



## MATHEMATICS 201-NYB-05

### Integral Calculus

### Winter 2012

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**Ponderation:** 3-2-3

**Credits:** 2 2/3

**Prerequisite :** 201-NYA-05 (Differential Calculus)

#### Programme Objectives

In this course you will use the methods of integral calculus to study functions and problem solving satisfying objective 00UP.

More generally, you will learn

- 1) to solve problems systematically;
- 2) to reason logically;
- 3) to communicate in a clear and precise fashion;
- 4) to use previously acquired knowledge when dealing with new situations;
- 5) to use the appropriate information technologies;
- 6) to work autonomously;
- 7) the historical context of the concepts taught;
- 8) appropriate attitudes.

#### Course Objectives

The calculus courses introduce the student to that branch of mathematics called analysis. In this course the student will learn to apply integral calculus methods to the study of functions and to problem solving. To meet this objective, the student will learn:

- 1) to calculate the indefinite integral of a function;
- 2) to calculate the definite integral over an interval as well as improper integrals;
- 3) to represent concrete situations as differential equations and to solve simple differential equations (separable variables);
- 4) to calculate areas, volumes and lengths as well as construct graphic representations of objects in  $\mathbb{R}^2$  and  $\mathbb{R}^3$ ;
- 5) to analyse the convergence of series.

#### 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)

*Single Variable Essential Calculus: Early Transcendentals* by J. Stewart, Thomson Brook/Cole (2007).

#### Calculators

The use of calculators is strictly forbidden during all of the tests and quizzes.

#### Use of Electronic Devices

Use of any electronic devices is strictly prohibited in class. Their use may result in disciplinary action.

### Additional References

*Calculus: Brief Edition (7th Edition)* by Howard Anton, Irl Bivens and Stephen Davis, John Wiley & Sons (2002).

*Calculus of a Single Variable (7th Edition)* by Ron Larson, Robert P. Hostetler and Bruce H. Edwards, Houghton Mifflin (2002).

### Course Content

- 1) Review of Differential Calculus and Introduction to Areas: derivatives and differentials, the area function, the mean value theorem of Integral Calculus, the fundamental theorems of Integral Calculus
- 2) Indefinite Integrals and Methods of Integration: indefinite integrals and their properties, methods of integration: basic integration formulae, transformations, substitutions, integration by parts, by partial fractions, by trigonometric substitutions, and other substitutions.
- 3) Definite Integrals: properties, calculation of the area under the curve, area between two curves, volumes of revolution, volumes with known cross-sections, length of a plane curve, surface area of a volume of revolution \*, average value of a function \*, centre of mass \*; improper integrals.
- 4) Differential Equations: representation of concrete situations, solving simple differential equations (variable separable).
- 5) Sequences and Series: basic sequences and series, convergence tests, Taylor and MacLaurin series.

\* These topics will only be covered if time allows.

### Evaluation

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

- 1) to use the appropriate concepts;
- 2) to represent situations through the use of functions;
- 3) to sketch exact graphic representations of functions;
- 4) to choose and apply correct differentiation techniques;
- 5) to manipulate algebraic expressions correctly;
- 6) to arrive at exact answers;
- 7) to arrive at correct interpretations of results;
- 8) to justify the steps you have taken in problem solving;
- 9) to use the appropriate terminology (notation).

There will be four term tests, between 10 and 15 quizzes 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
Quizzes (Average)	20%	12%
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 20% 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 5.4 of the IPESA where these rules are clearly indicated.