

## **COURSE OUTLINE**

**COURSE:** **Shaping, Assembly and Installation Techniques**  
**PROGRAM:** 280.C0 Aircraft Maintenance  
**DISCIPLINE:** 280 Aeronautics  
**WEIGHTING:** Theory: 2 Practice: 3 Personal Study: 1

<b>Instructor(s)</b>	<b>Office</b>	<b>☎ Extension</b>	<b>✉ e-mail or web site</b>
Joaquin Mora	C-186	4220	<a href="mailto:joaquin.mora@cegepmontpetit.ca">joaquin.mora@cegepmontpetit.ca</a>

### **OFFICE HOURS FOR STUDENTS**

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Morning					
Afternoon					

<b>Coordinators(s)</b>	<b>Office</b>	<b>☎ Extension</b>	<b>✉ e-mail or web site</b>
Éric Goudreault	C-186		<a href="mailto:eric.goudreault@cegepmontpetit.ca">eric.goudreault@cegepmontpetit.ca</a>
Serge Rancourt	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 given during the first semester of the program.

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

- dexterity with tools
- research skills using technical manuals
- familiarity with materials and hardware;
- the capacity to fabricate different parts that will be assembled and install a conduit using appropriate tools and hardware.

**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) 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)**

To master the aeronautic maintenance work techniques.

## **MINISTRY OBJECTIVE(S) AND COMPETENCIES**

**025Q** To use shaping, assembly and installation techniques.

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

- To shape aluminum with precision.

## **TEACHING AND LEARNING STRATEGIES**

- Lecture with or without audio-visual support
- Demonstration.
- Hands-on work

**COURSE PLAN – THEORY**

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<b>Time Period:</b>	<b>WEEK 1</b>
<b>Learning Objectives:</b>	1.1 Describe the role and responsibilities of an AMT. 1.2 Describe Imperial Unit System 1.3 Identify and describe measuring tools
<b>Content:</b>	- Present Course Outline - Introduction to course "Shaping, Assembly and Installation Techniques". - Exercise on ruler, Vernier and micrometer reading.
<b>Activities for Personal Study:</b>	- Read Course Outline and Course Policies - Review study document and personal notes

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<b>Time Period:</b>	<b>WEEK 2</b>
<b>Learning Objectives:</b>	2.1 Identify and describe manual and workshop tools 2.2 Identify and describe drilling tools
<b>Content:</b>	- Marking tools; dry point compass, scribes, pencils, combination square set, dividers, punches, Vernier protractor. - Vices, clamps - Files, hammers, center punches, mallets - Sheet metal shears - Drills, drill bits, deburring tools
<b>Activities for Personal Study:</b>	- Review study document and personal notes

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<b>Time Period:</b>	<b>WEEK 3</b>
<b>Learning Objectives:</b>	3.1 Describe the WHMIS system 3.2 Identify and describe risks associated with air tools
<b>Content:</b>	- Presentation of WHMIS system - Safety Data Sheet - Supplier labels
<b>Activities for Personal Study:</b>	- Review study document and personal notes

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<b>Time Period:</b>	<b>WEEK 4</b>
<b>Learning Objectives:</b>	4.1 Identify and describe aerospace hardware
<b>Content:</b>	- Threaded fasteners - Pipe threads
<b>Activities for Personal Study:</b>	- Review study document and personal notes

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*Course outline 280-1A5-EM: Shaping, Assembly and Installation Techniques*

**Time Period:** **WEEK 5**

**Exam #1** **2 periods**

**Content:** - Content of week 1 to week 4

**Activities for Personal Study:** - Review study document and personal notes

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**Time Period:** **WEEK 6**

**Learning Objectives:** 6.1 Describe cutting tools.  
6.2 Identify and describe manual workshop tools.

**Content:** - Drills and drill bits  
- Reamers  
- Taps & dies

**Activities for Personal Study:** - Review study document and personal notes

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**Time Period:** **WEEK 7**

**Learning Objectives:** 7.1 Describe and use aircraft hardware.

**Content:** - Types of washers  
- Lockwire

**Activities for Personal Study:** - Review study document and personal notes

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**Time Period:** **WEEK 8**

**Learning Objectives:** 8.1 Describe alloys and heat treatments

**Content:** - Types of alloys used in aeronautics  
- Heat treatment of alloys

**Activities for Personal Study:** - Review study document and personal notes

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**Time Period:** **WEEK 9**

**Learning Objectives:** 9.1 Describe composite materials

**Content:** - Types composites used in aeronautics

**Activities for Personal Study:** - Review study document and personal notes

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**Time period** **WEEK 10**

**Exam #2** **2 periods**

**Content:** - Multiple choice and short answer/description exam.  
- Content of weeks 6 to 9

**Activities for Personal Study:** - Review study document and personal notes

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*Course outline 280-1A5-EM: Shaping, Assembly and Installation Techniques*

**Time Period:** **WEEK 11**

**Learning objectives:** 11.1 Describe torque wrench

**Content:** - Torque calculation

**Activities for Personal Study:** - Review study document and personal notes

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**Time Period:** **WEEK 12**

**Learning objectives:** 12.1 Describe aeronautical plumbing

**Content:** - Tubing hardware (codification)  
- Rigid tubing  
- Flexible hoses.  
- Single and double flaring  
- Flareless fittings

**Activities for Personal Study:** - Review study document and personal notes

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**Time Period:** **WEEK 13**

**Learning objectives:** 13.1 Describe aeronautical miscellaneous hardware  
13.2 Describe aeronautical sealing devices and compounds

**Content:** - Cables and pulleys  
- Sealing compounds  
- O-Rings

**Activities for Personal Study:** - Review study document and personal notes

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**Time Period:** **WEEK 14**

**Learning objectives:** 14.1 Revision for final exam

**Content:** - Content of weeks 1 to 13

**Activities for Personal Study:** - Review study document and personal notes

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**Time period** **WEEK 15**

**Exam #3 (Final)** **2 periods**

**Content:** - Multiple choice and short answer/description exam.  
- Content of weeks 1 to 13

**Activities for Personal Study:** - Review study document and personal notes

**COURSE PLAN – PRACTICAL PART**

**Time Period:** **WEEKS 1, 2**

**Learning Objective 1:** 1.1 Outline plan as a reference for the course.  
1.2 General safety.  
1.3 Explain filing metal using the appropriate tools.

**Content:** - Introduction to the laboratory section of the course  
- Project outline  
- Combination Square and files

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**Time Period:** **WEEKS 3, 4, 5, 6**

**Learning Objective 2:** 2.1 Explain measuring tools.  
2.2 Explain sawing, cutting.

**Content:** - Measuring thickness and length of metal  
- Using band saw  
- Fabricating the different parts of the project

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**Time Period:** **WEEKS 7, 8, 9**

**Learning Objective 3:** 3.1 Explain drilling and finishing holes.  
3.2 Make threads.

**Content:** - Drilling holes  
- Tapping holes

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**Time Period:** **WEEKS 10, 11, 12**

**Learning Objective 4:** 4.1 Explain and carry out installation of hardware.  
4.2 Explain and carry out safety precautions on parts.

**Content:** - Torque wrench  
- Lockwire  
- Cutter pin

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**Time Period:** **WEEKS 13, 14**

**Learning Objective 5:** 5.1 Explain bending and flaring for rigid tubing.  
5.2 Explain making a flexible hose.  
5.3 Check rigid tube & flexible hose on test bench.

**Content:** - Manual tube bending and flaring  
- Mechanical tube bending and flaring  
- Single flare & double flare  
- Specialized tool kit

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**Time Period:** **WEEK 15**

**Learning Objective 6:** 8.1 Final assembly of the project

**SYNTHESIS OF SUMMATIVE EVALUATION METHODS**

**THEORY**

Description of evaluation activity	Learning context and method of evaluation	Learning Objective(s)	Evaluation criteria	Due Date (date to turn in homework or exam date)	Weighting (%)
Exam 1 - Imperial units and measuring tools - Shop manuals - Shop tools - Drilling tools - Safety and WHMIS - Aerospace hardware	Written exam with multiple choice and short answer questions. In class, individually, without course notes.	Content of Weeks 1 to 4	<ul style="list-style-type: none"> <li>Accuracy of explanations</li> <li>Apply the concepts</li> </ul>	Week 5	10%
Exam 2 - Bore repair and threading - Nuts, Washers, Safetying - Alloys - Heat treatment - Bending - Composite materials	Written exam with multiple choice and short answer questions. In class, individually, without course notes.	Content of Weeks 6 to 9	<ul style="list-style-type: none"> <li>Accuracy of explanations</li> <li>Apply the concepts</li> <li>To achieve a bending calculation within a precision of plus or minus ten thousandths of an inch.</li> </ul>	Week 10	15%
Exam 3 - Torque Wrench - Aeronautical pipping - Scellants - Cables - Orings + Recap questions from the beginning of the course.	Written exam with multiple choice and short answer questions. In class, individually, without course notes.	Content of Weeks 1 to 4, 5 to 9 And 11 to 14	<ul style="list-style-type: none"> <li>Accuracy of explanations</li> <li>Apply the concepts</li> </ul>	Week15	15%

**Total for theory 40%**

**PRACTICAL**

Description of evaluation activity	Learning context and method of evaluation	Learning Objective(s)	Evaluation criteria	Due Date (date to turn in homework or exam date)	Weighting (%)
Firewall	In the lab; individual	Content of Weeks 1 to 2	Given to students in lab	End of Week 2	10%
Angle brackets		Content of Weeks 3 to 5		Week 5	(10% each) 20%
Manifold		Content of Week 6 to 9		Week 9	10%
Assembly and safetying		Content of Week 10 to 12		Week 12	10%
Tube and hose fabrication		Content of Weeks 13 to 15		Week 15	10%

**Total for practical (Laboratory) 60%**

**Total: 100%**

## **REQUIRED MATERIAL**

- Safety glasses
- Safety shoes
- Approved work clothing

## **MEDIAGRAPHY**

ÉTATS-UNIS, DEPARTMENT OF TRANSPORTATION. FEDERAL AVIATION ADMINISTRATION. Acceptable methods, techniques and practices; v.1: Aircraft inspection and repair, AC 43.13-1A, v. 2: Aircraft alterations, AC 43.13-2A, Washington, D.C. US Government Printing Office, 1977, 2 volumes.

CRANE, Dale. Aircraft hydraulic systems, Basin, Wyo., Aviation Maintenance Publishers, c 1975, 91 p.

FEMINIER, Didier. Cellules et systèmes d'aéronefs, Outremont, Modulo, c 1982, 315 p.

HURTS, Dale. Aircraft Structural Technician, 2002, Standard Aircraft Handbook, 5e édition.

LEAVELL, Stuart et Stanley BUNGAY. Standard aircraft handbook, 5d ed., édition Larry Reithmaier, Calif., Aero, 1991, 232 p.

MCNICKLE, L.S. L'hydraulique simplifiée, trad. par J. Faisan-dier, Paris, Dunod, c 1979, 215 p.

MERRILL, Samuel W. Fluid Power for Aircraft; Modern Hydraulic Technology, 3th ed., Peston, Ida., Intermountain Air Press, c 1974, 286 p.

SANDERSON, JEPPESON. A & P Technician General Textbook, Englewood, Co., 1996. \*

SANDERSON, JEPPESON. A & P Technician Airframe Textbook, Englewood, Co., 1992.



## **REQUIREMENTS TO PASS THE COURSE**

### **(1) Passing Mark**

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

### **(2) Tardiness**

Students who arrive late after the beginning of the first period of a course are considered absent for this period.

### **(3) Attendance for Summative Evaluations**

Attendance at summative assessment activities is mandatory (PIEA article 5.2.5.1)

### **(4) Submitting Assignments**

Homeworks required by a teacher must be submitted to the date, the place and time set. The penalties associated with delays are established according to departmental rules (PIEA, section 5.2.5.2).

In case of delay penalties are:

- See section «Règles des départements» at the following link:  
<http://guideena.cegepmontpetit.ca/regles-des-departements/>

### **(5) Presentation of Written Work**

The student must meet the "Written Work Standard Presentation" adopted by the CEGEP. Non-compliance of these standards may delay the acceptance of the work or affect the rating granted. These standards are available in **Flash Links, Bibliothèques** under "**Méthodologie**" of the CEGEP Documentation Centers at: [www.cegepmontpetit.ca/normes](http://www.cegepmontpetit.ca/normes).

The **departmental penalties** for non-compliance with Written Work Standard Presentation (PIEA, article 5.3.2) are:

- See section « Règles des départements » at the following link:  
<http://guideena.cegepmontpetit.ca/regles-des-departements/>

## **OTHER DEPARTMENTAL REGULATIONS**

Students are encouraged to consult the website for the specific regulations for this course:  
<http://guideena.cegepmontpetit.ca/regles-des-departements/>.

## **INSTITUTIONAL POLICIES AND REGULATIONS**

All students enrolled in the École Nationale d'aérotechnique of Édouard-Montpetit CEGEP must be aware of and comply with the contents of institutional policies and regulations. In particular, the *Politique institutionnelle de la langue française (PILF)*, the *Politique pour un milieu d'études et de travail exempt de harcèlement et de violence (PPMÉTEHV)*, the *conditions of admission and academic progress*, the *procedure dealing with student complaints within educational relations*.

The complete version of these policies and regulations is available on the CEGEP website at the following address: <http://www.cegepmontpetit.ca/ipesa>

<http://www.cegepmontpetit.ca/ena/a-propos-de-l-ecole/reglements-et-politiques>. In case of discrepancy between the version appearing elsewhere and the complete version, the complete version will be applied and will be considered the official version for legal purposes.