



MA080 Calculus I

Instructor Information	Xiang Zhang Home Institution: School of Mathematical Sciences, Shanghai Jiao Tong University Email: xzhang@sjtu.edu.cn		
Term	June 27, 2022 - July 22, 2022	Credits	4 units
Class Hours	Monday through Friday, 120 mins per teaching day		
Discussion Sessions	2.5 hours each week, conducted by teaching assistant(s)		
Total Contact Hours	66 contact hours (1 contact hour = 45 mins, 3000 mins in total)		
Required Texts (with ISBN)	CALCULUS: Early Transcendentals, Eighth Edition by James Stewart ISBN 978-1-285-74155-0		
Prerequisite	N/A		



Course Overview

Calculus One focuses on the computations of the derivatives of functions, applications of derivatives, and integrals of functions. Of particular importance are the squeeze theorem, the L'Hospital's rule, the product rule, the quotient rule, the chain rule, the mean value theorems and the fundamental theorem of calculus.

Learning Outcomes

On completion of this subject students should

1. Know very well how to use various ideas, such as the squeeze theorem, the L'Hospital's rule;
2. Find the limits of functions;
3. Understand how to use product rule, quotient rule, chain rule, implicit differentiation rule as well as the properties of the natural logarithmic function to compute the derivatives of a given function;
4. Understand how to apply the derivatives to show if a function is increasing or decreasing, to find the local and absolute maximum and minimum of a function;
5. Apply the fundamental theorem of calculus and the substitution rule to evaluate indefinite and definite integrals and to compute the derivative of a function defined by using an integral.

Grading Policy

Quizzes and Homework	30%
Midterm Examination	30%
Final Examination	40%

Grading Scale is as follows

Number grade	Letter grade	GPA
90-100	A	4.0
85-89	A-	3.7
80-84	B+	3.3
75-79	B	3.0
70-74	B-	2.7
67-69	C+	2.3
65-66	C	2.0
62-64	C-	1.7
60-61	D	1.0
≤59	F (Failure)	0



Class Schedule

Date	Lecture	Readings
Day 1	The tangent and velocity problems. The limit of a function	Chapter 2.1-2.2
Day 2	Calculating limits using the limit laws. The precise definition of a limit	Chapter 2.3 – 2.4
Day 3	Continuity. Limits at infinity and horizontal asymptotes	Chapter 2.5 – 2.6
Day 4	Derivatives and rates of change. The derivative as a function	Chapter 2.7 – 2.8
Day 5	Derivatives of polynomials and exponential function. The product and quotient rules	Chapter 3.1 – 3.2
Day 6	Derivatives of trigonometric functions. The chain rule	Chapter 3.3 – 3.4
Day 7	Implicit differentiation. Derivatives of logarithmic functions	Chapter 3.5 – 3.6
Day 8	Rates of change in natural and social sciences. Exponential growth and decay. Related rates	Chapter 3.7 – 3.9
Day 9	Linear approximations and differentials. Hyperbolic functions. Review for midterm exam one	Chapter 3.10 – 3.11
Day 10	Midterm Examination One	Chapter 2 & 3
Day 11	Maximum and minimum values. The mean value theorem	Chapter 4.1 – 4.2
Day 12	How derivatives affect the shape of a graph. Intermediate forms and L'Hospital's rules	Chapter 4.3 – 4.4
Day 13	Summary of curve sketching. Optimization problems	Chapter 4.5 – 4.7
Day 14	Newton's method. Antiderivatives	Chapter 4.8 – 4.9
Day 15	Areas and distances. The definite integrals	Chapter 5.1 – 5.2
Day 16	The fundamental theorem of calculus	Chapter 5.3
Day 17	Indefinite integrals and the net change theorem	Chapter 5.4
Day 18	The substitution rule	Chapter 5.5
Day 19	Review for the final examination	Chapters 2 - 5
Day 20	The Final Examination	Chapters 2 - 5