



## CEGEP CHAMPLAIN - ST. LAWRENCE

### 201-203-RE: Integral Calculus

### Winter 2009

**Instructor:** Martin Huard  
**Office:** 318  
**Web Site :** <http://web2.slc.qc.ca/mh/>

**e-mail :** [mhuard@slc.qc.ca](mailto:mhuard@slc.qc.ca)  
**Telephone:** 656-6921, ext. 435

**Ponderation:** 3-2-3

**Credits:** 2 2/3

**Prerequisite :** Differential Calculus (Math 201-103-RE)

#### Course Objectives

In this course you will apply the methods of integral calculus to the study of functional models in the field of Social Science, satisfying competency 022Y of the Social Science Programme. The objectives of this competency are:

- 1) To situate the historical context of the development of integral calculus.
- 2) To find the indefinite integral of a function using integration techniques.
- 3) To calculate the definite integral of a function on an interval and provide its interpretation.
- 4) To calculate the limits of a function with indeterminate forms using l'Hospital's rule.
- 5) To calculate the improper integral of a function on an interval and provide its interpretation.
- 6) To analyze a phenomenon using differential equations with separable variables.
- 7) To analyze a phenomenon by checking for convergence of a series.

#### Programme Objectives

You will analyze human phenomena, partially satisfying competency 022R of the Social Science Programme. The objectives of this competency are:

- 1) To know and understand the facts, notions, concepts, theories, methods and other components that are part of a body of knowledge related to Social Science disciplines.
- 2) To analyze various aspects of cases, situations or problems.
- 3) To analyze a theme based on knowledge already acquired.

You will also apply concepts of integral calculus to the understanding of the human phenomena in concrete situations, partially satisfying competency 022S. The objectives of this competency are

- 1) To identify concrete situations that lend themselves to study.
- 2) To use concepts applicable to these situations.
- 3) To use a strategy appropriate to these situations.

#### Course Contents

- 1) Review of differential calculus and introduction to antiderivatives: limits and l'Hospital's rule, derivatives, antiderivatives, indefinite integrals.
- 2) Separable differential equations and their applications.
- 3) Areas and the definite integral: the Fundamental Theorem of Calculus.
- 4) Other applications of the definite integral: areas between curves, volumes of solids of revolution, length of a curve, average value, consumer and producer surplus.
- 5) Techniques of integration: substitution, integration by parts, integrating trigonometric functions, long division and the method of partial fractions, completing the square, numerical integration, integration with Maple.
- 6) Improper integrals.
- 7) Approximating functions by polynomials (Taylor polynomials). Infinite sequences and series: geometric series, annuities, market stabilization, tests for convergence, power series, Maclaurin series for a function.

## Teaching Method

The course is given in an interactive lecture form, with frequent interludes for you to try out the ideas being considered.

## Textbook (Optional)

*Calculus, An Applied Approach (7<sup>th</sup> edition)* by R. Larson and B. H. Edwards, Houghton Mifflin Co. (2006). Included with the book is the software *Maple – Student Version* (if bought at the bookstore). Only the SHARP EL-531 calculator will be permitted during the exam. It is available at the bookstore.

## Additional References

*Calculus: early transcendentals (7<sup>th</sup> edition)* by H. Anton, I. Bivens and S. Davis, Wiley (2002).  
*Calculus for Business, Economics, and the Social and Life Sciences (7<sup>th</sup> edition)* by L.D. Hoffmann and G.L. Bradley, McGraw Hill (2000).  
*Single Variable Calculus: early transcendentals (6<sup>th</sup> edition)* by J. Stewart, Brooks/Cole (2008).

## Evaluation

The evaluation in this course will verify that you have learned the following:

- 1) To use the appropriate concepts.
- 2) To adequately represent situations in the form of equations, series and graphs.
- 3) To perform algebraic operations in conformity with rules.
- 4) To correctly select and apply the rules and techniques.
- 5) To make accurate calculations.
- 6) To arrive at correct interpretations of results.
- 7) To justify the steps you have taken in problem solving.
- 8) To use the appropriate terminology (notation).

There will be four term tests, four assignments and a final evaluation consisting of a final exam examination. The midterm and final grade will be calculated as follows:

	<u>Midtem grade</u>	<u>Final Grade</u>
Tests	2 at 40% each	4 at 12% each
Assignments	2 at 10% each	4 at 3% each
Final Exam	-	40%

If a student is absent for a test due to a College-authorized reason (see the *Institutional Policy on the Evaluation of Student Achievement (IPESA)*, section 2.7 on the SLC web site <http://www.slc.qc.ca/>), then a make up evaluation will be given, otherwise a student will be given zero (0). Late assignments will be severely penalised (10% taken off per day), and will not be accepted once I have given back the graded assignments.

Tests and assignments (including the final examination) will be graded on the proper use of English and Mathematics. That means that written passages must be grammatically correct and that proper mathematical style and notation will be required. Improper use may result in a loss of up to 15% of the grade.

## Absences

Attendance is mandatory and a maximum of 5 absences will be tolerated (explained and/or unexplained). More than the 5 absences may mean failure in the course (see section 5.2 of the IPESA).

## Rules & Regulations

St. Lawrence has definite regulations concerning cheating and plagiarism. Any student caught cheating or plagiarizing on an assignment or a test will automatically receive a zero for that assignment or test. If a student is caught a second time, automatic failure in the course will result and disciplinary action may be taken. For more information, the student can consult section 5.5 of the IPESA where these rules are clearly indicated.