

COURSE OUTLINE

COURSE: Maintenance of Aircraft Flight Controls and Control Surfaces

PROGRAM: 280.C0 Aircraft Maintenance Technology

DISCIPLINE: 280 Aeronautics

WEIGHTING: Theory: 2 Practical Work: 3 Personal Study : 1

Instructor(s)	Office	☎ Extension	✉ Email or Website
Joaquin Mora	C-186	4220	joaquin.mora@cegepmontpetit.ca

OFFICE HOURS

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Morning					
Afternoon					

Coordinator(s)	Office	☎ Extension	✉ Email or Website
Éric Goudreault	C-160	4691	eric.goudreault@cegepmontpetit.ca
Serge Rancourt	C-160	4664	serge.rancourt@cegepmontpetit.ca

CONTEXT OF THIS COURSE IN THE PROGRAM

This course is offered during the fifth semester of the Aircraft Maintenance Program.

The *Maintenance of Aircraft Flight Controls and Control Surfaces* course prepares students for the general maintenance techniques of aircraft flight controls and control surfaces.

The objectives of this course, together with the prerequisite course, "Introduction to Aeronautics," provide students with the theoretical and practical skills they will need for their final courses on airplane and helicopter internships for aircraft maintenance technicians.

As in all sectors, basic knowledge of aircraft flight controls and control surfaces is essential in order to understand more complex systems and provide effective maintenance. The vast majority of aircraft currently in service follow the basic principles demonstrated in this course.

Upon completion of this course, students will have developed the ability to:

1. Gather the necessary information
2. Plan the work
3. Apply procedure and standards
4. Perform maintenance activities related to flight orders
5. Store and clean the workplace

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 "Privileges granted by Transport Canada".

COMPETENCE OF PORTRAIT OF GRADUATE

Perform maintenance of aircraft systems.

DEPARTMENTAL OBJECTIVE (S) (CODE AND STATEMENT)

0267 Perform maintenance of controls and flight controls.

TERMINAL OBJECTIVE OF THE COURSE

At the end of this course, the student will be able to perform an inspection and adjustment of the aircraft control and control system.

PEDAGOGICAL ORIENTATIONS

Theory part: For the first part of the session, the student will have to acquire the necessary basic notions which will allow him, later, to organize a complete maintenance task related to the flight controls. To do this, the student will have to document his approach by using various reference works, concretely applying certain concepts presented in the form of lectures and carrying out the learning activities proposed by the teacher. Later on, the student will be able to refine his fine understanding of a relatively complex flight control system by studying the dedicated manuals, testing these systems and preparing a presentation for the other members of the group. All this, to arrive at the end of the session to be able to develop a method of problem solving, to identify the usual difficulties encountered in service on the control circuits and aircraft control surfaces and to be able to plan and perform the repair .

The student has at his disposal course documents (available on LÉA) that will allow him to follow the learning process. In addition, he will have access to the technical manuals of the studied aircraft, as well as to some other documents placed on LÉA. The student has access, both at school and at home, to a host of educational tools that can provide answers to his questions or allow him to push his learning process even further.

Laboratory part: During the labs, the teacher will guide the student along the way, through practical demonstrations, technical assistance and advice to promote his or her research, analysis and synthesis skills. The student will have the opportunity to perform, on his own, several activities leading him to be able to perform a complete maintenance task on aircraft controls and controls, ranging from information retrieval, to work planning at the execution of the work, until the maintenance release. The student will be able to self-evaluate and thereby develop his autonomy through practice, coaching and also, using the self-assessment grids provided in the course books.

It is the responsibility of each student to get involved in his laboratory by following all the instructions. The indicated activities must be completed by each member of a team.

The student has at his disposal course documents (available on LÉA) that will allow him to follow the learning process. In addition, he will have access to the technical manuals of the studied aircraft, as well as to some other documents placed on LÉA. The student has access, both at school and at home, to a host of educational tools that can provide answers to his questions or allow him to push his learning process even further.

This course is designed in such a way that the theoretical part prepares for the laboratory and that the laboratory part completes the theoretical part as much as possible.

COURSE PLANNING

Objectives:

- ❶ To gather required information
- ❷ Plan work
- ❸ Apply procedures and standards
- ❹ Perform Maintenance Activities Related To Flight Orders

Week	Theoretical course content	Practical course content
1	Introduction Review and preparation	Introduction Self-diagnosis on his current knowledge in terms of flight control
2	Airworthiness Notice C010 - Maintenance tasks and ATA100 ❶ ❸	Integration Familiarization with specific components of flight controls. Draw a "simple" airplane flight control system ❶ ❹
3	Hardware and Inspection rules ❶ ❷ ❸ ❹	Tools Use specialized tools in adjusting flight controls. Measurement condition. ❶ ❷ ❸ ❹
4	Aerodynamic Forces - Hinge moment ❶ ❷ ❸ ❹	Safetying Master the techniques of safe installation and "Safetying" of turnbuckles and control rods. ❶ ❷ ❸ ❹
5	Flight control surfaces Primary control surfaces, secondary control surfaces, mechanical principles, redundancy and wind damage prevention systems. ❹	Cables Aircraft cable manufacturing ❶ ❷ ❸ ❹
6	Exam 1 Assessment of acquired skills	Adjustment of a flight control on the AT-1000 model (Mock-up). Replacement of non-compliant cables on the AT-1000 model and perform all adjustments and inspection required for returning to service. ❶ ❷ ❸ ❹
7	Mechanical circuits ❹	Assessment of acquired skills
8	Hydraulic circuits ❹	Functional testing of flight controls Perform operational tests on flight control systems, complex aircraft. ❸ ❹

9	Compensators – Tertiary flight controls ④	Inspection Organize a planned inspection on an aircraft and do it. Deal with the independent inspection. ① ② ③ ④
10	Dornier vs Challenger, distinction and comprehension of different circuits ① ④	Adjustment of a flight control on an aircraft Organize a maintenance activity, in this case the adjustment of a flight control on an aircraft. Perform an independent inspection following the work of a colleague. ① ② ③ ④
11		Synthesis (formative to the final evaluation) Perform a complete maintenance task on an AT-1000 mock-up. <ul style="list-style-type: none"> • Perform a planned inspection • Schedule the maintenance task • Perform the entire task • Allow the return to service ① ② ③ ④
12	Troubleshooting / Problem-Solving ① ④	Validating the rigging of a Challenger 601 In teams, find the relevant information and complete the necessary steps to make a diagnostic judgment on the condition of a CL601 aircraft flight control system. ① ② ③ ④
13	ATA procedure redaction activities ① ② ③ ④	Semester work (case study) Based on an anomaly identified on a flight control component. Plan each maintenance step leading to the unit's return to service. Everything to be produced according to the rules and criteria requested by the customer. ① ② ③ ④
14	Electrical circuits ① ③ ④	
15	Exam 2 Terminal assessment of acquired skills	Terminal assessment of acquired skills

THEORY PART EVALUATION

Objectives:

- ❶ To gather required information
- ❷ Plan work
- ❸ Apply procedures and standards
- ❹ Perform Maintenance Activities Related To Flight Orders

Evaluation Criteria:

- a) Well oriented research of information
- b) Proper planning of the requested work
- c) Compliance with standards
- d) Correct performance of maintenance work
- e) Coherent explanation of a phenomenon, situation or component.
- f) A correction grid is provided in advance

Description of the evaluation activity	Context and method of evaluation	Learning Objective (S)	Evaluation Criteria	Deadline (Date Of Handing Over Of Work Or Period Of Examination)	Weighting (%)
Exam 1 Multiple choice and short answer exam.	Individually Covers material from theory courses from week 1 to week 5.	❶❷❸❹	a b c d e	Week 6	15
Semester assignment Technical explanation and comparison of the same "complex" control system and control surfaces, between different aircraft.	In teams of 2 (or 3) Each team will present the fruit of their work to the class. Different means are allowed.	❶❷❹	a b c e f	Weeks 10 and 11	10
Exam 2 Multiple choice and short answer exam.	Individually Covers material from theory courses from week 1 to week 14.	❶❷❸❹	a b c d e	Week 15	15

TOTAL : 40%

LABORATORY PART EVALUATION

Objectives:

- ❶ To gather required information
- ❷ Plan work
- ❸ Apply procedures and standards
- ❹ Perform Maintenance Activities Related To Flight Orders

Evaluation Criteria:

- a) Well oriented research of information
- b) Proper Planning Of The Requested Work
- c) Compliance With Standards
- d) Correct Performance Of Maintenance Work
- e) Coherent Explanation Of A Phenomenon, Situation Or Component.
- f) A Correction Grid Is Provided In Advance

Description of the evaluation activity	Context and method of evaluation	Learning Objective (S)	Evaluation Criteria	Deadline (Date Of Handing Over Of Work Or Period Of Examination)	Weighting (%)
<p>Mechanical Drawing</p> <p><i>Drawing must be presented on a 11 X 17 drawing sheet.</i></p>	<p>Individually</p> <p>The student will draw a simple, functioning flight control circuit and indicate the "movement", name of the components and give the part numbers.</p> <p>To do this, he will have access to the system itself, on the plane as well as to all the technical manuals.</p>	❶❸	a b c f	Week 4	5
<p>Exam 1</p> <p><i>See study document available on LÉA</i></p>	<p>Individually</p> <p>Student will have to perform various maintenance actions. Research information, take measurements, inspect cables, perform safe installations, make adjustments, etc. (everything that has been treated since the beginning of the semester)</p> <p>All necessary tools and technical documents will be provided.</p>	❶❷❸❹	a b c d e	Week 7	15
<p>Semester work</p> <p><i>In reference to the study document available on LÉA</i></p>	<p>Individually</p> <p>Student will have to plan the maintenance allowing an aircraft whose component is broken to return to service. All this, rigorously following the requests of his "client".</p>	❶❷❸❹	a b c d e f	Week 15	10
<p>Exam 2</p> <p>Evolutionary scenario (history of which you are the hero) where the student must take charge of the return to service of an aircraft.</p> <p><i>See study document available on LÉA</i></p>	<p>Individually</p> <p>Student will have to perform all maintenance actions, according to the standards, allowing the return to service of his aircraft (AT-1000)</p> <p>All necessary tools and technical documents will be provided.</p>	❶❷❸❹	a b c d e f	Week 15	30

TOTAL: 60%

MANDATORY REQUIRED MATERIALS

- Study documents for both theory and laboratory, are available on LÉA.
- Drawing Sheet (1) 11 X 17 (For Semester assignment) available at Coop.
- Safety glasses, safety shoes, appropriate (approved) clothing for the laboratory.

MEDIAGRAPHY

FAA, Ac43-13 Aircraft Inspection, Repair & Alterations. Acceptable Methods, Techniques And Practices, https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document/information/documentid/99861, January 10, 2018

FAA, Ac65-15a Airframe & Powerplant, Mechanics Airframe Handbook, https://www.faa.gov/documentlibrary/media/advisory_circular/ac_65-15a.pdf, January 10, 2018

FAA, Aviation Maintenance Technician Handbook Chapter 2, Aerodynamics, Aircraft, Assembly And Rigging. https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/amt_airframe_handbook/media/ama_ch02.pdf, January 10, 2018

Genuine Aircraft Hardware Co., <http://www.gen-aircraft-hardware.com>, January 10, 2018

Pierre Ménard, ÉNA - Pm Site, Course 280-505, <http://pmenard.ep.profweb.qc.ca/>, January 10, 2018

Transport Canada, Airworthiness Notice - C010, Issue 2 - October 10, <https://www.tc.gc.ca/eng/civilaviation/standards/maintenance-aarpc-ans-c010-557.htm>, January 10, 2018

As Well As All The Technical Documents (Mm, Ipc, Training Manuals) Of The ÉNA Aircraft, Available On The Cegep's Servers

REQUIREMENTS TO PASS THE COURSE

(1) Passing Mark

The passing mark for this course is 60%. (Iepa, Article 5.1m).

(2) Attendance to summative evaluations

Attendance to summative evaluation activities is mandatory (Iapp, Section 5.2.5.1).

(3) Submitting Assignments

Assignments requested by a teacher must be handed at the date, place and time specified. The penalties resulting from delays are established according to the departmental rules (Piea, article 5.2.5.2).

In case of delay the penalties are:

- see "departmental rules" section at <http://guideena.cegepmontpetit.ca/departments-rules/>

(4) Presentation of written work (assignments)

The student must respect the "standards for presentation of written work" adopted by the cégep. Failure to meet these standards may delay acceptance of the work or affect the mark awarded. These standards are available in the quick links libraries under the "methodology" section of the cégep documentation centers, which can be found at www.cegepmontpetit.ca/normes.

The Departmental Penalties Concerning The Non-Respect Of The Standards Of Physical Presentation Of Works (Piea, Article 5.3.2) Are:

- See "Departmental Rules" Section at <http://guideena.cegepmontpetit.ca/departments-rules/>

CLASS PARTICIPATION EXPECTATIONS

- Safety rules in the hangar and around aircrafts
- Rules for safe use of equipment and aircrafts

OTHER DEPARTMENTAL REGULATIONS

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

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 particulières concernant le maintien de l'admission d'un étudiant, la Politique de 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 Cégep 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.

ANNEX

None