

<b>COURSE #: 20100</b> <b>COURSE TITLE: Calculus I</b> CAREER: undergraduate CATEGORY: regular TERM OFFERED: Fall, Spring, Summer PRE-REQUISITES: C or better in Math 19500 or placement PRE/CO-REQUISITES: HOURS/CREDITS: 4HR/WK; 4 CR DATE EFFECTIVE:08/01/18 COURSE SUPERVISOR: Prof. Thea Pignataro	<b>CATALOG DESCRIPTION:</b> Limits, continuity, derivatives, differentiation and its applications, differentials, definite and indefinite integrals.  Text: Thomas' Calculus: Early Transcendentals (14 <sup>th</sup> ed.), Haas, Heil, and Weir (Pearson).
--	--

Topics and Allotted Times

Suggested Periods	Section	Topics
1	1.1	Functions and Their Graphs
1	1.2	Combining Functions; Shifting and Scaling Graphs
1	1.3	Trigonometric Functions
1	1.5	Exponential Functions
2	1.6	Inverse Functions and Logarithms
0.5	2.1	Rates of Change and Tangents to Curves
2	2.2	Limit of a Function and Limit Laws
(1 opt.)	2.3	The Precise Definition of a Limit (optional)
1	2.4	One-Sided Limits
1.5	2.5	Continuity
1.5	2.6	Limits Involving Infinity; Asymptotes of Graphs
2	3.1	Tangents and the Derivative at a Point
1	3.2	The Derivative as a Function
3	3.3	Differentiation Rules
1	3.4	The Derivative as a Rate of Change
1	3.5	Derivatives of Trigonometric Functions
2	3.6	The Chain Rule
1	3.7	Implicit Differentiation
2.5	3.8	Derivatives of Inverse Functions and Logarithms
1	3.9	Inverse Trigonometric Functions
1.5	3.10	Related Rates
1	3.11	Linearization and Differentials
1	4.1	Extreme Values of Functions
1	4.2	The Mean Value Theorem
1	4.3	Monotonic Functions and the First Derivative Test
2	4.4	Concavity and Curve Sketching
2	4.5	Indeterminate Forms and L'Hôpital's Rule
1	4.6	Applied Optimization
1.5	4.8	Antiderivatives
1	5.1	Area and Estimating with Finite Sums
1.5	5.2	Sigma Notation and Limits of Finite Sums
1	5.3	The Definite Integral
1.5	5.4	The Fundamental Theorem of Calculus
2	5.5	Indefinite Integrals and the Substitution Method
2	5.6	Substitution and Area Between Curves

### COURSE LEARNING OUTCOMES

After taking this course, the student should be able to:	Contributes to Departmental Learning Outcome(s):
1. Evaluate limits, including the use of L'Hôpital's Rule.	a, b, e1, e2
2. Differentiate algebraic and transcendental functions.	a, b, e1, e2
3. Solve Maximum and Minimum problems.	a, b, c, e1, e2
4. Solve Related Rates problems.	a, b, c
5. Apply methods of calculus to sketch curves.	a, b
6. Anti-differentiate algebraic and trigonometric functions.	a, b, c, e1, e2
7. Approximate integrals by Riemann sums.	e1, e2, g
8. Evaluate elementary integrals using substitution.	a

### COURSE ASSESSMENT TOOLS

1. Term average, based mostly on in-class examinations: 60% of grade
2. Comprehensive written final exam: 40% of grade.

### DEPARTMENTAL LEARNING OUTCOMES

*The mathematics department, in its varied courses, aims to teach students to*

- a. perform numeric and symbolic computations*
- b. construct and apply symbolic and graphical representations of functions*
- c. model real-life problems mathematically*
- d. use technology appropriately to analyze mathematical problems*
- e. state (e1) and apply (e2) mathematical definitions and theorems*
- f. prove fundamental theorems*
- g. construct and present (generally in writing, but, occasionally, orally) a rigorous mathematical argument*