University of International Business and Economics

University of International Business and Economics
International Summer School

MAT 110 Calculus I

Term: October 26th - November 20th, 2020
Instructor: TBD
Home Institution: TBD
Email: TBD
Class Hours: Monday through Friday, 120 minutes each day (2,400 minutes in total)
Discussion session: 2 hours each week

Total Contact Hours: 66 contact hours (45 minutes each, 48 hours in total)
Location：WEB
Credit: 4 units

Course Description：

The course covers the following concepts: Functions of a real variable; Basics functions such as polynomial, exponential, logarithmic, and trigonometric functions; Limits and continuity; The derivative of a function of a real variable; The derivative as a function; Continuous and differentiable functions; Rules of differentiation; Implicit functions and their derivatives; Extreme values of a functions; The mean value theorem; First and Second derivative tests; Analyzing the shape of a graph of a function using derivatives; l'Hospital's rule for computing limits; Tangent line to the graph of a function; Taylor polynomials of a function; Analyzing the behavior of a function near a point using Taylor polynomials; Antiderivatives; Definite integral of a function; Geometrical significance of the definite integral of a continuous function over an interval; Indefinite integrals; The fundamental theorem of Calculus; Basic methods to compute integrals; The substitution rule.

Course Goals：

A student who satisfactorily completes this course should be able to:
1. Differentiate and integrate basic functions;
2. Analyze the shape of the graph of a function using derivatives of the function;
3. Investigate the extreme value problem for a function of a real variable;
4. Approximate a function by its Taylor polynomials near a point

Required Text：

Stewart, James. *Single Variable Calculus:* 8th edition with ISBN 978-1-285-74062-1

Prerequisites：

Students are expected to be familiar with basic algebra and trigonometry studied in high school.

Attendance:

Students are expected to be present at all class meetings and examinations.

Grading Policy：

If G is the course score as defined above, then the grade thresholds are

A	90 and above	**C+**	65-69
A-	85-89	**C**	60-64
B+	80-84	**C-**	55-59
B	75-79	**D**	50-54
B-	70-74	**F**	below 50

It should be noted that in many US colleges **C-** is not a passing grade if the course is required for a major.

There will be one midterm and a final exam in this class. All exams will be closed-book. No notes, calculators, or other electronic devices will be allowed, and having such a device in view during the exam is an academic honesty violation.
Grading Scale:
The course grades will be calculated based on the following percentages:

- Homework: 30%
- Midterm: 30%
- Final Exam: 40%

The final exam will be cumulative. There will be no make-up exams.

Class Rules:

All academic work should be done with the high level of honesty and integrity. Academic misconduct of any kind may result in a grade penalty or the assignment of a failing grade.

Course Schedule:

Week 1
Assignment

1.1 Four Ways to Represent a Function
Hw: 3, 7, 11, 25, 27, 31, 33, 41, 45, 57
1.2 Mathematical Models: A Catalog of Essential Functions
Hw: 1, 3, 5, 9, 11, 13
1.3 New Functions from Old Functions
Hw: 1, 3, 5, 7, 9, 11, 13, 15, 17, 23, 31, 35, 39
1.4 The Tangent and Velocity Problems

Hw: 1, 5, 7
1.5 The Limit of a Function
Hw: 3, 5, 7, 11, 15, 29, 31, 33, 35, 39
1.6 Calculating Limits Using the Limit Laws
Hw: 3, 5, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29
1.8 Continuity
Hw: 11, 13 15, 17, 19, 25, 35, 37, 53, 55
2.1 Derivatives and Rates of Change
Hw: 5, 7, 11, 13, 23, 31, 33, 35
2.2 The Derivative as a Function
Hw: 1, 3, 5, 7, 9, 11, 19, 21, 23, 25

Week 2
Assignment

2.3 Differentiation Formulas
Hw: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 25, 29
2.4 Derivatives of Trigonometric Functions
Hw: 1, 3, 5, 7, 9, 11, 13, 15, 21, 23
2.5 The Chain Rule
Hw: 7, 9, 11, 13, 15, 17, 19, 21, 25, 27, 29, 31, 33, 41
2.6 Implicit Differentiation
Hw: 5, 7, 9, 11, 13, 15, 17, 19, 35
2.7 Rates of Change in the Natural and Social Sciences
Hw: 1, 3, 5, 7, 9
2.8 Related Rates
Hw: 1, 3, 5, 7, 9, 15, 17
2.9 Linear Approximations and Differentials
Hw: 1, 3, 7, 9, 11
3.1 Maximum and Minimum Values
Hw: 3, 5, 15, 17, 19, 21

Week 3
Assignment

3.2 The Mean Value Theorem
Hw: 5, 7, 11, 21
3.3 How Derivatives Affect the Shape of a Graph
Hw: 1, 5, 7, 9, 15, 17, 33, 39
3.4 Limits at Infinity; Horizontal Asymptotes
Hw: 1, 3, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 35
3.5 Summary of Curve Sketching
Hw: 1, 3, 5, 7, 9, 15, 17, 21, 23
3.7 Optimization Problems
Hw: 3, 5, 7, 13, 15, 21
3.9 Antiderivatives

Hw: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 23, 25, 27, 31, 33
4.1 Areas and Distances
Hw: 1, 3, 5, 7, 17
4.2 The Definite Integral
Hw: 1, 3, 5, 9, 17, 19

Week 4
Assignment

4.3 The Fundamental Theorem of Calculus
Hw: 3, 5, 7, 9, 11, 13, 15, 17, 19, 23, 39
4.4 Indefinite Integrals and the Net Change Theorem
Hw: 1, 3, 5, 7, 9, 11, 13, 15, 21, 25, 27, 39
4.5 The Substitution Rule
Hw: 1, 3, 5, 7, 9, 13, 17, 25, 37
6.1 Inverse Functions
Hw: 5, 7, 9, 11, 17, 23, 25, 39
6.2 Exponential Functions and Their Derivatives
Hw: 3, 5, 7, 9, 11, 13, 15, 17, 23, 29, 33, 41
6.3 Logarithmic Functions
Hw: 3, 5, 7, 9, 11, 13, 15, 17, 27, 29, 31, 39, 47, 53, 59
6.4 Derivatives of Logarithmic Functions
Hw: 3, 5, 7, 9, 15, 17
6.5 Exponential Growth and Decay
Hw: 1, 3, 5, 7, 9, 11, 15, 17, 21, 43, 71, 75, 77
6.8 Indeterminate Forms and L'Hospital's Rule
Hw: 1, 3, 9, 11, 13, 15, 17, 19, 21, 25, 27, 47, 51, 55, 61

General Comments:
1. In order to train your minds in mathematical thinking, much of lecture will consist of the "Socratic
Method" of questioning. Even if silently, do try to puzzle out the answers. An analogy: the lecture should be a "mental exercise" class. Knowledge cannot be given: it must be stolen. Engage your mind.
2. Many problems will not be solvable at first (or second) viewing. Be patient: clarify any unknown
concepts, try to reduce the problem, brainstorm to unearth possibly relevant concepts, and follow your intuition. It may help to, after a period of hard work, put the problem away. Do not worry if you cannot do every problem: what is important is that you try.
3. If you find yourself getting lost in the material, come to office hours immediately! It is much is
easier to lead a student's mind individually rather than in a group.
4. Note that we may not dot every i or cross every t in class: you are responsible for reading the text. In particular, it is to your advantage to read the material before coming to class; in this way

the student becomes an active participant rather than a passive recipient.
5. Basic etiquette should be maintained. For example: to give your classmates time to think, please
do not blurt out answers unless called upon (or overcome with excitement); please do not walk out of class without prior explanation, etc.
6. Using a cell phone in class is not permitted; students using phones will be penalized 5 percentage
points on the next exam.
7. Tests will check your understanding of the lectures as well as cover homework-type problems; it
will benefit you to check after each lecture to see if you've understood the line of the arguments.
Precise knowledge of the theory is vital!