**MATH 1500/** Calculus 42U Introduction to Calculus

## February 2023– June 2023 Semester 2

## University of Manitoba

# Faculty of Science , Department of Mathematics

## 

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**Microsoft Teams**

A Microsoft Teams page has been set up for this course and I will use that page to post all notes, PowerPoints, assignments and videos. Even though all the content information will be posted on our Teams page, please check my website (see above) daily as that is where I will post the agenda with all due dates, deadlines, assigned tasks etc.

**It is your responsibility to check the Teams page and my website daily.**

**Textbook**

Single Variable Calculus 7th Edition, James Stewart

## Materials Required

A binder with looseleaf and adequate writing supplies are required.

**Course Objectives**

The goals of this course are to help students develop an understanding of the properties of functions and their role in many different areas of mathematics, increase their awareness of the scope of mathematics, develop skills that will increase their ability to simplify algebraic and numeric expressions and prepare them for further courses in calculus and related fields.

## Topics

**FUNCTIONS AND MODELS**

* Four Ways to Represent a Function
* New Functions from Old Functions
* Exponential Functions

**LIMITS**

* Limit of a Function
* Limit Laws
* Continuity
* Limits at Infinity: Horizontal Asymptotes

**DERIVATIVES**

* Derivatives and Rates of Change
* The Derivative as a Function
* Derivatives of Polynomials and Exponential Functions
* Product and Quotient Laws
* Derivatives of Trigonometric Functions
* The Chain Rule
* Implicit Differentiation (omit inverse trig functions)
* Related Rates

**MIDTERM**

**APPLICATIONS OF DERIVATIVES**

* Inverse Functions and Logarithms
* Derivatives of Logarithmic Functions
* Maximum and Minimum Values
* Mean Value Theorem
* How Derivatives Affect the Shape of a Graph
* Curve Sketching (omit oblique asymptotes)
* Optimization Problems
* Antiderivatives
* Areas and Distances

**INTEGRATION**

* Definite Integral
* Fundamental Theorem of Calculus
* Indefinite Integrals

**FINAL EXAM**

## Proofs that are subject to examination

* If a function is differentiable on (a,b) then it must be continuous on (a,b).
* Prove: (cf)’= cf’ (by using the definition of a derivative)
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* If f’ = 0 on (a,b) then f is constant on (a,b) (by using MVT)
* If f’ > 0 on (a,b) then f is increasing on (a,b) (by using MVT)
* If f’ < 0 on (a,b) then f is decreasing on (a,b) (by using MVT)

## Assessment

Assessment of term work will be a balance of assessment for learning, assessment as learning and assessment of learning and may include the following :

Observation, homework, demonstrations, performance tasks, investigations, quizzes, and tests.

## Other

Please refer to your agenda concerning regulation for the following:

attendance, lates, text books, dress code, homework, student evaluation, testing, incomplete policy, reporting and academic honesty.