



National Taiwan University of Science and Technology

2020 Summer Program

MATH 111 Calculus 1

Course Outline

Term: July 06-August 07,2020

Class Hours: 16:00-17:50 (Monday through Friday)

Course Code: MATH 111

Instructor: Professor Vadim Olshevsky

Home Institution: University of Connecticut

Office Hours: TBA and By Appointment

Email: olshevsky@gmail.com

Credit: 4

Class Hours: According to the regulations of Minister of Education, R.O.C, 18 class hours could be counted as 1 academic credit in all universities in Taiwan. This course will have 72 class hours, including 40 lecture hours, professor 10 office hours, 10-hour TA discussion sessions, 2-hour review sessions, 10-hour extra classes.

Course Description:

Calculus 1 is the first of a sequence of three courses in calculus covering basic calculus. Topics to be covered include a review of functions, limits, differentiation, applications of the derivative, and introduction of integration.

Course Objectives: The objective of the course is to build an understanding of the basic principles and applications of differential and integral calculus through lectures, homework, discussion, quizzes, and exams.

Required Textbooks:

Calculus: Early Transcendentals, 8th Edition, by James Stewart with WebAssign Access Code. Can be purchased directly at

<https://www.cengage.com/c/calculus-early-transcendentals-8e-stewart/9781337771498#compare-buying-options>

It is important that you purchase both the textbook and the WebAssign code, the latter is necessary for the homework assignments.

Homework: There will be online WebAssign homework assignments for each section of the text. Each assignment will be made available on several days before the section is covered in class. The due date for each assignment will be set by your instructor and will generally be two or three days after the material is covered in class. You will get five attempts for each question.

Grading & Evaluation

		Grade	Range
Attendance and participation:	10%	A	90-100
Homework:	30%	B	80-89
Midterm:	30%	C	70-79
Final:	<u>30%</u>	D	60-69
		F	0-59

Course Schedule

Week1 Functions: definition, representation, types, operations, mathematical models. Limits and continuity: limit of a function, the limit law, continuity, definition of a limit. Derivatives: Definition, rates of change

Week2 Derivatives: Differentiation rules: polynomial, trigonometric, inverse, logarithmic, exponential, implicit functions. The product, quotient, and chain rules.

Week3 Applications of differentiation: Higher derivatives, linear approximation and differentials, minima and maxima, the Mean Value Theorem, L'Hôpital's rule, limits at infinity and asymptotes, curve sketching.

Week4 Applications of differentiation: Applied optimization problems Integrals (Anti-derivatives, approximating areas, the definite integral).

Week5 Integrals: The Fundamental Theorem of Calculus, substitution rule.



Detailed Course Outline

Week	Date	Chapter	Topic
	07/06/2020	1 Functions	1.1 Definition and representation of functions 1.2 Types of functions 1.3 Operations on functions (Composition, inverse)
1	07/07/2020	2 Limits and continuity	1.4 Mathematical models 2.1 The limit of a function 2.2 The limit laws
	07/08/2020		2.3 Continuity 2.4 Precise definition of a limit
	07/09/2020	3 Derivatives	3.1 Definition of a derivative 3.2 Derivatives as rates of change
	07/13/2020		3.3 Differentiation rules (constants and polynomials) 3.4 The chain, product, and quotient rules
2	07/14/2020	3 Derivatives	3.5 Derivatives of trigonometric functions 3.6 Derivatives of inverse functions
	07/15/2020		3.7 Implicit differentiation 3.8 Derivatives of exponential and logarithmic functions
	07/16/2020		Exam 1
	07/20/2020		3.9 Higher derivatives 4.1 Linear Approximation and Differentials
3	07/21/2020		4.2 Maxima and minima
	07/22/2020	4 Applications of derivatives	4.3 The Mean Value Theorem 4.4 L'Hôpital's rule
	07/23/2020		4.5 Limits at infinity and asymptotes 4.6 Curve sketching
	07/27/2020		4.6 Curve sketching 4.7 Applied Optimization problems
4	07/28/2020	5 Integrals	5.1 Anti-derivatives
	07/29/2020		5.2 Approximating areas 5.3 The definite integral
	07/30/2020		Exam 2
	08/03/2020		5.4 The Fundamental Theorem of Calculus
5	08/04/2020	5 Integrals	5.5 Substitution Rule
	08/05/2020		Final Exam
	08/06/2020		Discussion of final exam

Student responsibilities/expectations: The main course material will be presented through lectures. A discussion session, to be held every Friday will offer an opportunity for students to discuss course material and assigned problems with a teaching assistant (TA). Students are advised to keep pace with the course



material as it is being presented. Consequently, students should endeavor to attend all class meetings and discussion sessions, be early for class, and spend sufficient time working on assigned homework problems. If for any reason a student misses a class, he/she should endeavor to obtain the notes and learn the missed material before the next class meeting. Students should not hesitate to ask questions or seek additional assistance to ensure that they are staying on pace with the class. Students will be expected to come to class prepared and ready to participate actively. Please, turn off your cell phones and put aside any unrelated material before class begins. Students must be responsible and show respect towards fellow students. Late-coming to class or early departure from class meetings will not be allowed.

Examinations: There will be two midterm exams plus one cumulative final exam. The exams will contain problems to solve and definitions, brief explanations of concepts, and simple proofs.

