

**SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY**

**SAULT STE. MARIE, ONTARIO**



**COURSE OUTLINE**

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

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

**PROGRAM: AIRCRAFT STRUCTURAL REPAIR**

**AUTHORS: Paul Davis**

**DATE: Jan. 2017 PREVIOUS OUTLINE DATED: Jan. 2016**

**APPROVED:**  
Corey Meunier Dec '16  
Chair DATE

**TOTAL CREDITS: 2**

**PREREQUISITE(S):**

**HOURS: (Total) 32**

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*School of Technology and Skilled Trades*  
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**COURSE DESCRIPTION:****I.**

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 45% and assignments are worth (10%) 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:

### 1. Course Outline Amendments:

The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

### 2. 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.

### 3. Retention of Course Outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

4. Prior Learning Assessment:

Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question. Please refer to the Student Academic Calendar of Events for the deadline date by which application must be made for advance standing.

Credit for prior learning will also be given upon successful completion of a challenge exam or portfolio.

Substitute course information is available in the Registrar's office.

5. Accessibility Services:

If you are a student with a disability (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Accessibility Services office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

6. Communication:

The College considers Desire2Learn (D2L) as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of this Learning Management System (LMS) communication tool.

7. Academic Dishonesty:

Students should refer to the definition of “academic dishonesty” in Student Code of Conduct. Students who engage in academic dishonesty will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

8. Tuition Default:

Students who have defaulted on the payment of tuition (tuition has not been paid in full, payments were not deferred or payment plan not

honoured) as of the first week of November (fall semester courses), first week of March (winter semester courses) or first week of June (summer semester courses) will be removed from placement and clinical activities due to liability issues. This may result in loss of mandatory hours or incomplete course work. Sault College will not be responsible for incomplete hours or outcomes that are not achieved or any other academic requirement not met as of the result of tuition default. Students are encouraged to communicate with Financial Services with regard to the status of their tuition prior to this deadline to ensure that their financial status does not interfere with academic progress.

9. Student Portal:

The Sault College portal allows you to view all your student information in one place. mysaultcollege gives you personalized access to online resources seven days a week from your home or school computer. Single log-in access allows you to see your personal and financial information, timetable, grades, records of achievement, unofficial transcript, and outstanding obligations, in addition to announcements, news, academic calendar of events, class cancellations, your learning management system (LMS), and much more. Go to <https://my.saultcollege.ca>.

10. Recording Devices in the Classroom:

Students who wish to use electronic devices in the classroom will seek permission of the faculty member before proceeding to record instruction. With the exception of issues related to accommodations of disability, the decision to approve or refuse the request is the responsibility of the faculty member. Recorded classroom instruction will be used only for personal use and will not be used for any other purpose. Recorded classroom instruction will be destroyed at the end of the course. To ensure this, the student is required to return all copies of recorded material to the faculty member by the last day of class in the semester. Where the use of an electronic device has been approved, the student agrees that materials recorded are for his/her use only, are not for distribution, and are the sole property of the College.