

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



**SAULT  
COLLEGE**

**COURSE OUTLINE**

**COURSE TITLE:** METALLURGY AND HEAT TREATING PROCESSES

**CODE NO. :** ASR111 **SEMESTER:** 2

**PROGRAM:** AIRCRAFT STRUCTURAL REPAIR

**AUTHORS:** Paul Davis

**DATE:** January 2016 **PREVIOUS OUTLINE DATED:** January 2015

**APPROVED:** Colin Kirkwood 2015/2016  
DEAN

**TOTAL CREDITS:** 2

**PREREQUISITE(S):**

**HOURS: (Total)** 32

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For additional information, please contact Colin Kirkwood, Dean  
School of the Environment, Technology & Business  
(705) 759-2554, Ext. 2688

**I. COURSE DESCRIPTION:**

Basic metallurgy and heat treating processes will be discussed as it pertains to aircraft metals. Various procedures used to increase hardness and durability will be researched. Testing using specialized equipment will be explained.

**II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:**

Upon successful completion of this course, the student will demonstrate the ability to:

1. ***Understand the heat-treating processes used to heat-treat ferrous and nonferrous metals and to discuss and identify all terminology used in each heat treating process.***

Potential Elements of the Performance:

- describe how aluminum is produced
- identify the major alloy in a sheet of aluminum by the part number stamped on the sheet
- discuss various terms associated with the heat treatment process of aluminum
- describe why we heat treat aluminum and the changes that occur in the metal
- discuss the characteristics associated with magnesium
- discuss heat treatment of ferrous metals and the various methods used in the heat treatment of ferrous metals
- describe the purpose of having "Alclad" on aluminum
- identify with the use of charts, the temperature that specific metals are heat treated at
- describe, using charts, the precipitation heat treatment procedures to be used to heat treat aluminum
- identify the "soaking" temperature of various alloyed metals
- discuss heat treatment of 2024T3 rivets

**2. *Discuss and identify various hardness testing methods performed on ferrous and non-ferrous metals.***

Potential Elements of the Performance:

- identify the procedures used to operate both the Brinell and Rockwell hardness testers
- describe how to identify the hardness of aluminum using the Barcol tester
- discuss, using charts, the ultimate and shearing strength of various types of alloyed aluminum

**III. TOPICS:**

1. Ferrous and Non Ferrous Metals  
Heat Treatment of Metals
2. Hardness Testing

**IV. REQUIRED RESOURCES/TEXTS/MATERIALS:**

Aviation Maintenance Technician Handbook (FAA-H-8083-30)  
Teacher Handouts

**V. EVALUATION PROCESS/GRADING SYSTEM:**

Two Multiple Choice Tests (Test #24A and #24B) – each worth 50% of Final Grade.

**Note: Students in the Aircraft Structural Repair Program require a minimum of seventy (70) percent in a course to obtain a passing grade. This equates to a “B” grade.**

The following semester grades will be assigned to students:

<b>Grade</b>	<b><u>Definition</u></b>	<i>Grade Point Equivalent</i>
A+	90 – 100%	4.00
A	80 – 89%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
F (Fail)	49% and below	

CR (Credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

If a faculty member determines that a student is at risk of not being successful in their academic pursuits and has exhausted all strategies available to faculty, student contact information may be confidentially provided to Student Services in an effort to offer even more assistance with options for success. Any student wishing to restrict the sharing of such information should make their wishes known to the coordinator or faculty member.

**VI. SPECIAL NOTES:****Attendance**

Course attendance is mandatory. If a student is absent, he/she must have a valid reason – documentation is required.

Students having missed more than 5 percent of the program through absences, shall not qualify for experience credit from Transport Canada, and will not be granted make-up or re-write options for theory tests and shop projects.

If a student is absent for all of the in-class theory or shop demonstrations for which a test/project is assigned, he/she will not be granted permission to complete the test/project.

It is the departmental policy that once the classroom door has been closed, the learning process has begun. Late arrivers will not be granted admission to the room.

**VII. COURSE OUTLINE ADDENDUM:**

The provisions contained in the addendum located in D2L and on the portal form part of this course outline.