

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@ena.ca

OFFICE HOURS

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Morning					
Afternoon					

Coordinator(s)	Office	☎ Extension	✉ Email or Website
Éric Goudreault	C-160	4691	eric.goudreault@ena.ca
Stéphanie Arpin	C-160	4630	stephanie.arpin@ena.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) according to Transport Canada requirements. The application of Transport Canada policies regarding absences is available on the [Ma réussite à l'ÉNA](#) website under the heading « Privilèges accordés par Transports 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

Learning objectives:	1-	To gather required information
	2-	Plan work
	3-	Apply procedures and standards
	4-	Perform Maintenance Activities Related To Flight Orders

THEORY PART

Week	Learning Objective (s)	Content and Learning activities
1		Introduction Review and preparation
2	1, 2	Airworthiness Notice C010 - Maintenance tasks and ATA100
3	1, 2, 3, 4	Hardware and Inspection rules
4	1, 2, 3, 4	Aerodynamic Forces - Hinge moment
5	4	Flight control surfaces Primary control surfaces, secondary control surfaces, mechanical principles, redundancy and wind damage prevention systems.
6		Exam 1 Assessment of acquired skills
7	4	Mechanical circuits
8	4	Compensators – Tertiary flight controls
9	1, 2, 3, 4	Research in Technical Manuals Develop the ability to effectively research manuals, perform troubleshooting according to manufacturer's instructions and plan related maintenance activities.
10		
11		
12	1, 2, 4	Semester assignment (expert's capsule) In-depth research work on the architecture of a complete aircraft flight control system (one axis only).
13		
14		
15		Exam 2 Assessment of acquired skills

THEORETICAL SUMMATIVE EVALUATION METHODS

- Learning Objectives:** 1- Gather the necessary information
 2- Plan the work
 3- Apply the procedure and standards
 4- Perform maintenance activities related to flight controls

- Evaluation criteria :** a- Correct terminology
 b- Accuracy of answer
 c- Well-oriented search for information
 d- Adequate planning of the required work
 e- Meets standards
 f- Correct execution of maintenance work
 g- Coherent explanation of a phenomenon, situation or component.
 h- A correction grid will be 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.	1,2,3,4	a b c d e	Week 6	15
Session work (expert's capsule)	In-depth research work on the architecture of a complete aircraft flight control system (one axis only).	1,2,4	a b c e f g h	Weeks 11, 12 and 13	10
Exam 2 Multiple choice and short answer exam.	Individually Covers material from theory courses from week 6 to week 14.	1,2,3,4	a b c d e	Week 14	15

TOTAL : 40%

LABORATORY PART

- Learning Objectives:** 1- Gather the necessary information
 2- Plan the work
 3- Apply the procedure and standards
 4- Perform maintenance activities related to flight controls

Week	Learning Objective (s)	Content and Learning activities
1		Introduction Self-diagnosis on his current knowledge in terms of flight control
2	1, 4	Integration Familiarization with specific components of flight controls. Draw a "simple" airplane flight control system
3	1, 2, 3, 4	Tools Use specialized tools in adjusting flight controls. Measurement condition.
4	1, 2, 3, 4	Safetying Master the techniques of safe installation and "Safetying" of turnbuckles and control rods.
5	1, 2, 3, 4	Cables Aircraft cable manufacturing
6	1, 2, 3, 4	Rigging 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.
7		Assessment of acquired skills
8	3, 4	Functional testing of flight controls Perform operational tests on flight control systems, complex aircraft.
9	1, 2, 3, 4	Inspection Organize a planned inspection on an aircraft and do it. Deal with the independent inspection.
10	1, 2, 3, 4	Rigging 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.
11	1, 2, 3, 4	Synthesis (formative to the final evaluation) Perform a complete maintenance task on an AT-1000 mockup. <ul style="list-style-type: none"> • Perform a planned inspection • Schedule the maintenance task • Perform the entire task • Allow the return to service
12	1, 2, 3, 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.
13		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.
14		Terminal assessment of acquired skills
15		

LABORATORY SUMMATIVE EVALUATION METHODS

Learning Objectives: 1- Gather the necessary information
 2- Plan the work
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Evaluation criteria : a- Correct terminology
 b- Accuracy of answer
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 e- Meets standards
 f- Correct execution of maintenance work
 g- Coherent explanation of a phenomenon, situation or component.
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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 (%)
Mechanical Drawing <i>Drawing must be presented on a 11 X 17 drawing sheet.</i>	Individually The student will draw a simple, functioning flight control circuit and indicate the "movement", name of the components and give the part numbers. To do this, he will have access to the system itself, on the plane as well as to all the technical manuals.	1,3	a b c f	Week 4	5
Exam 1 <i>See study document available on LÉA</i>	Individually 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) All necessary tools and technical documents will be provided.	1,2,3,4	a b c d e	Week 7	15
Semester work <i>In reference to the study document available on LÉA</i>	Individually 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".	1,2,3,4	a b c d e f	Week 14	10
Exam 2 Evolutionary scenario (history of which you are the hero) where the student must take charge of the return to service of an aircraft. <i>See study document available on LÉA</i>	Individually Student will have to perform all maintenance actions, according to the standards, allowing the return to service of his aircraft (AT-1000) All necessary tools and technical documents will be provided.	1,2,3,4	a b c d e f	Week 14	30

TOTAL : 60%

MANDATORY REQUIRED MATERIALS

- Study documents for both theory and laboratory, are available on LÉA.
(Paper copy of Laboratory document is required)
- Drawing Sheet (1) 11 X 17 (For Semester assignment) available at Coop.
- Safety glasses, safety shoes, approved ÉNA 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% by adding the marks for the theory and practical work for the course.

2. Attendance for Summative Evaluations

Students must be present for summative evaluations and must comply with the instructions given by the instructor to carry out the evaluation activity and written in the course outline. Unexcused tardiness for a summative evaluation could result in being excluded from the activity. Any absence from a summative evaluation that is not due to serious reasons (illness, death in the family, etc.) could result in a mark of zero (0) for the activity.

Students are responsible for meeting with the instructor before an evaluation activity is held or immediately upon returning to ÉNA to explain the reason for an absence. Proper documentation, such as a medical certificate, a death certificate, legal papers, etc., must be shown if the reason for absence is serious and recognized as such by the instructor(s), arrangements will be made between the instructor(s) and the student to make up the activity.

3. Submitting Assignments

All assignments must be submitted by the date, hour and location designated by the instructor(s). Late assignments will be penalized 10% per day that they are late and will receive a mark of zero (0) after one week.

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.

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/>.

CLASS PARTICIPATION EXPECTATIONS

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

OTHER DEPARTEMENTAL REGULATIONS

Students are encouraged to consult the website for the specific regulations for this course:

<http://guideena-en.cegepmontpetit.ca/departement-rules/>

<https://mareussite.cegepmontpetit.ca/ena/mon-parcours/mon-programme/regles-departementales>

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/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 ADAPTED SERVICE CENTER FOR STUDENTS WITH DISABILITIES

Students with a professional diagnosis (motor limitations, neurological, organic, sensory, learning disabilities, mental health disabilities, autism spectrum disorder or others) or with a temporary medical condition can apply for appropriate measures.

To access this service, send your diagnosis either by MIO to "Service, CSA-ENA" or by email to <https://mareussite.cegepmontpetit.ca/ena/mes-ressources/soutien-aux-apprentissages/centre-de-services-adaptes/>.

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

APPENDIX

None.