

## COURSE OUTLINE

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

**PROGRAM:** 280.C0 Aircraft Maintenance Technology

**DISCIPLINE:** 280 Aeronautics

**WEIGHTING:** Theory: 2 Practical Work: 4 Personal Study: 1

Instructor(s)	Office	☎ extension	✉ email or web site
Marc-Antoine Charette	C-183	4418	<a href="mailto:ma.charette@cegepmontpetit.ca">ma.charette@cegepmontpetit.ca</a>

### OFFICE HOURS

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Morning					
Afternoon					

Coordinator(s)	Office	☎ extension	✉ email or web site
Goudreault Éric	C-160	4691	<a href="mailto:jose.marcoux@cegepmontpetit.ca">jose.marcoux@cegepmontpetit.ca</a>
Rancourt Serge	C-160	4664	<a href="mailto:serge.rancourt@cegepmontpetit.ca">serge.rancourt@cegepmontpetit.ca</a>

## CONTEXT OF THIS COURSE IN 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.**

## TRANSPORTS 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) and Avionics (280.D0) according to Transport Canada requirements. The application of Transport Canada policies regarding absences is available on the college website and in the student agenda under the heading « Privilèges accordés par Transports Canada ».

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

Maintain aircraft structures.

## MINISTERIAL OBJECTIVES 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.

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

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

## 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 instructor 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.

**COURSE PLANNING**

**Learning objectives 0261**

1. Know the objectives and needs
2. Plan the work
3. Remove damaged parts
4. Perform repair work on a non-pressurized aircraft structure and on a pressurized structure.
5. Check the quality of the work.
6. Arrange and clean the workplace

**Learning objectives 0262**

1. Know the objectives and needs
7. Inspect the damaged parts
2. Plan the work
8. Perform preparatory work to repair damaged parts
9. Install or repair a covering of an canvas aircraft component
10. Make a molding in composite materials
11. Repair an element made of composite materials
6. Arrange and clean the workplace

<b>Week</b>	<b>Theoretical Content</b>	<b>Practical work content</b>
1	Introduction to Composites	Presentation & making a carbon airplane
2	Characteristics of Composite Materials	Fiberglass laminated plate
3	Characteristics of Composite Materials	Fiberglass laminated plate & Inspection report
4	Pre-impregnated, cores	Inspection report & pre-preg floor
5	Composite Construction	Inspection report delivery & Exam #1
6	Health and safety, bagging	Honeycomb repair
7	Exam 1	Honeycomb repair & mini wing

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8	Curing and assembly	Mini-wing
9	Evaluations of a repairs	Mini-wing & complex shape repair
10	SRM major repairs	Complex shape repair
11	Presentation of the assignment, CTA visit	Honeycomb repair
12	Flight domain constraint, tubular structure	Complexe shape repair & honeycomb repair
13	Wood and Fabric Materials	Inspection panel & Honeycomb repair
14	New Trends	Inspection panel & Honeycomb repair
15	Exam 2	Exam 2

SYNTHESIS OF SUMMATIVE EVALUATION METHODS - THEORY

Description of Evaluation Activity	Context	Learning Objective(s)	Évaluation criterias	Due Date (date assignment is due or exam period)	Weighting (%)
<b>Exam 1</b>	Individual Shorts answer questions	1	See 6 <sup>th</sup> week instructions	6 <sup>th</sup>	15
<b>Research, repair as per SRM</b> The student will have to make a preliminary report of a damage on an honeycomb structure of a Challenger 601	Individual/Team	1,2,7,8	See 11 <sup>th</sup> week instructions	12 <sup>th</sup>	15
<b>Exam 2</b>	Individual Short answer questions	1	See 14 <sup>th</sup> week instructions	15 <sup>th</sup>	20

**Sub-total: 40%**

SYNTHESIS OF SUMMATIVE EVALUATION METHODS – PRACTICAL PART

Description of Evaluation Activity	Context	Learning Objective(s)	Évaluation criterias	Due Date (date assignment is due or exam period)	Weighting (%)
<b>Inspection report</b> The student will have to records and analyse the results of a serie of test made on a liminated plate.	Individual	7	Relevance of observations	5 <sup>th</sup>	10
<b>Exam 1</b> The student will have to perform a repair on a laminated plate and identify different material that we use in composite repair.	Individual	1,2,3,6,7,11	terminology mixing repair	5 <sup>th</sup>	20
<b>Exam 2</b> The student will have to perform a repair on a composite floor	Individual	All	①	15 <sup>th</sup>	30

**Sub-total: 60%**

**TOTAL: 100%**

① 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.

REQUIRED MATERIAL

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

The following text is required for the course Composite Structural Repair (280-616)

**ADVANCED COMPOSITES, Cindy Foreman, Jeppesen, JS312645, Englewood, Colorado, 2002, 200 pages.**

MEDIAGRAPHY

Internet site for this course: <http://www.collegeem.qc.ca/ena/preenvol/pmenard/>

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)

## REQUIREMENTS TO PASS THE COURSE

### (1) Passing Mark

The passing mark for this course is 60% (PIEA, article 5.1m).

### (2) Attendance for Summative Evaluations

Attendance is mandatory for summative evaluations (PIEA, article 5.2.5.1)..

### (3) Submitting Assignments

All assignments must be submitted by the date, time and place designated by the teacher. Any class or homework assignment handed in late will be penalized. The **penalties** associated with delays are set **according to the departmental rules** (PIEA, article 5.2.5.2).

### (4) Presentation of Written Work

Students must follow the standards adopted by the Cégep for written work (« *Normes de présentation matérielle des travaux écrits* »). These can be found in the documentation centre on the Cégep web site [www.cegepmontpetit.ca/normes](http://www.cegepmontpetit.ca/normes), under the heading **Liens éclair, Bibliothèques**, « **Méthodologie** » (des centres de documentation du Cégep).

The **departmental penalties** concerning non-compliance with the standards for assignment presentation (PIEA, article 5.3.2) are : <http://guideena.cegepmontpetit.ca/regles-des-departements/>.

## METHOD OF COURSE PARTICIPATION

### SAFETY RULES IN THE HANGAR

1. No running

2. Take precautions with loose clothing when using rotary tools. (For example: tie, sleeves, long hair must be tied back).
3. Workshop and hand tools may be used only after demonstration.
4. No work in workshops without the supervision of a teacher.
5. Small pieces of metal to drill (manual or column) must be held in place with a clamp
6. All hazardous products (e.g. M.E.K.) must be used in a room with adequate ventilation (painting room).
7. Do not sit on the equipment tables in the workshop.
8. Everyone must follow instructions according to the visual and aural signals in case of fire.
9. All accidents must be reported to authorized personnel; notify security if first aid measures do not suffice.

#### **SAFETY RULES FOR WORKSHOP EQUIPMENT**

1. Clean the workshop after each course (tables, workbenches, floor, etc.).
2. Clean workshop tools after each use (drill, sander, grinder, etc.).
3. No aluminum or non-ferrous material on the grinding wheels.
4. Respect material indications on the band saws.
5. Return workshop equipment to the appropriate place after use.
6. Report any defective equipment or tools.
7. Correctly maintain the classification of rivets and bolts.

#### **OTHER DEPARTMENTAL REGULATIONS**

Students are encouraged to consult the website for health and safety regulations :  
<http://guideena.cegepmontpetit.ca/sante-et-securite/>

Students are encouraged to consult the website for specific regulations related to this course:  
<http://guideena-en.cegepmontpetit.ca/department-rules/>

**NOTE:** This Course Outline is a translation of the *Plan de cours* for 280-616-EM: *Réparation de structures en composite, bois, toile et métal*. If there is a discrepancy, then the original French version will be considered the official version for legal purposes.

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

All students enrolled at cégep Édouard-Montpetit must become familiar with and comply with the institutional policies and regulations. In particular, these policies address learning evaluations, maintaining admission status, French language policies, maintaining a violence-free and harassment-free environment, and procedures regarding student complaints. The French titles for the policies are: *Politique institutionnelle d'évaluation des apprentissages, les conditions d'admission et cheminement scolaire, la Politique relative*

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*à l'usage, à la qualité et à la valorisation de la langue française, la Politique pour un milieu d'études et de travail exempt de harcèlement et de violence, les procédures et règles concernant le traitement des plaintes étudiantes.*

The full text of these policies and regulations is accessible on the College web site at the following address: <http://ena.cegepmontpetit.ca/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.