

Calculus 120

Bonar Law Memorial School

2021–2022

Mr. B. Lynch

E-mail: bradley.lynch@nbed.nb.ca

TEXTS and RESOURCES

- Mathematical Modeling Book 4 (2002) and Mathematics: Principles and Process 12 (1991)
- Calculus with Analytic Geometry (Larson & Hostetler), 1979
- Calculus: A First Course (Stewart, James), 1989
- Calculus: Early Transcendentals, 4th Ed., (Stewart, James), 1999
- Single Variable Calculus Early Transcendentals, 7th Ed., (Stewart, James), 2012
- Calculus: Graphical, Numerical, Algebraic, 4th Ed., AP Edition, (Finney, Ross), 2012
- Pens, pencils, erasers, loose-leaf paper and binder.

SYLLABUS

Unit 1 – Limits and Rates of Change (one week) ~ Review topics.

C1 – Explore the concepts of average and instantaneous rate of a change.

(Factoring types, evaluating limits, intercepts, vertical and horizontal asymptotes, domain and range, piecewise functions, one-sided limits, composite functions, and infinite sequences and series.)

Unit 2 – Derivatives (six weeks)

C2 – Determine the derivative of a function by applying the definition of a derivative.

C3 – Apply derivative rules to determine the derivative of a function, including: Constant Rule, Power Rule, Constant Multiple Rule, Sum Rule, Difference Rule, Product Rule, Quotient Rule.

C5 – Apply the Chain Rule to determine the derivative of a function.

C11 – Solve problems involving related rates.

C9 – Use calculus techniques to solve optimization problems.

C10 – Use linearization to solve problems.

C4 – Find derivatives of trigonometric functions.

(Definition of a derivative, power rule, sum and difference rules, the product rule, the quotient rule, the chain rule, implicit differentiation, higher order derivatives, limits and derivatives of trigonometric functions, velocity/acceleration problems, tangent problems, related rates and optimization, and derivatives of absolute value functions.)

Unit 3 – Mean Value Theorem and Curve Sketching (two weeks)

C8 – Use calculus techniques to sketch the graph of a function.

(Mean Value Theorem, Intermediate Value Theorem, Rolle's Theorem, Extreme Value Theorem, critical numbers, maximum and minimum values, first and second derivative tests, vertical, horizontal / oblique asymptotes, concavity, curve sketching, and application problems.)

Unit 4 – Inverse Functions (three weeks)

C6 – Solve problems involving inverse trigonometric functions.

C7 – Find limits and derivatives of exponential and logarithmic functions.

(Exponential and Logarithmic Functions, natural logarithms, derivatives of exponential and logarithmic functions, logarithmic differentiation, limits and L'Hôpital's rule, inverse trigonometric functions and their derivatives, exponential growth and decay, hyperbolic functions and their derivatives.)

Unit 5 – Integrals and Extension Topics (four weeks)

C12 – Determine the definite integral of a function.

C13 – Determine the antiderivative of a function.

C14 – Solve problems that involve the application of the integral of a function from a variety of fields, including the physical and biological sciences, economics and business.

(General antiderivatives, approximating and evaluating the area under a curve using the limit of a Riemann sum, areas between curves, The Fundamental Theorem of Calculus, Definite and Infinite Integrals, Substitution rule, Integration by Parts, Trigonometric Substitution, Partial Fractions, Antiderivatives of Trigonometric Functions, and Volumes of Revolution {Disc and Shell Methods}.)

EVALUATION

Your **final grade** will be based on the following scheme:

- Semester Mark 70%
- Final Exam (June 2022) 30%

Semester Mark will be calculated based on the following scheme:

- Tests and Quizzes 85% (translates to 59.5% of final grade)
(1 quiz every 1–2 weeks and 1 test every 2–3 weeks)
- In–Class Assignments 10% (translates to 7% of final grade)
(1 assignment every 2–3 weeks)
- Homework 5% (translates to 3.5% of final grade)

Students must obtain a minimum mark of 60% to receive credit for this course.

Please note: According to the BLMS Exam Incentive, if you have earned a Semester mark $> 85\%$ in Calculus 120, the final grade may also be computed by weighting the exam to be 15%, 30%, or 50%, and whichever scheme works in the student’s favour will be recorded as the final grade.

Absenteeism and Marks

A legitimate written excuse from a parent or guardian for illness or medical appointments will be required to circumvent the penalization of marks due to the lateness of an assignment or a test. See BLMS Assignment Tardiness Policy.

Please note that **NO** Calculators are permitted to be used during tests or on the Final Exam.

This is an **elective** senior level Mathematics course. The course is designed to prepare students for post-secondary programs that require a mathematical background. The intent of this course will be to further the development of mathematical skills. Since the pace of this course will be rapid, students will be expected to maintain excellent attendance and are responsible for all missed work.

“I hear and I forget... I see and I remember... I do and I understand.” – Chinese Proverb

EXPECTATIONS

- You are expected to be in class on time each day with all your materials.
(*these include: pen, pencil, paper, scientific calculator and worksheets*)
- You are expected to treat others with respect and dignity. You are expected to contribute to a positive learning environment.
- You are expected to work the entire period to the best of your ability.
- This course will include in-class assignments (open book) that will be completed individually only during class time. Homework will also be assigned on a regular basis and students will be expected to have it completed at the beginning of each class.
- When you miss a class it is **your** responsibility to get caught up on your own time. This means you may have to call a classmate at home to receive the work missed or you may have to make arrangements to stay for extra help.
- If you miss a test or an in-class assignment you must write it when you return to school at a time arranged by the teacher.
- **ALL WORK** must be handed in and **ALL TESTS** must be written.
- If at **any** time a student is having difficulty, **extra help** is available upon request. Students are **always** welcome for extra help. I am available during lunch hour and after school.

~ If All You Do Is Watch Someone Else Do Mathematics, All You Will Become Good At Is Watching Someone Else Do Mathematics. ~

....Old Math Proverb

One for the dinner table.... "What is the first derivative of a cow?"

– Prime Rib!



Sir Isaac Newton

1642 – 1727