Collège
Édouard-Montpetit
École nationale d'aérotechnique

201-2A5-EM
WINTER 2010
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(s)	**Office**	**☎ Extension**	**✉ email or website**
Marie-Hélène Gagnon	C-184	4651	marie-helene.gagnon@college-em.qc.ca

OFFICE HOURS

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Morning					
Afternoon					

Coordinator(s)	**Office**	**☎ Extension**	**✉ email or website**
Baribeau Lorraine	A-249	2551	lorraine.baribeau@college-em.qc.ca
Pépin Jean-Nicolas	A-249B	5551	jean-nicolas.pepin@college-em.qc.ca

CONTEXT OF COURSE IN THE STUDENT'S PROGRAM

This course is the second and last mathematics course for students in the Aircraft Maintenance Program (280.C). Whereas the preceding course (Math 201-115-EM), which was part of all three ÉNA programs, reviewed and reinforced important concepts of algebra, trigonometry, geometry and vector geometry, the core of this course is to introduce students to differential calculus.

After studying arithmetic in primary school and algebra in secondary school, college students who study differential and integral calculus have entered the world of adults, from a mathematical point of view.

OBJECTIVE

To model and interpret mathematical results for aerospatial applications

TEACHING AND LEARNING STRATEGIES

During each period of this course, formal lecture presentations will alternate with practice time so that you can work on exercises suggested by the teacher. The formal lectures are designed to introduce theoretical concepts and the examples allow students to understand these concepts. Occasionally, possibilities available on the internet or specialized mathematical software programs such as **Wiris** and **Excel** may be demonstrated. Frequently the course will begin with a period of warm-up exercises that review material seen in the preceding course. The two-hour course is delivered without a break (2 x 50 minutes without interruption.)

The personal work done outside of class is intended to help you complete the exercises suggested by the instructor during the practice periods and to encourage you to review and study the subjects covered during the theory presentations. Success in this course depends mainly on your individual work. You should not hesitate to take advantage of the instructor's office hours. If you must be absent from a course, you are expected to find out from other students in the course what was done or said during your absence and make up missed work as quickly as possible. If necessary, you should contact the instructor.

You must regularly consult the college's website LEA (Omnivox). LEA can be used as a message board for communication between students and teacher; the teacher will also use it to post documents related to the course.

MATH HELP CENTER (*CENTRE D'AIDE EN MATHÉMATIQUES* = *CAM*)

The CAM is located in the same rooms as the French Help Center (C-122). It is always open to allow individual work. There is no need to register. Math teachers are there to answer your questions according to a schedule which will be distributed at the beginning of the session and will be posted on the center's door. This is a resource to take advantage of.

COURSE PLAN

Periods 1 to 9

Learning Objective	Content	Évaluation
1. To acquire basic concepts of exponential and logarithmic functions.	• Properties of exponential functions and logarithms • Solving exponential and logarithmic equations • Applying exponential and logarithmic models • Logarithmic scales.	Exam 1* written during Periods 21 and 22 20 %

Periods 10 to 14

Learning Objective	Content	Évaluation
2. To model using algebraic equations of scatter diagrams of points obtained experimentally	• Linear, quadratic, exponential, logarithmic, and conic models • Method of least squares • Regression • Interpolation et extrapolation	Homework 1: due for Period 14 5%

* Homework is not to be done in class; the due date will be announced at an appropriate time.

Periods 15 to 22

Learning Objective	Content	Évaluation
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. • Applying these methods to concerete physical models: speed, acceleration, distance, consumption, power, output,energy input	Exam 1: written during Periods 21 and 22 20%
4. To acquire and apply an intuitive concept of derivatives	• Instantaneous rate of change • Intuitive concept of derivatives at one point	

Periods 23 to 50

Learning Objective	Content	Évaluation
4. To acquire and apply an intuitive concept of derivatives	• Calculate and evaluate the derivative of simple functions • Use the concept of derivatives in modeling concrete situations: maximum, minimum, growth, decrease, study of behavior graphed on a curve, optimization, related rates	Homework or work done in class for Period 30 5%
5. To solve algebraic, transcendental and trigonometric equations	• Finding an exact solution • Finding an approximate solution (using a calculator efficiently, error calculation)	Homework or work done in class for Period 40 5 %
6. To solve algebraic inequalities	• Finding all solutions for a system of inequalities with 2 unknowns • Using geometric interpretation to solve inequalities with 1 or 2 unknowns	Exam 2: written during Periods 49 and 50 25%

Periods 51 to 69

Learning Objective	Content	Évaluation
7. To acquire and apply the basic concept of integrals	• Intuitive concept of the primitive and the integral • Calculation and evaluation of integrals of simple functions • Use of integrals in modeling concrete situations (speed, surface calculations, problems involving rate of change, etc.)	Exam 3: written during Periods 68 and 69 20%
8. To use numeric series for approximate calculations of variables and functions	• Becoming familiar with the notation $\sum$ • Special examples of series • Calculating infinite sums (convergence) • Approximate calculation by series expansion (Maclaurin)	

Review: the remaining periods will be devoted to preparing for the comprehensive final exam

Comprehensive Final Exam: 20% (3 periods, during the period of common exams at the end of the session)

REQUIREMENTS TO PASS THE COURSE

(1) Passing Mark

The passing mark for this course is 60%. There are no make-up exams

(2) Attendance for Summative Evaluations

Students who are absent for periodic exams due to serious circumstances (illness, death in the family, major event that prevented student from attending, etc.) must explain the absence and provide supporting documents within five work days following the exam. **If the instructor recognizes that the reasons are serious,** arrangements for a postponed exam will be made between the teacher and the student; otherwise, the student will receive a mark of zero (0) for this exam.

(3) Submitting Assignments

Assigned work must be submitted by the date, the location and the time determined by the instructor. Late assignments will be penalized 10% per day that they are late.

(4) Presentation of Written Work

Students must follow the standards adopted by the College for written work (« *Normes de présentation matérielle des travaux écrits* »). These can be found in the documentation centre on the College web site (http://ww2.college-em.qc.ca/biblio/normes.pdf) under the heading **"Aides à la recherché".**

REQUIRED MATERIAL

- Four-Chapter Custom Version of ''Single Variable Calculus, Early Transcendentals,'' 6th edition, James Stewart Thomson, Nelson 2008
- Coop Course Manuel
- Students must have a recent model scientific calculator with statistical functions that has at least five memories. Graphic calculators are not permitted during exams.

MEDIAGRAPHY

These books can be found in the ENA library. They also cover the course material and were written for a student clientele at the college level. They are recommended for students who wish to see how the same material might be treated differently by various authors. We believe, however, that the required text and the course notes are sufficient to assure success in the course.

RICHMOND, Allan Edwin. *Calcul différentiel et intégral appliqué à l'électronique.* Montréal : McGraw-Hill, 1985. 506 p.

CHARRON, Gilles, Pierre PARENT. *Mathématique 103 : calcul différentiel et intégral I*. Montréal : Études vivantes, 1995. 448 p.

FRADETTE, Jean. *Calcul différentiel*. Anjou : Éditions CEC, 2001. 434 p.

ROSS, André. *Mathématiques appliquées à l'électronique 2*. Sainte-Foy : Le Griffon d'argile, 1986. 374 p.

MARK REVISIONS

Students should refer to the Institutional Policy for Evaluating Learning (PIÉA) for information regarding arrangements concerning mark revisions. This can be found in the student date book (agenda) or on the college web site. The committee for mark revisions is made up of three teachers: the teacher giving the course and two teachers giving or who have already given the same course.

The Committee for Mark Revisions for this course is:

- Danielle Bertrand, Mathematics teacher
- Pierre Letarte, Mathematics teacher
- Claire St-Jacques, Mathemeatics teacher.