

Lingnan University
Department of Economics

Course Title	:	Calculus
Course Code	:	SSC2114
Recommended Study Year	:	3 and 4
No. of Credits/Term	:	3
Mode of Tuition	:	Lecture-Tutorial
Class Contact Hours	:	2-hour lecture per week 1-hour tutorial per week
Category in Major Prog.	:	Elective
Discipline	:	Economics
Prerequisite(s)	:	N/A
Co-requisite(s)	:	N/A
Exclusion(s)	:	Students are not allowed to take both this course and CDS1002 Calculus
Exemption Requirement(s)	:	N/A

Brief Course Description

The course covers both differential calculus and integral calculus. It will cover basic derivatives and integration techniques with one variable as well that with more than one variable functions.

Aims

The course aims to provide students with a clear comprehension of the concepts and theory of calculus, and be able to use calculus intelligently for solving a wide variety of mathematical problems.

Learning Outcomes (LOs)

Upon completion of the course, students will be able to:

1. demonstrate basic knowledge and techniques of calculus
2. apply the knowledge and techniques of calculus to solve mathematical problems;

Indicative Contents

1. Limits and Derivatives
 - a. Limits
 - b. Continuity
 - c. Derivatives
 - d. Differentiations
 - e. The Chain Rule

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- f. Implicit Differentiation
- g. Linear Approximations
- 2. Applications of Differentiation
 - a. Maximum-Minimum Problems
 - b. The Mean Value Theorem
 - c. Increasing and Decreasing Functions
 - d. The Second Derivatives and Concavity
- 3. Partial Derivatives
 - a. Functions of Several Variables
 - b. Limits and Continuity
 - c. Partial Derivatives
 - d. The Chain Rule
 - e. Higher Order Partial Derivatives
 - f. Optimisation for Functions of n-Variables
 - g. Lagrange Multipliers
- 4. Integrals
 - a. Indefinite Integral
 - b. Definite Integral
 - c. The Fundamental Theorem of Calculus
 - d. Integration by Parts
 - e. Integration by Substitution
 - f. Multiple Integrals

Teaching Method

Lectures combined with tutorials and vigorous homework exercises.

Measurement of Learning Outcomes

Learning outcomes are measured by:

1. tutorials and quizzes are designed to assess student's comprehension of lecture and assigned readings (LO1, LO2),
2. mid-term tests and final examination assess students' understanding and applications of the techniques to the problem in economics (LO1, LO2).

Assessment

1. Tutorial Participation and Presentation*	10%
2. Two quizzes (5% each)	10%
3. Mid-term test	30%
4. Final examination	50%
Total	100%

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- * All students are required to attend tutorials. Grade will be deducted for absence without justifiable reasons.

Required/ Essential Reading

James Stewart, *Calculus*, International Metric Edition, 8th edition, Cengage Learning, 2016.

Recommended/ Supplementary Readings

Alpha Chiang and Kevin Wainwright, *Fundamental Methods of Mathematical Economics*, 4th edition, McGraw-Hill, 2005.

Weir, M; Hass, J and F Giordano, *Thomas' Calculus*, 11th edition, International Edition, Pearson, 2005.

Or any other standard introductory textbooks for calculus

Important Notes:

- (1) Students are expected to spend a total of 9 hours (i.e. 3 hours of class contact and 6 hours of personal study) per week to achieve the course learning outcomes.
- (2) Students shall be aware of the University regulations about dishonest practice in course work, tests and examinations, and the possible consequences as stipulated in the Regulations Governing University Examinations and Course Work. In particular, plagiarism, being a kind of dishonest practice, is “the presentation of another person’s work without proper acknowledgement of the source, including exact phrases, or summarised ideas, or even footnotes/citations, whether protected by copyright or not, as the student’s own work”. Students are required to strictly follow university regulations governing academic integrity and honesty.
- (3) Students are required to submit writing assignment(s) using Turnitin.
- (4) To enhance students’ understanding of plagiarism, a mini-course “Online Tutorial on Plagiarism Awareness” is available on <https://pla.ln.edu.hk/>.
- (5) Students are required to fill in a mid-term survey and the end of course CTLE survey.
- (6) Students must adhere to the University’s guidelines and practices when using Generative Artificial Intelligence (AI) tools. The official documents “Guidelines for Using GAI Tools at Lingnan University” and “Best Practices for Ethical and Responsible Use of GAI Tools in Course Assessments” can be found here: <https://www.ln.edu.hk/tlc/generative-artificial-intelligence/gai-guidelines-bestpractices>.

Rubrics for Quizzes, Midterm Test and Final Exam (10%, 30% and 50%)

<u>Dimensions</u>	Excellent	Good	Fair	Pass	Failure
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	A-, A	B- to B+	C- to C+	D, D+	F
Comprehension of concepts (8%, 24% and 40%)	Demonstrates a thorough understanding of the relevant concepts; always or almost always performs the required operations correctly	Demonstrates a good understanding of the relevant concepts; usually performs the required operations correctly	Demonstrates a fair understanding of the relevant concepts; sometimes performs the required operations correctly	Demonstrates a superficial understanding of the relevant concepts; sometimes performs the required operations correctly but there are major mistakes	Demonstrates insufficient understanding or misunderstanding of the relevant concepts; fails to perform all or most operations correctly
Clarity (2%, 6% and 10%)	consistently accurate, logical and clear	generally accurate, logical and clear	comprehensible and clear with some minor lapses	comprehensible but there are some major lapses	largely incomprehensible

Rubrics for Tutorial Participation (10%)

<u>Dimenions</u>	Excellent A-, A	Good B- to B+	Fair C- to C+	Pass D, D+	Failure F
Participation (10%)	Frequently raises good questions and/or eagerly responds to questions	Often raises good questions and/or eagerly responds to questions	Occasionally raises questions and/or responds to questions	Rarely raises questions and/or responds to questions	Fails to fulfill satisfactory attendance