



**Course Number and Name:** MAT 171 Section Name - *Unified Calculus I*

**Term Dates:** Section Start Date - Section End Date

**Meeting Location:** Section Meeting Building Section Meeting Room

**Meeting Days & Times:** Section Meeting Days; Section Start Time - Section End Time

**Lecture/Lab Hours:** 4.00 Lecture Hours

**Credits:** 4.00

**Prerequisite(s):** MAT-144 or MAT-155; ENG-097

**Corequisite(s):** Course Coreqs

**Course Description:** This course is a college level study in Calculus. Topics include: analytic geometry; limits and continuity; differentiation and integration of algebraic and transcendental functions; extrema; definite and indefinite integrals; applications to geometric and physical problems.

## Course Learning Outcomes

---

**Upon successful completion of this course, students will be able to:**

1. Calculate the limit of a function at a point using numerical, graphical and analytical techniques, and use the limit to classify a function as continuous or discontinuous at a point.
2. Use derivatives to solve a variety of "real-world" problems including related rates, optimization, and rectilinear motion.
3. Determine the derivatives of algebraic, trigonometric, logarithmic and exponential functions as well as functions defined implicitly.
4. Construct a detailed graph of a nontrivial function using limits and information about its first and second derivative to identify asymptotes, extrema, and points of inflection, increasing/decreasing intervals and concave up/concave down intervals.

5. Apply basic techniques and the method of substitution to determine the definite and indefinite integrals of algebraic, trigonometric, logarithmic and exponential functions.
6. Use the Fundamental Theorem of Calculus to evaluate definite integrals, with specific application to finding the area under a curve.

## Course Materials

---

*image  
not  
available*

### Calculus

**ISBN:** 9780357749166

**Authors:** Ron Larson, Bruce Edwards

**Publication Date:** 2023-01-01

**Edition:** 12th Edition

## Grading

---

Letter Grade	Percentage
A	90-100
B+	87-89
B	80-86
C+	77-79
C	70-76
D+	67-69
D	60-66
F	< 60

## Class Schedule

---

The exact schedule of topics will be determined by the instructor.

UNITS	CLASS WEEKS	CLASS MTGS.	TEXT ASSIGNMENT CHAP. PAGES	TOPICS
-------	----------------	----------------	--------------------------------	--------

UNITS	CLASS WEEKS	CLASS MTGS.	TEXT ASSIGNMENT CHAP. PAGES		TOPICS
I	2 ¼	1	P1 – P4  1.1	2-40  46-50	Prerequisites LIMITS & THEIR PROPERTIES A Preview of Calculus
		1	1.2	52-58	Finding Limits Graphically and Numerically
		2	1.3	63-70	Evaluating Limits Analytically (Squeeze Theorem is optional)
		2	1.4	74-82	Continuity and One-Sided Limits
		1	1.5	87-91	Infinite Limits
		2			REVIEW & TEST #1
		9			
II	3	2	2.1	100-106	DIFFERENTIATION The Derivative and the Tangent Line Problem
		2	2.2	110-117	Basic Differentiation Rules and Rates of Change
		2	2.3	122-128	The Product and Quotient Rules and Higher-Order Derivatives
		1	2.4	133-139	The Chain Rule
		1	2.5	144-148	Implicit Differentiation
		2	2.6	152-156	Related Rates
		2			REVIEW & TEST II
		12			

UNITS	CLASS WEEKS	CLASS MTGS.	TEXT ASSIGNMENT CHAP. PAGES		TOPICS
III	3 $\frac{3}{4}$				APPLICATIONS OF DIFFERENTIATION
		1	3.1	166-170	Extrema on an Interval
		1	3.2	174-177	Rolle's Theorem and the Mean Value Theorem
		2	3.3	181-186	Increasing and Decreasing Functions and the First Derivative Test
		2	3.4	191-195	Concavity and the Second Derivative Test
		2	3.5	199-205	Limits at Infinity
		2	3.6	209-214	A Summary of Curve Sketching
		2	3.7	219-223	Optimization Problems
		1	3.9	235-239	Differentials
		2			REVIEW & TEST III
		15			
IV	4 $\frac{1}{2}$				INTEGRATION
		2	4.1	248-254	Antiderivatives and Indefinite Integration
		1	4.2	258-266	Area (light on finding areas by the limit definition)
		1	4.3	270-276	Riemann Sums and Definite Integrals
		2	4.4	281-291	The Fundamental Theorem of Calculus
		2	4.5	296-304	Integration by Substitution
		2	5.1	314-320	The Natural Logarithmic Function: Differentiation
		2	5.2	324-329	Integration
		1	5.3	333-338	Inverse Functions

UNITS	CLASS WEEKS	CLASS MTGS.	TEXT ASSIGNMENT CHAP. PAGES		TOPICS
		3	5.4	342-347	Exponential Functions: Differentiation and Integration
		2			REVIEW & TEST # 4
		18			

## Experiential Learning

---

Students must complete an experiential learning activity that connects course content to career applications. This activity may be a content specific assignment or practical skill that is applied within a course assignment. This assignment supports the general education learning outcomes of scientific/critical thinking and quantitative reasoning; oral and written communication; and information literacy/technological competency.

## Academic Policies

---

See College Catalog for more information: <http://onlinecatalog.ucc.edu/content.php?catoid=10&navoid=2858>

## Americans with Disabilities Act (ADA)

---

Union College offers reasonable accommodations and/or services to persons with disabilities. Any student who has a documented disability and wishes to self-identify should contact the Coordinator of Disability Support Services at (908) 709-7164, or email [disabilitysvc@ucc.edu](mailto:disabilitysvc@ucc.edu). Accommodations are individualized and in accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1992. In order to receive accommodations, students must be registered with Disability Support Services. Students should register with the office as soon as possible. Accommodations are not official until the Faculty Accommodations Alert Form(s) are issued from the student to his/her instructor(s).

## Family Educational Rights and Privacy Act (FERPA)

---

The FERPA Statement can be found at <https://www.ucc.edu/admissions/the-family-education-rights-and-privacy-act/>.

## Equal Opportunity Statement

---

Union College does not discriminate and prohibits discrimination, as required by state and/or federal law, in all programs and activities, including employment and access to its career and technical programs.

## Union College Mission Statement

---

*Transforming Our Community. . . One Student at a Time*

## Suggested Teaching Methodologies

---

1. Lecture
2. Active learning/problem-solving activities
3. Independent practice
4. Discussion
5. Technology (Maple, Converge, Derive) supports course objectives to be determined at the discretion of the instructor

## Mapping Course Learning Outcomes to Learning Activities and Evaluation Methods

---

Course Learning Outcomes (CLO's)	Learning Activities	Evaluation Methods
Calculate the limit of a function at a point using numerical, graphical and analytical techniques, and use the limit to classify a function as continuous or discontinuous at a point.	Mix of the following as appropriate: <ul style="list-style-type: none"><li>• Lecture</li><li>• Class Discussion</li><li>• Student Practice</li><li>• Group Work</li><li>• Homework – textbook/software</li></ul>	Written assignments  Quizzes & Tests  Classroom discussion
Use derivatives to solve a	Mix of the following as	Written assignments

variety of "real-world" problems including related rates, optimization, and rectilinear motion.	<p>appropriate:</p> <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Class Discussion</li> <li>• Student Practice</li> <li>• Group Work</li> <li>• Homework – textbook/software</li> </ul>	<p>Quizzes &amp; Tests</p> <p>Classroom discussion</p>
Determine the derivatives of algebraic, trigonometric, logarithmic and exponential functions as well as functions defined implicitly.	<p>Mix of the following as appropriate:</p> <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Class Discussion</li> <li>• Student Practice</li> <li>• Group Work</li> <li>• Homework – textbook/software</li> </ul>	<p>Written assignments</p> <p>Quizzes &amp; Tests</p> <p>Classroom discussion</p>
Construct a detailed graph of a nontrivial function using limits and information about its first and second derivative to identify asymptotes, extrema, and points of inflection, increasing/decreasing intervals and concave up/concave down intervals.	<p>Mix of the following as appropriate:</p> <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Class Discussion</li> <li>• Student Practice</li> <li>• Group Work</li> <li>• Homework – textbook/software</li> </ul>	<p>Written assignments</p> <p>Quizzes &amp; Tests</p> <p>Classroom discussion</p>
Apply basic techniques and the method of substitution to determine the definite and indefinite integrals of algebraic, trigonometric, logarithmic and exponential functions.	<p>Mix of the following as appropriate:</p> <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Class Discussion</li> <li>• Student Practice</li> <li>• Group Work</li> <li>• Homework – textbook/software</li> </ul>	<p>Written assignments</p> <p>Quizzes &amp; Tests</p> <p>Classroom discussion</p>
Use the Fundamental Theorem of Calculus to	<p>Mix of the following as appropriate:</p> <ul style="list-style-type: none"> <li>• Lecture</li> </ul>	<p>Written assignments</p> <p>Quizzes &amp; Tests</p>

evaluate definite integrals, with specific application to finding the area under a curve.	<ul style="list-style-type: none"> <li>• Class Discussion</li> <li>• Student Practice</li> <li>• Group Work</li> <li>• Homework – textbook/software</li> </ul>	Classroom discussion
-------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------

**Please note:** all programs must integrate in one or more courses, discipline-specific course learning outcomes that reflect the College learning outcomes of scientific/critical thinking and quantitative reasoning, oral/written communication, and information literacy.