

COURSE OUTLINE

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

Instructor(s) Serge Chevigny **Office** C-186 **Extension** **e-mail or web site** serge.chevigny@cegepmontpetit.ca

OFFICE HOURS FOR STUDENTS

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Morning					
Afternoon					
Other					

Coordinators(s)	Office	Extension	e-mail or web site
Éric Goudreault	C-160	4691	eric.goudreault@cegepmontpetit.ca
Stephanie Arpin	C-160	4630	stephanie.arpin@cegepmontpetit.ca

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 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.
- Repairing a fluid line in order to install a hydraulic component on an aircraft.

TEACHING AND LEARNING STRATEGIES

- Lecture with or without audio-visual support
- Theoretical asynchronous course and/or weekly meeting on Teams
- Demonstration in lab class
- Hands-on work

COURSE PLAN – THEORY

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

Time Period:	WEEK 2
Learning Objectives:	2.1 Identify and describe manual and workshop tools 2.2 Identify and describe drilling tools
Content:	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
Activities for Personal Study:	- Review study document and personal notes

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

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

Time Period:	WEEK 5
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Exam #1	- Multiple-choice exam and/or development
Content:	- Content of week 1 to week 4
Activities for Personal Study:	- Review study document and personal notes

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

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

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

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

Time period **WEEK 10**

Exam #2 - Multiple-choice exam and/or development

Content: - Content of weeks 6 to 9

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

Time Period: **WEEK 11**

Learning objectives: 11.1 Install aeronautical components

Content: - Describe torque wrench
- Torque calculation

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

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

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

Time Period:	WEEK 14
Learning objectives:	14.1 Revision for final exam
Activities for Personal Study:	- Review study document and personal notes

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.
- 1.4 Shop Cleaning

Content:

- Introduction to the laboratory section of the course
- Project outline
- Project plan

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

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

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

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

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 7	<ul style="list-style-type: none"> • Accuracy of explanations • Apply the concepts 	Week 8	20%
Exam 2 - Bore repair and threading - Nuts, Washers, Safetying - Alloys - Heat treatment - Bending - Composite materials 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 13	<ul style="list-style-type: none"> • Accuracy of explanations • Apply the concepts • To achieve a bending calculation within a precision of plus or minus ten thousandths of an inch. 	Week 14	20%

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	Precision: Position of hole Symmetry Good dimension Perpendicular Finish: No marks (file, guillotine, etc.) Visible and intact radius	Week 2	Formative
Angle brackets	In the lab; individual	Content of Weeks 3 to 4	- Position and dimension of holes within ± 0.030 " - Dimension of radius and roundness - Straightness of tangents and link to radius - Finish (soft, no tool marks or sharp edges)	Week 3 and 4	15%
Manifold	In the lab; individual	Content of Week 5 to 6	- Perpendicular and straight ends - Holes perpendicularities, depth and position. - Finishing	Week 5 and 6	15%
Modification	In the lab; individual	Content of Week 1 to 14	- Compliance with health and safety procedures - Compliance with instructions (AD) - Tightening and security of fasteners - Cleanliness of the work area	Week 13 and 14	30%

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) Attendance for Summative Evaluations

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

(3) 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/>

(4) 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.

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 (PPMÉTÉHV)*, 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.

THE CENTRE FOR ADAPTED SERVICES - FOR STUDENTS WITH DISABILITIES

Students with a professional diagnosis (motor, neurological, organic, sensory, learning, mental health, autism spectrum disorder or other limitations) or with a temporary medical condition may apply for accommodations.

To access this service, send your diagnosis either by MIO to "Service, CSA-ENA" or by email to servicesadaptesena@cegepmontpetit.ca.

If you already have an accommodation plan with the CSA, you are invited to contact your teacher at the beginning of the session to discuss the accommodation measures determined by the CSA.