried by wing spars.
- 5.10 Drill holes in stainless steel.
- 5.11 Define bearing failure as related to sheet metal structures.
- 5.12 Define shear failure.
- 5.13 Repair a hole in a stressed-skin metal wing.
- 5.14 Repair a section of damaged skin using a single-lap sheet splice.
- 5.15 Construct a watertight joint
- 5.16 Countersink a hole.



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- 5.17 Perform the dimpling process.
- 5.18 Select the correct rivet to accomplish a repair using a specified material.
- 5.19 Repair or splice stringers on the lower surface of a stressed-skin metal wing.
- 5.20 Determine the correct rivet layout and spacing for a specified repair.
- 5.21 Use proper riveting techniques.
- 5.22 Stop drill cracks in sheet metal.
- 5.23 Repair a slightly oversized hole.
- 5.24 Repair structural units, such as spars, engine supports, etc., that have been built from sheet metal.
- 5.25 Repair shallow scratches in sheet metal.
- 5.26 Determine the condition of a stressed-skin metal structure that is known to have been critically loaded.
- 5.27 Use a reamer.

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Unit 6 Conventional Rivets

General Outcome:



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- 6.0 The student shall:** The students should be able to install conventional rivets.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 6.1 Prepare sheet metal for installation of flush rivets.
- 6.2 Identify and select rivets.
- 6.3 Determine the correct rivet length and diameter.
- 6.4 Select and use the correct rivet set for specified rivet head styles.
- 6.5 Select and use bucking bars.
- 6.6 Remove rivets.
- 6.7 Determine the condition of a driven rivet.
- 6.8 Determine the circumstance under which 2117 rivets may be used to replace 2017 and 2024.
- 6.9 Define rivet tipping.
- 6.10 Determine the correct number of rivets to be used in making a structural sheet metal repair.
- 6.11 Handle and install rivets that require heat treatment prior to use.
- 6.12 Adjust and use an air-operated riveting gun.
- 6.13 Describe the circumstances under which type "A" rivets may be used in aircraft.
- 6.14 Explain the mechanical properties of heat-treated rivets.



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Unit 7 Sheet metal

General Outcome:

7.0 The student shall: The students should be able to hand form, layout, and bend sheet metal.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

- 7.1 Make a joggle or offset bend.
- 7.2 Bend sheet metal that requires the use of a large radius.
- 7.3 Determine the neutral axis of a bend.
- 7.4 Define bend radius.
- 7.5 Determine the amount of material required to make a specified bend.
- 7.6 Bend sheet metal to a specified angle.
- 7.7 Lay out and bend a piece of sheet metal using a minimum radius for the type and thickness of material specified.
- 7.8 Lay out a bend in relationship to metal "grain" to minimize the possibility of cracking.
- 7.9 Determine the flat layout dimensions of a component part to be formed by bending.
- 7.10 Form metal by bumping.