ÉCOLE NATIONALE D'AÉROTECHNIQUE
UNE ÉCOLE AFFILIÉE AU CÉGEP ÉDOUARD-MONTPETIT

201-2A5-EM
WINTER 2021
Department of Mathematics

COURSE OUTLINE

COURSE: **Mathematics for Aircraft Maintenance**

PROGRAM: 280.C0 Aircraft Maintenance

DISCIPLINE: 201-Mathematics

WEIGHTING: Theory: 3 Practice: 2 Personal Study: 3

Instructor	**Office**	**☎ Extension**	**✉ email**
Jonathan Bolduc	C-184	2559	jonathan.bolduc@cegepmontpetit.ca or MIO

OFFICE HOURS by MIO or TEAMS or ZOOM

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Morning				10:00 AM to 12:00 PM	
Afternoon				12:00 PM to 2:00PM	

Coordinator(s)	**Office**	**☎ Extension**	**✉ email**
Natasha Dufour	C-184	2803	natasha.dufour@cegepmontpetit.ca

1 PLACE OF THE COURSE IN THE STUDENT'S CURRICULUM

- The course 201-2A5-EM is a compulsory course of the program Aircraft Maintenance Technology (280.C0)**.**
- This course has 201-1A5-EM as an absolute prerequisite.
- Failing this course could have **serious** consequences on the student's curriculum. Hence, the student should use all means necessary to avoid such an outcome.
- A student wishing to attend university or to deepen their knowledge of mathematics can register in calculus courses (Math NYA and Math NYB) offered in French at ÉNA as part of their complementary general curriculum.
- 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.

2 COMPETENCIES OF THE EXIT PROFILE (STUDENT SKILL PROFILES)

- To master the scientific basics and those of the working function

3 MINISTERIAL OBJECTIVE (CODE AND STATEMENT)

025S To model and interpret mathematical results as they apply to aircraft maintenance.

4 TERMINAL COURSE OBJECTIVE

- To use techniques from calculus in order to model and interpret mathematical results as they apply to aircraft maintenance.

5 INSTRUCTIONAL GUIDANCES

Live lessons will be given online on the **Zoom** platform according to the schedule you have received. You will receive an invitation by **MIO** or **TEAMS** before each meeting. All you have to do is click on the invitation link to join the meeting at the date and time specified in the invitation.

Lessons recordings will be available online (on **YouTube**) for those unable to attend (the link to the recordings will be posted on **LÉA**). We obviously encourage you to be as present as possible on **Zoom**. **The teacher reserves the right to take attendance during live lessons and to register absences on the Omnivox platform**.

All theory and practice periods will take place on the **Zoom** platform, live, according to the regular class schedule with the recordings available on **YouTube**. Except for exams, all lessons will be held online.

The personal work of the student, outside the classroom, is essential and consists in completing the preparatory work, finishing the exercises the teacher suggested during class and studying the concepts introduced during the lectures. Passing the course depends mainly on the student's individual work. Students should take advantage of the teacher's office hours as soon as they don't fully understand a topic.

The student should ask questions related to the course material (exercises and theory) on the course channel of the **Teams** platform. Personal questions should be directed to the teacher through the **MIO** platform. The student who must be absent from a class must watch the recording of the class on **YouTube** and catch up with the accumulated delay as soon as possible and contact the teacher, if necessary.

The student must regularly consult the **LÉA** and **Moodle** environments in the school's **Omnivox** platform. The **MIO** environment and the **Teams** channel will be used by the students and the teacher to communicate with each other. The teacher can also use **LÉA** and **Moodle** to post course documents.

STUDY CENTER

The Study Center in its usual form will be closed for the semester. On the other hand, a virtual study center is being developed in Teams. You can find resources there and also a forum where you can ask your questions. Teachers will answer your questions every day (not necessarily in real time) and, if necessary, can contact you to find solutions to your problems.

However, your teacher remains the best person to ask your questions to, he is the person best suited to help you!

6 SYLLABUS

LEARNING OBJECTIVE	CONTENT	PERSONAL STUDIES ACTIVITIES
ACTIVITY PERIOD	**About 10 periods (chapter 1)**	
1. To acquire basic concepts of exponential and logarithmic functions.	• Properties of exponential functions and logarithms; • Solution of exponential and logarithmic equations; • Applications of exponential and logarithmic models; • Logarithmic scales.	2 WeBWorK assignments Exercises from chapter 1
ACTIVITY PERIOD	**About 5 periods (chapter 1)**	
2. To model using algebraic equations of scatter diagrams of points obtained experimentally	• Linear, quadratic, exponential, and logarithmic models; • ~~Method of least squares;~~ • ~~Regression;~~ • Interpolation and extrapolation.	1 Excel laboratory
ACTIVITY PERIOD	**About 10 periods (chapter 2)**	

3. To acquire an intuitive concept of limits	• Variation, rate of change, slope of a secant line; • Intuitive concept of infinitely small variations; • Intuitive concept of limit; • Simple calculation of limits by successive approximations; • Use of the limit concept in approximate calculations of the slopes of tangents, of ~~surfaces, of volumes~~, etc.; • Applications to concrete physical models: speed, acceleration, distance, consumption, power, energy input and output.	2 WeBWorK assigments 1 Excel laboratory Exercises from chapter 2
ACTIVITY PERIOD	**About 25 periods (chapters 3 and 4)**	
4. To acquire and apply an intuitive concept of derivatives	• Instantaneous rate of change; • Intuitive concept of the derivative at one point; • Computation and evaluations of the derivative of simple functions; • Uses of the concept of derivatives in modeling concrete situations: maximum, minimum, growth, decrease, study of behavior graphed on a curve, optimization, ~~related rates~~.	3 WeBWorK asignments 1 Excel laboratory Exercises from chapters 3 and 4

LEARNING OBJECTIVE	CONTENT	PERSONAL STUDIES ACTIVITIES
5. To solve algebraic, transcendental and trigonometric equations. ~~6. To solve algebraic inequalities.~~	• Exact solutions; • ~~Approximate solutions (using a calculator efficiently, error calculation).~~ • ~~Solutions of a system of inequalities with two unknowns;~~ • ~~Geometric interpretation and inequalities with one or two unknowns.~~	
ACTIVITY PERIOD	**About 15 periods (chapter 5)**	
7. To acquire and apply the basic concept of integrals ~~8. To learn the sigma (Σ) notation acquire and apply the basic concept numerical series~~	• Intuitive concept of the primitive and the integral; • Computation and evaluation of integrals of simple functions; • Use of integrals in modeling concrete situations (speed, surface calculations, problems involving rate of change, etc.). • ~~Sigma (Σ) notation.~~ • ~~Particular series (Harmonic series, geometric and p-series)~~ • ~~Calculation of partial sums for geometric series~~	3 WeBWorK assignments 1 Excel laboratory Exercises from chapter 5

Course content for each week

WEEK	# OBJECTIVE	CONTENT	MODE OF INSTRUCTION AND LEARNING ACTIVITIES	TECHNOLOGICAL TOOLS AND RESOURCES
1	1	- Log and exponential functions.	- Live lessons on Zoom. - **WeBWorK assignment #1.**	- Zoom, Teams, LÉA and Moodle.
2	1 and 2	- Applications of the log and exponential functions. - **Excel lab #1.**	- Live lessons on Zoom. - **WeBWorK assignment #2.**	- Zoom, Teams, LÉA and Moodle.
3	1, 2 and 3	- Introduction to limits.	- Live lessons on Zoom. - **WeBWorK assignment #3.**	- Zoom, Teams, LÉA and Moodle.
4	1, 2 and 3	- Limits of indeterminate forms. - **Excel lab #2.**	- Live lessons on Zoom. - **WeBWorK assignment #4.**	- Zoom, Teams, LÉA and Moodle.
5	1, 2 and 3	- Revision and exercises. - **Exam #1 on chapters 1 and 2.**	- Live lessons on Zoom. - **Exam #1 at the school.**	- Zoom, Teams, LÉA and Moodle.
6	1, 2, 3 and 4	- ARC, IRC and the derivative as a function.	- Live lessons on Zoom. - **WeBWorK assignment #5.**	- Zoom, Teams, LÉA and Moodle.
7	1 to 5	- Differentiation techniques.	- Live lessons on Zoom. - **WeBWorK assignment #6.**	- Zoom, Teams, LÉA and Moodle.
8	1 to 5	- Tangent lines and higher derivatives. - **Excel lab #3.**	- Live lessons on Zoom.	- Zoom, Teams, LÉA and Moodle.
9	1 to 5	- Complete study of a function.	- Live lessons on Zoom. - **WeBWorK assignment #7.**	- Zoom, Teams, LÉA and Moodle.
10	1 to 5	- Revision and exercises. - **Exam #2 on chapters 3 and 4.**	- Live lessons on Zoom. - **Exam #2 at the school.**	- Zoom, Teams, LÉA and Moodle.
11	1 to 7	- Optimisation. - Indefinite integral.	- Live lessons on Zoom. - **WeBWorK assignment #8.**	- Zoom, Teams, LÉA and Moodle.
12	1 to 7	- U substitution. - Definite integral.	- Live lessons on Zoom. - **WeBWorK assignment #9.**	- Zoom, Teams, LÉA and Moodle.
13	1 to 7	- Applications of the integral. - **Excel lab #4.**	- Live lessons on Zoom. - **WeBWorK assignment #10.**	- Zoom, Teams, LÉA and Moodle.
14	1 to 7	- Revision and preparation for the final exam. - **Final exam on all the chapters.**	- Live lessons on Zoom - **Final exam at the school.**	- Zoom, Teams, LÉA and Moodle.

Note: a more detailed schedule (lesson by lesson) will be available on the course's LÉA platform.

7 SYNTHESIS OF SUMMATIVE EVALUATION METHODS

Description of Evaluation Activity	Context	Learning Objectives	Evaluation Criteria	Due Date*	Weighting (%)
Written Exam 1 (140 min)	Individual written exams at the school (if possible) where the student solves questions similar to those studied in class.	1-2-3	Look at section 12: Autres règles départementales, subsection 4.3.4 Exigences (In French) If other evaluation criteria are to be used, they will be presented to the student one week before the evaluation date in written form (PIEA, 5.1j).	Week 5	18 %
Written Exam 2 (140 min)		4-5		Week 10	25 %
Final Written Exam (180 min)	Individual cumulative written exam at the school (if possible) where the student solves questions similar to those studied in class.	1 to 7		Week 14	35 %
4 Excel assignments (homeworks)	Individual homework on Excel.	1 to 7		Dates available on LÉA	12 %
10 WeBWorK assignments (homeworks)	Individual homework on WeBWorK.	1 to 7		Dates available on LÉA	10 %
				TOTAL	**100 %**

* The exams' dates are approximate and may be modified by the professor. If that happened, the professor will communicate the new date a week before the exam.

Students who are caught cheating during any evaluation activity will be given the grade of zero ("0"). A more detailed document about what is considered as "cheating" will be posted on LÉA.

The professor will keep all the marked exams.

8 REQUIRED MATERIAL

- Guided notes where you have to fill the blank space during live lessons are available on the LÉA platform. **It is mandatory to print the notes since you must fill the blanks manually.**
- Calculator: Sharp EL-531 (**it is the only calculator allowed during exams at ÉNA**)

9 MEDIAGRAPHY

- ANDERSEN, John G. *Technical shop mathematics*, 2nd Edition. Industrial Press Inc, 1983, 525 p.
- COLIN, Michèle et LAVOIE, Paul. *Mathématiques pour les techniques de l'industrie*, 2e édition. Chicoutimi : Gaëtan Morin, 1987, 421 p.
- GINGRAS, Michèle. *Mathématique d'appoint,* 2e édition. Montréal : Les éditions HRW, 1999, 328 p.
- LACOMBE, Réal, *Mathématiques appliquées*. CEMEQ, 1996.
- ROSS, André. *Mathématiques appliquées aux technologies du bâtiment et du territoire*. Sainte-Foy : Le Griffon D'Argile, 2000, 428 p.
- ROSS, André. *Modèles mathématiques pour les techniques industrielles*. Sainte-Foy: Le Griffon D'Argile, 1998, 438 p.

- SMITH, Robert & PETERSON, John C. *Introductory Technical Mathematics,* 5th Edition. Thomson Delmar Learning, 2007, 858 p.
- SMITH, Robert. *Mathematics for Machine Technology,* 4th Edition. Delmar Publishers, 1999, 483 p.

10 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

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 out in the course outline (PIEA 5.2.5.1). 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 ENA 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). In that case, arrangements will be made between the instructor(s) and the student to make up for the activity.

3. Submitting Assignments

All assignments must be submitted by the date, hour and location designated by the instructor(s). Late assignments will not be accepted and hence the student will receive a mark of zero (0) for the assignment.

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 inacceptable, 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 in the documentation center on the Cégep website www.cegepmontpetit.ca/normes under the heading **« Méthodologie ».**

Departmental regulations on the presentation of written work (In French)

Les **pénalités départementales** concernant le non-respect des normes de présentation matérielle des travaux (PIEA, article 5.3.2) sont :

Pour tous les travaux pour lesquels la contribution de l'étudiant ou de l'étudiante est complètement originale (travail manuscrit ou informatisé créé à partir de pages vierges), les normes applicables contenues dans le document « Normes de présentation matérielle des travaux écrits » du Cégep Édouard-Montpetit doivent être respectées.

Pour tous les travaux pour lesquels la contribution de l'étudiant ou de l'étudiante est complètement originale (travail manuscrit ou informatisé créé à partir de pages vierges), si le barème d'évaluation n'accorde pas de points a priori pour le respect des normes de présentation, le non-respect des normes sera pénalisé par le refus du travail ou par une déduction allant jusqu'à cinq pour cent (5 %) de la note maximale du travail.

Pour tous les travaux pour lesquels la contribution de l'étudiant ou de l'étudiante est complètement originale (travail manuscrit ou informatisé créé à partir de pages vierges) et dont la pondération pour la note finale du cours est d'au moins dix pour cent (10%), un minimum de cinq pour cent (5 %) de la note maximale du travail est accordé au respect des normes de présentation.

Pour tous les travaux pour lesquels la contribution de l'étudiant ou de l'étudiante est partiellement originale et manuscrite (questionnaire troué à compléter, par exemple), les normes de typographie contenues dans le document Normes de

présentation matérielle des travaux écrits du Cégep Édouard-Montpetit ne s'appliquent pas. Le professeur ou la professeure doit s'assurer que le canevas du travail respecte les normes de présentation applicables.

11 METHODS OF COURSE PARTICIPATION

Attendance at Zoom theory and practical lessons is encouraged. The student who misses a live lesson must take responsibility for this absence and its consequences. To minimize the impact of such an absence, the student is asked to watch the recording of the meeting on YouTube, complete the blank spaces in the notes and begin the exercises. If all of these steps are completed, the student is encouraged to seek help from the teacher in clarifying less well understood concepts.

For online classes:
By attending online classes through videoconference technology, the student understands that his image and voice may be captured on video in the context of his courses and agrees to this. Videos are only visible during live classes and by the teacher and other participants exclusively.

For pedagogical reasons, some courses may be recorded. It is the teacher's responsability to clearly inform students beforehand when their images and voices are to be captured on video. Any student opposed to his image and/or voice being recorded may turn off his camera and microphone but will be required to participate in writing through means established by the teacher. Otherwise, students who activate their cameras or their microphones are deemed to have agreed to their images and voices being taped. These recordings of courses will be available for the express and sole use of those students registered in the courses for the duration of the semester. It is strictly forbidden to broadcast these recordings in any public manner or to use them other than for pedagogical purposes.

No student may record an online course without prior consent from the teacher. Students whose personal information (voices and images) is captured on video may exercise such remedies as provided by the right to access records and the right of rectification per the Act respecting access to documents held by public bodies and the protection of personal information through the Cegep's Secretary General's Office.

12 OTHER DEPARTMENTAL REGULATIONS (IN FRENCH)

4.3 Modalités d'évaluation
4.3.1 Modes d'évaluation
Dans chacun des cours de mathématiques, les activités d'évaluation prennent l'une ou l'autre ou plusieurs des formes suivantes :

a) Contrôles ou examens périodiques écrits ;
b) Examen final de synthèse écrit ;
c) Devoirs, tests, laboratoires ou travaux écrits à réaliser individuellement ou en équipe ;
d) Exposés oraux filmés avec images et sons ;

Toute autre forme d'évaluation doit préalablement être approuvée par le Département.

4.3.4 Exigences
Le Département a convenu des exigences suivantes relatives aux examens :

a) L'étudiant peut s'attendre à devoir répondre à :
— des problèmes d'application ;
— des questions théoriques (définitions, propriétés, lois, énoncés de théorèmes, démonstrations) ;
— des questions de compréhension ou de synthèse ;
— des questions calculatoires.

b) L'étudiant devra démontrer son habileté à choisir lui-même et à utiliser correctement différentes méthodes vues au cours.

c) Les solutions présentées doivent faire preuve de clarté et de rigueur. L'étudiant pourra être pénalisé pour une présentation désordonnée, incohérente ou imprécise d'une solution.
d) Le symbolisme mathématique doit être utilisé adéquatement en tout temps. Une utilisation non pertinente ou inexacte d'un symbole ou d'une notation pourra entraîner une pénalité.
e) À moins de consignes contraires, toutes les solutions doivent être détaillées. Les étapes essentielles doivent apparaître sur papier, et dans l'ordre approprié. Même lorsque la réponse finale est exacte, l'étudiant pourra perdre des points si des étapes importantes de la démarche exigée sont manquantes.
f) Dans les problèmes à contexte concret, une réponse claire faisant référence au contexte du problème doit être énoncée.

4.3.11 Reprise d'examen

Au Département de mathématiques, il n'y a pas de reprise d'examen.

Translation of point 4.3.11: The Department of Mathematics doesn't allow students to redo exams.

13 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* (PIEA), *Politique institutionnelle de la langue française* (PILF), *Politique pour un milieu d'études et de travail exempt de harcèlement et de violence* (PPMÉTEHV), *Conditions d'admission et cheminement scolaire, Procédure concernant le traitement des plaintes étudiantes dans le cadre des relations pédagogiques.*

The full text of these policies and regulations can be found on the Cégep website at the following address: http://www.cegepmontpetit.ca/ena/a-propos-de-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.

14 THE ADAPTED SERVICES CENTER - FOR STUDENTS WITH DISABILITIES

Students with a professional diagnosis (motor, neurological, organic, sensory limitations, 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" or by email to servicesadaptes@cegepmontpetit.ca .

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

15 APPENDIX

No appendix.