



BROWARD COMMUNITY COLLEGE COURSE OUTLINE

LAST REVIEW: 2008-2009

(i.e. 2003-2004)

NEXT REVIEW: 2013-2014

(i.e. 2008-2009)

STATUS: A

(A, I, D)

COURSE TITLE: Materials & Processes

COMMON COURSE NUMBER: AMT 0040

CREDIT HOURS: 2

CONTACT HOUR BREAKDOWN

(per 16 week term)

CLOCK HOURS: 84

(Voc. Course ONLY)

Lecture: 46

Lab: 38

Clinic:

Other:

PREREQUISITE(S): None

COREQUISITE(S): None

PRE/COREQUISITE(S): None

COURSE DESCRIPTION *(750 characters, maximum):* Familiarizes the student with the Air Force, Navy, and military specification codes used to identify hardware and the pricing methods used by the vendors, with the methods used to identify and select aircraft materials, and with various heat-treating processes and provides the student with experience in the use of non-destructive methods of inspection and evaluation and in correct shop practices and procedures and the use of special tools, including torquing methods, safety wiring, use of precision measuring equipment, shop safety, and technicians' ethics and legal responsibilities. 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. Non-destructive Methods
2. Penetrant, Chemical Etching, and Magnetic Particle
3. Basic Heat-Treating Processes
4. Aircraft Hardware and Materials
5. Welds
6. Precision Measurements



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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 students should be able to identify hardware, select aircraft materials, use non-destructive methods of inspection and evaluation, and use special tools.

**** 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. Write clearly and coherently	
4. Think creatively, logically, critically, and reflectively (analyze, synthesize, apply, and evaluate)	
5. Demonstrate and apply literacy in its various forms: <i>(highlight in green ALL that apply)</i> (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



BROWARD COMMUNITY COLLEGE COURSE OUTLINE

Common Course Number: AMT 0040

UNITS

Unit 1 Non-destructive Methods

General Outcome:

- 1.0 The student shall:** The students should be able to identify and select appropriate non-destructive methods.

Specific Measurable Learning Outcomes:

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

- 1.1 Discuss the use of radiography in aircraft and component inspection.
- 1.2 Explain the use of ultrasonic inspection methods for detecting cracks.
- 1.3 Describe the applicability of magnetic particle inspection methods to engine crankshafts.
- 1.4 Describe the method for detecting surface cracks in aluminum castings and forgings.
- 1.5 Explain the technique for locating cracks in materials when only one side of the material is accessible.



BROWARD COMMUNITY COLLEGE

COURSE OUTLINE

Common Course Number: AMT 0040

Unit 2 Penetrant, Chemical Etching, and Magnetic Particle Inspections

General Outcome:

- 2.0 The student shall:** The students should be able to perform penetrant, chemical etching, and magnetic particle inspections.

Specific Measurable Learning Outcomes:

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

- 2.1 Explain the general procedure for performing magnetic particle inspection.
- 2.2 Demagnetize steel parts after magnetic particle inspection.
- 2.3 Clean parts in preparation for penetrant inspection.
- 2.4 Describe the visual indications of a subsurface flaw or fracture during magnetic particle inspection.
- 2.5 Locate cracks and blowholes in welded assemblies.
- 2.6 Determine the correct length bolt to use.
- 2.7 Determine correct torque values for tightening aircraft nuts and bolts.
- 2.8 Identify materials suitable for use for firewalls and exhaust shrouds.
- 2.9 Install castle nuts.
- 2.10 Explain the strength characteristics of type "A" rivets.
- 2.11 Describe the characteristic of aluminum alloy rivet material that causes some rivets to require several days to reach their ultimate strength.
- 2.12 Determine that materials used in aircraft maintenance and repair are of the proper type and conform to the appropriate standards.
- 2.13 Describe the characteristics of aluminum-clad sheet aluminum alloy.



BROWARD COMMUNITY COLLEGE COURSE OUTLINE

- 2.14 Demonstrate the procedure for using dye penetrants.
- 2.15 Distinguish between heat-treated and non-heat-treated aluminum alloys when the identification marks are not on the material.



BROWARD COMMUNITY COLLEGE

COURSE OUTLINE

Common Course Number: AMT 0040

Unit 3 Basic Heat-Treating Processes

General Outcome:

- 3.0 **The student shall:** The students should be able to perform basic heat-treating processes.

Specific Measurable Learning Outcomes:

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

- 3.1 List the types of aluminum alloys considered to be heat treatable.
- 3.2 Anneal copper tubing.
- 3.3 Describe the steps in heat treatment of aluminum alloys.
- 3.4 List the effects of various forms of heat treatment.
- 3.5 Explain the effect of incorrect heat treatment on the corrosion-resistant properties of aluminum alloy.
- 3.6 Identify the degree of temper for aluminum alloy products from code designators.
- 3.7 Describe the effect of heating a metal slightly above its critical temperature, and then rapidly cooling it.
- 3.8 Describe the effect of strain hardening on the tensile strength of aluminum alloy.
- 3.9 Explain the relationship between tensile strength and metal hardness.
- 3.10 Anneal a welded steel part.



BROWARD COMMUNITY COLLEGE

COURSE OUTLINE

Common Course Number: AMT 0040

Unit 4 Aircraft Hardware and Materials

General Outcome:

- 4.0 **The student shall:** The students should be able to identify and select aircraft hardware and materials.

Specific Measurable Learning Outcomes:

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

- 4.1 Identify aluminum alloys from code designators.
- 4.2 Identify steel from code designators.
- 4.3 List the identification markings of AN standard steel bolts.
- 4.4 Identify aircraft cable.
- 4.5 Explain the characteristics of a material that affect its ability to be hammered, rolled, or pressed into various shapes.
- 4.6 Identify the SAE system of identifying steel.
- 4.7 Determine wrought aluminum alloy composition and condition by referring to aluminum codes.
- 4.8 Install self-locking nuts.



Common Course Number: AMT 0040

Unit 5 Welds

General Outcome:

- 5.0 The student shall:** The students should be able to inspect and check welds.

Specific Measurable Learning Outcomes:

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

- 5.1** Describe the characteristics of a good weld.
- 5.2** Explain the types of stress that welded joints can withstand.
- 5.3** Discuss the effect of welding over a previously brazed or soldered joint.



BROWARD COMMUNITY COLLEGE COURSE OUTLINE

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Unit 6 Precision Measurements

General Outcome:

6.0 The student shall: Upon successful completion of this unit, the students should be able to:

Specific Measurable Learning Outcomes:

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

- 6.1 Use a micrometer and a caliper to make precise measurements.
- 6.2 Measure a small hole using a micrometer and a hole gauge.
- 6.3 Read and interpret a vernier micrometer scale.
- 6.4 Use a dial indicator, V-blocks, and a surface plate to check alignment of a shaft.