Mathematics 116
Calculus I for Management and Economics

2020 Winter Term 1 (Sept.–Dec. 2020) – Section 001

Note. All times displayed below are in Pacific Standard Time (PST).

General Information

Lectures:	Mon, Wed, Thu: 5 – 6 PM. (Lectures will be recorded!)
Instructor:	Dr. Paul Tsopméné
Office:	FIP 324
Office hours:	Mon, Wed, Thu: 2:30 – 4:30 PM, Tue: 4 – 6 PM, or by appointment.
Email:	paul.tsopmene@ubc.ca
Tutorial:	Every student must be registered in one of the tutorial sections. You should know your tutorial section number and the name of your TA.
Canvas:	Zoom links, lecture videos, practice problems, and important dates will be posted on the canvas course page. It is your responsibility to check announcements and important dates frequently. Log in at `https://canvas.ubc.ca`
Textbook:	*Calculus with Applications* by Margaret L. Lial, Raymond N. Greenwell, and Nathan P. Ritchey, 11th edition, Pearson.
Calculators:	The use of a scientific calculator (non-graphing, non-programmable) is permitted.
Prerequisites:	Either (a) a score of 67% or higher in one of MATH 12, PREC 12 or (b) a score of 60% or higher in one of MATH 125, MATH 126.

Course Description

MATH 116 covers the following topics.

- **Linear Functions**: Slopes, Equations of Lines and Applications.

- **Nonlinear Functions**: Quadratic, Polynomial, Rational, Exponential and Logarithmic Functions.

- **The Derivative**: Limits, Continuity, Rates of Change, Definition of the Derivative, and Graphical Differentiation.

- **Calculating the Derivative**: Techniques of Finding Derivatives, Product, Quotient and Chain Rules, Derivatives of Exponential and Logarithmic Functions.

- **Graphs and the Derivative**: Increasing and Decreasing Functions, Relative Extrema, Concavity, the Second Derivative Test, and Curve Sketching.

- **Applications of the Derivative**: Absolute Extrema, Optimization, Elasticity of Demand, Implicit Differentiation, and Related Rates.

- **Sequences and Series**: Taylor Polynomials at 0 and Newton's Method.

Course Objectives

To enable the student to

- understand the fundamental concepts of differential calculus and applications to marginal analysis, and elasticity of demand;

- learn the most important techniques for calculating derivatives;

- practice how to apply these techniques to model and solve various problems.

Evaluation

The final grade will be based on Assignments (15%), Midterms (35%) and Final Exam(50%) as shown below.

Description	Weights	Dates	Duration
Assignments	15 %	**See below**	See below
Midterm 1	17.5%	**Wednesday Oct. 14**	30 minutes
Midterm 2	17.5%	**Wednesday Nov. 18**	30 minutes
Final Exam	50%	**TBA**	3 hours

- **Assignments.** There will be 8 assignments that will be posted on Fridays. The **due date** will be on the next **Friday at 11:59 PM.**

Assign-ment #	Assignment Topics	Will be posted on	Due dates
1	Equations of Lines and Applications	Sept. 11	Sept. 18
2	Linear, Quadratic and Exponential Functions	Sept. 18	Sept. 25
3	Logarithmic Functions and Limits(I)	Sept. 25	Oct. 2
4	Limits(II, III and IV)	Oct. 2	Oct. 9
5	Product, Quotient and Chain Rules	Oct. 23	Oct. 30
6	Chain Rule(II), Derivatives of Exp. and Logarithmic	Oct. 30	Nov. 6
7	Increasing, Decreasing, Extrema and Concavity	Nov. 6	Nov. 13
8	Optimization, Elasticity of Demand and Implicit Diff.	Nov. 27	Dec. 4

- **Practice Problems.** There will be additional practice problems that will be typed and posted each week. While completion of these problems is essential for your success in this course, you do not hand them in for grading.

- **Midterms.** There will be **two midterm exams** (30 minutes each), which are scheduled for the dates shown above. These will be written during the class time. **No make up midterms will be given. If a test is missed for a valid reason (e.g. medical or compassionate reasons, with documentation), the final exam will be weighted more heavily to compensate.**

Midterm 1 Topics	Midterm 2 Topics	Final Exam Topics
Linear Functions	Techniques for Finding Derivatives	Midterm 1 Topics
Quadratic Functions	Product and Quotient Rules	Midterm 2 Topics
Exponential Functions	The Chain Rule	Absolute Extrema
Logarithmic Functions	Derivatives of Exponential Functions	Optimization
Limits	Derivatives of Logarithmic Functions	Elasticity of Demand
Continuity	Increasing and Decreasing Functions	Implicit Differentiation
Definition of the Derivative	Relative Extrema	Related Rates
	Concavity and Inflection Points	Taylor Polynomials at 0
	Curve Sketching	Newton's Method

- **Final Exam.** There is a three-hour comprehensive final exam during the final examination period Dec. 7 – 22. **Failure to write the final exam at the scheduled time OR failure to attain a mark of at least 35% on the exam may result in a failing grade for the course.**

- **Submission Policy.** Once you are done with your assignment or midterm or final exam, you **MUST upload a single file** (preferably a PDF file) of your work on Canvas. For example, if your work consists of 10 pictures, you must first merge them into a single file and then submit the latter.

Lecture Outline

Lecture #	Description	Date
1	Introduction to Calculus and Slopes	Sept. 9
2	Equations of Lines	Sept. 10
	Assignment # 1	
3	Linear Functions and Applications	Sept. 14
4	Quadratic Functions	Sept. 16
5	Exponential Functions	Sept. 17
	Assignment # 2	
6	Exponential and Logarithmic Functions	Sept. 21
7	Logarithmic Functions	Sept. 23
8	Limits	Sept. 24
	Assignment # 3	
9	Limits	Sept. 28
10	Limits	Sept. 30
11	Limits	Oct. 1
	Assignment # 4	
12	Continuity	Oct. 5
13	Rates of Change	Oct. 7
14	Definition of the Derivative	Oct. 8
	Midterm # 1	**Oct. 14**
15	Graphical Differentiation	Oct. 15

16	Techniques for Finding Derivatives	Oct. 19
17	Product and Quotient Rules	Oct. 21
18	The Chain Rule	Oct. 22
	Assignment # 5	
19	The Chain Rule	Oct. 26
20	Derivatives of Exponential Functions	Oct. 28
21	Derivatives of Logarithmic Functions	Oct. 29
	Assignment # 6	
22	Increasing and Decreasing Functions	Nov. 2
23	Relative Extrema	Nov. 4
24	Concavity and the Second Derivative Test	Nov. 5
	Assignment # 7	
25	Curve Sketching	Nov. 9
	Midterm Break	**Nov. 12 − 13**
26	Absolute Extrema	Nov. 16
	Midterm # 2	**Nov. 18**
27	Optimization	Nov. 19
28	Optimization	Nov. 23
29	Elasticity of Demand	Nov. 25
30	Implicit Differentiation	Nov. 26
	Assignment # 8	
31	Related Rates	Nov. 30
32	Taylor Polynomial at 0	Dec. 2
33	Newton's Method	Dec. 3

Useful Information

- **Math and Science Centre.** This is a good place to go if you need help other than at the time of a tutorial session:
  https://students.ok.ubc.ca/academic-success/learning-hub/math-science-tutoring/

- **Supplementary Learning (SL).** SL sessions will be held and you are encouraged to attend. More information can be found at
  `https://students.ok.ubc.ca/academic-success/learning-hub/supplemental-learning/`
  This will also be announced in class during the first week.

Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

A more detailed description of academic integrity, including the policies and procedures, may be found at:
`http://okanagan.students.ubc.ca/calendar/index.cfm?tree=3,54,111,0`
If you have any questions about how academic integrity applies to this course, please consult with your professor. A current version of the above integrity statement can be found as a .pdf in the following link:
`http://web.ubc.ca/okanagan/ikbarberschool/facultystaff/forms.html`

Disability Services

If you require disability-related accommodations to meet the course objectives, please contact the Coordinator of Disability Resources located in the Student Development and Advising area of the student services building. For more information about Disability Resources or academic accommodations, please visit the website at
`www.ubc.ca/okanagan/students/drc/welcome.html`.

Equity, Human Rights, Discrimination and Harassment

UBC Okanagan is a place where every student, staff and faculty member should be able to study and work in an environment that is free from human rights based discrimination and harassment. If you require assistance related to an issue of equity, discrimination or harassment, please contact the Equity Office. `www.ubc.ca/okanagan/equity`