

## Course outline

COURSE : **Structural Repairs on Composites, Wood, Fabric and Metal**

PROGRAM : 280.C0 Aircraft Maintenance

DISCIPLINE : 280 Aeronautics

WEIGHTING : Theory : 2 Practice : 4 Personal Study : 1

Teacher(s)	Office	☎ extension	✉ e-mail ou website
Marc-Antoine Charette	C-183	4418	<a href="mailto:Ma.charette@cegepmontpetit.ca">Ma.charette@cegepmontpetit.ca</a>

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### Office hours

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Morning					
Afternoon					
Other					

Coordinator(s)	Office	☎ extension	✉ e-mail
Joaquin Mora	C-160	4220	<a href="mailto:joaquin.mora@cegepmontpetit.ca">joaquin.mora@cegepmontpetit.ca</a>
Jeanne Dumas Roy	C-160	4470	<a href="mailto:jeanne.dumasroy@ena.ca">jeanne.dumasroy@ena.ca</a>

## 1 CONTEXT OF THIS COURSE WITHIN THE PROGRAM

This course is offered during the sixth session of the Aircraft Maintenance Program.

By the end of this course, students will have developed:

- Dexterity with tools.
  - Research skills in technical manuals
  - Knowledge of materials and hardware.
  - Ability to repair laminated or sandwich-type composites.
  - Ability to carry out repairs using moulds.
  - Ability to carry out repairs using wood and fabric.
  - Ability to install and remove different types of fasteners.
  - Ability to provide a preliminary report of a major repair that complies with the applicable manufacturer's standards.
- Students must keep this course outline for the duration of their studies as it will be useful for the comprehensive assessment at the end of the program.

Transport Canada: This course outline meets the requirements of Training Organisation Certification Manual (MCF) of Transport Canada. The Department applies Transport Canada standard which allows a maximum absence of 5% for the course (theory and laboratory). The department compiles absences of all students enrolled in Aircraft Maintenance (280.C0) according to Transport Canada requirements. The application of Transport Canada policies regarding absences is available on the [Student Guide](#) website under the heading « Information/AME and AML licences ».

## 2 COMPETENCIES OF THE EXIT PROFILE (STUDENT SKILL PROFILES)

- Maintain aircraft structure

## 3 MINISTERIAL OBJECTIVE(S) AND COMPETENCIES

- |      |   |
|------|---|
| 0261 | Maintain the metal structures and structural components of an aircraft.                             |
| 0262 | Maintain aircraft structures and structural components made of composite materials, wood and fabric |

## 4 TERMINAL OBJECTIVE OF THE COURSE (FINAL COURSE OBJECTIVE)

- At the end of this course, the student will be able to perform the appropriate structural repair.

## 5 TEACHING AND LEARNING STRATEGIES

### THEORY

The theoretical part of the Structural Repairs on Composites is organized into various themes:

- Composite materials
- Hardware
- Aircraft constraints and structures

- Repair procedures
- Preliminary report
- Techniques for working with wood and fabric

Exercises and class discussions will be used as a strategy to develop the necessary skills for routine aircraft maintenance. Directed research in technical manuals and multimedia elements will complement learning.

#### PRACTICAL WORK

In the laboratory, the teacher will use hands-on demonstrations to guide students regarding the use of various measuring instruments. The practical assignments will allow students to acquire manual dexterity and the necessary competence for aircraft maintenance technicians. The repair projects carried out during the session are designed to provide students with practical experience using various repair methods on the materials being studied according to aeronautical standards. All of this complies with the health and safety work procedures applicable to the aviation industry.

## 6 COURSE PLAN

### LEARNING OBJECTIVES

1. Become familiar with the objectives and requirements
2. Inspect the damaged parts
3. Plan the work to be carried out
4. Perform the preliminary work required to repair the damaged part
5. Repair an element made of composite material
6. Tidy and clean the work area+ CNESST precaution

### THEORETICAL PART

WEEK	# OBJECTIVE	CONTENT	<u>MODE OF INSTRUCTION</u> AND LEARNING ACTIVITIES	DOCUMENTATIONS, RESOURCES, TECHNOLOGICAL TOOLS AND URL ADDRESS
1	1	Introduction to composites	Power point and exercices	LEA for class notes
2	1	Bagging	Power point and exercices	LEA for class notes
3	1	Resins (thermoplastics, thermosettings)	Power point and exercices	LEA for class notes
4	1	Fibers (glass, carbon, aramid)	Power point and exercices	LEA for class notes
5	1	Pre-impregnated, cores (honeycomb, foams)	Power point and exercices	LEA for class notes
6	1	Composite Construction methods/Health and safety	Power point and exercices	LEA for class notes
7	1	Exam 1		
8	1	Curing and assembly	Power point and exercices	LEA for class notes
9	1,2,3,4	SRM, inspection and repair of a structure	Power point and exercices	LEA for class notes
10	1,2,3	Composite repair	Power point and exercices	LEA for class notes
11	1,2,3,4	Flight domain, constraint and tubular structure	Power point and exercices	LEA for class notes
12	1,2,3,4	Wooden structure	Power point and exercices	LEA for class notes
13	1,2,3,4	Canvas covering	Power point and exercices	LEA for class notes
14	1,2,3,4	New trends	Power point and exercices	LEA for class notes
15	1,2,3,4	Exam 2		

## PRATICAL PART

WEEK	# OBJECTIVE	CONTENT	DOCUMENTATIONS, RESOURCES, TECHNOLOGICAL TOOLS AND URL ADDRESS
1	1,3	Presentation & making a carbon airplane	Laboratory textbook
2	1,3,4	Fabrication of a laminated plate	Laboratory textbook
3	1,2,3,4,5	Fiberglass laminated plate and testing	Laboratory textbook
4	1,2,3,4,5	Fiberglass laminated plate testing and pre-preg floor fabrication	Laboratory textbook
5	1,2,3,4,5	Honeycomb repair with GMI	Laboratory textbook
6	1,2,3,5	Exam 1	Laboratory textbook
7	1,2,3,5	Honeycomb repair and mini-wing fabrication	Laboratory textbook
8	1,3	Mini-wing interlining	Laboratory textbook
9	1,2,3,5	Mini-wing repair and inspection panel	Laboratory textbook
10	1,2,3	Inspection panel	Laboratory textbook
11	1,2,3,4,5,6	Honeycomb repair & inspection panel	Laboratory textbook
12	1,2,3,4,5,6	Honeycomb repair & complexe shape repair	Laboratory textbook
13	1,2,3,4,5,6	Honeycomb repair & complexe shape repair	Laboratory textbook
14	1,2,3,4,5,6	Honeycomb repair & complexe shape repair	Laboratory textbook
15	1,2,3,4,5,6	Exam 2	Laboratory textbook

## 7 SYNTHESIS OF SUMMATIVE EVALUATION METHODS

### THEORETICAL

Description of Evaluation Activity	Context	Learning objective(s)	Evaluation Criteria <sup>1</sup>	Due Date (approximate date assignment due or exam given)	Weighting (%)
Exam 1	Individual, open questions	1	Correct terminology and understanding of technology	7 <sup>th</sup>	20
Exam 2	Individual, open questions	1,2,3,4	Correct terminology and understanding of technology	15 <sup>th</sup>	20
				<b>SUB-TOTAL</b>	<b>40 %</b>

### PRACTICAL OPTION 1

Description of Evaluation Activity	Context	Learning objective(s)	Evaluation Criteria <sup>2</sup>	Due Date (approximate date assignment due or exam given)	Weighting (%)
Exam 1: Repair of a partial penetration on a laminated plate	Individual	1,2,3,4,5	Terminology Mixing Repair	6 <sup>th</sup>	20
Exam 2: Perform a prepreg repair on a composite floor	Individual	ALL	❶	15 <sup>th</sup>	40
				<b>SUB-TOTAL</b>	<b>60%</b>
				<b>Total</b>	<b>100%</b>

❶ Relevance of observations, accuracy of dimensions, tolerances, compliance with standards in repair steps, rigorous recording, choice of tools and equipment, proper use of tools, precise calculations, careful removal and laying, respect of the SST norms and the cleanliness of the workplace.

<sup>1</sup> Issus du programme d'études (critères de performance) et adaptés au niveau des étudiants (exigences évolutives) d'une session à l'autre. Les critères d'évaluation doivent être explicites et permettre l'observation des résultats (processus, produits, propos). Les critères d'évaluation seront présentés par écrit aux étudiants au moins une semaine avant l'activité d'évaluation sommative (article 5.1j PIEA)

## 8 REQUIRED MATERIAL

In the laboratory, safety glasses, safety shoes or boots and coveralls are mandatory.

In the theory, have access to the class note (printed or on computer)

## 9 MEDIAGRAPHY

ACCEPTABLE METHODS, TECHNIQUES AND PRACTICES; V. 1: AIRCRAFT INSPECTION AND REPAIR, AC 4313-1A, V. 2: AIRCRAFT ALTERATIONS, AC 4313-2A, , Department of Transportation. Federal Aviation Administration. Washington D.C., U.S. Government Printing Office, 1977, 2 volumes.

CARE AND REPAIR OF ADVANCED COMPOSITES, Keith B. Armstrong ,SAE International, 2005, 664 pages.

AIRCRAFT STRUCTURAL TECHNICIAN, Dale Hurst , Avotek Publishing, Harrisonburg, Virginia, 2001, 272 pages.

STANDARD AIRCRAFT HANDBOOK, Leavell, Stuart et Stanley BUNGAY., 3d ed., Fallbrook, Calif., Aero, 1980, 159 pages.

UNDERSTANDING AIRCRAFT STRUCTURE, John Cutler, Granada publishing Ltd, Frogmore (England), 1981, 170 pages.

CELLULES ET SYSTÈMES D`AÉRONEFS, Didier Féminier, Modulo Éditeur, Mont-Royal, 1982, 315 pages. Chapitres 1 à 4, page 1 à 69.

ADVANCED COMPOSITE MATERIAL CHAPTER 7 AMT AIRFRAME HANDBOOK VOLUME 1 FAA-H8083-31 [HTTP://WWW.FAA.GOV/REGULATIONS\\_POLICIES/HANDBOOKS\\_MANUALS/AIRCRAFT/AMT\\_AIRFRAME\\_HANDBOOK/MEDIA/AMA\\_CH07.PDF](http://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/amt_airframe_handbook/media/ama_ch07.pdf)

## 10 REQUIREMENTS TO PASS THE COURSE

### 1. Passing Mark

The passing mark for this course is 60% by adding the marks for the theory and practical work for the course.

### 2. Attendance for Summative Evaluations

Presence at exams is obligatory. Any absence from an evaluation activity which is not justified by a serious reason will mean a mark of zero and failure of this evaluation. According to article 5.2.5.1 of the *Institutional Policy on the Evaluation of Student Achievement* (IPESA). *“it is the student’s responsibility to take the necessary means to meet his teacher and explain the motives for his absence with a supporting document explaining his absence. If the motives are serious and recognized as such by the teacher, the teacher and the student will agree to the terms of the delay for doing the evaluation or assignment.”*

In addition, the IPESA indicates that *“if a student is late for an evaluation activity with no justifiable reason, the teacher can refuse to allow the student to participate in the said activity.”*

Serious reasons that can be considered are: illness (with a medical certificate), death of a family member (with a death certificate), a force majeure or overpowering event, activities authorized by the College, and legal reason (proof of the court summons).

### 3. Submitting Assignments

All assignments must be submitted by the date, time and place designated by the teacher (s). Unless there is an agreement with the teacher, late assignments are penalized by the deduction of 10% per day, and a mark of zero will be given when the assignment is six days late. Any assignments due in the fifteenth week cannot be submitted late.

### 4. Presentation of Written Work

The instructor(s) will provide students with information and guidelines regarding the presentation of written work. When the presentation of an assignment is unacceptable, the work will be penalized as a late assignment until an acceptable version is submitted. In this case, the penalties for late work will be applied (Late assignments will be penalized 10% per day that they are late and will receive a mark of zero (0) after 6 days).

Students must follow the standards adopted by the Cégep for written work (« Normes de présentation matérielle des travaux écrits »). These can be found at : <http://rmsh.cegepmontpetit.ca/normes-de-presentation-materielle-des-travaux-ecrits-du-cegep/>.

### 5. Plagiarism and other breaches of academic integrity

- a) Plagiarism consists of copying, translating, paraphrasing, in whole or in part, the work of another person and wrongfully attributing it to oneself, with or without their consent, and constitutes a breach of academic integrity.
- b) The use of works generated entirely or partially by artificial intelligence, if not authorized by the professor, is also considered a breach of academic integrity.
- c) Acts of fraud, such as impersonating another student during a summative assessment, deceiving, cheating, or falsifying documents or results, also constitute breaches of academic integrity.
- d) Any collaboration in such acts or any attempt to commit them is also considered a breach of intellectual ethics.

Any violation of intellectual honesty, as well as any attempt at or collaboration in such an action will result in a mark of "0" for the exam, the assignment or the evaluation activity in question. In this case, the teacher will make a written report to departmental coordination which will be transmitted to the Dean of Studies in accordance with article 5.6.1 IPESA.

## 11 METHODS OF COURSE PARTICIPATION

Accident prevention is the responsibility of each and every individual. We invite you to familiarize yourself with all health and safety measures at <https://mareussite.cegepmontpetit.ca/ena/mes-outils/sante-et-securite/>.

Bringing food or beverages into the laboratories is strictly prohibited.

Attire worn by students in laboratories and workshops must feature the ÉNA logo. The use of hooded sweatshirts with drawstrings is not permitted due to safety risks when using equipment or machinery. ÉNA-branded clothing is available for purchase at the ÉNA Coop (room C163-A).

Authorized pants include work pants or jeans without any decorations (nails, metal parts, etc.).

Personal Protective Equipment (PPE) is essential for the safety of students and is mandatory in laboratories, workshops, and hangars. This includes wearing safety footwear (boots or shoes) and safety glasses. Protective clothing such as lab coats or uniforms is only necessary when required.

## 12 OTHER DEPARTMENTAL REGULATIONS

Students are invited to consult the website for the specific rules for this course:  
<https://guideena-en.cegepmontpetit.ca/department-rules/>



### **13 INSTITUTIONAL POLICIES AND REGULATIONS**

Any student registered at Cégep Édouard-Montpetit must read the content of certain institutional policies and regulations and comply with them.

The French titles for these policies are: *Politique institutionnelle d'évaluation des apprentissages* (PIEA), la *Politique institutionnelle de la langue française* (PILF), la *Politique pour un milieu d'études et de travail exempt de harcèlement et de violence* (PPMÉTEHV), les *Conditions d'admission et cheminement scolaire*, la *Procédure concernant le traitement des plaintes étudiantes dans le cadre des relations pédagogiques*.

The full text of these policies and regulations is accessible on the Cégep web site at the following address: <http://www.cegepmontpetit.ca/ena/a-propos-de-l-ecole/reglements-et-politiques>. If there is a disparity between shortened versions of the text and the full text, the full text will be applied and will be considered the official version for legal purposes.

### **14 STUDENT ACCESSIBILITY CENTER - FOR STUDENTS WITH DISABILITIES**

Students having received a professional diagnosis of impairment (motor skills, neurological, organic, sensory, learning difficulties, mental health, autism spectrum disorder or other) or suffering from a temporary medical condition may request special accommodations.

Students seeking these accommodations must forward their diagnosis to the CSA by either MIO to "Service, CSA-ENA" or email to "servicesadaptesena@cegepmontpetit.ca".

Students already registered with the CSA must communicate with their teachers at the beginning of the semester to discuss those accommodations they have been awarded by the CSA.

### **15 ANNEX**