Department of Economics
Lingnan University

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. Applications to economics, social sciences, managerial sciences, etc. will be covered.

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 as used in the social sciences.

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 in economics analysis;
3. demonstrate understanding of the basic structure and components of relationships among variables in economics and in social research.

Indicative Contents

1. Review of Fundamentals
   a. Real numbers and Inequalities
   b. Intervals and Absolute Values
   c. Functions and Graphs

2. Derivatives and Limits
   a. Introduction to Derivatives
   b. Limits

    c. Differentiations
    d. Products and Quotients
    e. The Chain Rule
    f. Implicit Differentiation

3. Graphing and Maximum-Minimum Problems
    a. Continuity and the Intermediate Value Theorem
    b. Increasing and Decreasing Functions
    c. The Second Derivatives and Cancavity
    d. The Maximum-Minimum Problems

4. Differentiation of Functions of Two or More Variables
    a. Partial Derivatives
    b. Higher Order Partial Derivatives
    c. Optimisation for Functions of n-Variables

5. Total Differentials and Total Derivatives
    a. Differentials
    b. Total Differentials
    c. Total Derivatives and Implicit Differentiation

6. Optimisation for Functions of n-Variable
    a. The unconstrained optimisation of functions of more than one variable
    b. Constrained optimisation- Lagrange multiplier method

7. Calculus in economics
    a. Utility maximisation
    b. Profit- maximisation and cost minimisation
    c. Comparative-static analysis in general function models.

8. Techniques of Integration
    a. Indefinite integral
    b. Definite integral
    c. Integration by parts
    d. Integration by substitution
    e. Application to economics

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, LO3),

Assessment

1. Tutorial Participation and Presentation*   10%
2. Two quizzes (5% each)   10%
3. Mid-term test   30%
4. Final examination   50%
   Total   **100%**
* All students are required to attend tutorials. Grade will be deducted for absence without justifiable reasons.

Good Practices

1. Students are encouraged to make appointments with the instructor during office hours for individual/group consultation regarding the assigned questions.
2. A course teaching and learning evaluation is conducted after the mid-term test allowing for early feedback from students regarding the course.

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. 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/.

Department of Economics
Lingnan University

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

Dimenions	Excellent A-, A	Good B- to B+	Fair C- to C+	Pass D, D+	Failure 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%)

Dimenions	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 attendence**