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👨‍👨‍👧‍👧 “Please remember me and my family in your prayers.” 🌸

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General Studies

MATH 1211 Calculus

UNIVERSITY OF THE PEOPLE
The Education Revolution

MATH 1211: Calculus

Syllabus

Prerequisites: MATH 1201: College Algebra with Trigonometry

Course Description: This course offers an interdisciplinary introduction to differential calculus, an essential component of mathematics with wide-ranging applications across various fields. It facilitates a thorough grasp of polynomials, exponential, logarithmic, and trigonometric functions. Each family of functions will include an exploration of related limits, derivatives and integrals. Throughout the course, learners will enhance their independent learning capabilities, problem-solving skills, and precision in mathematical reasoning and writing. Participants will also develop the ability to express solutions using geometric, symbolic, and analytical methods applicable to theoretical and practical mathematical problems.

Required Textbook and Materials: UoPeople courses use open educational resources (OER) and other materials specifically donated to the University with free permissions for educational use. Therefore, students are not required to purchase any textbooks or sign up for any websites that have a cost associated with them. The main required textbooks for this course are listed below and can be readily accessed using the provided links. There may be additional required/recommended readings, supplemental materials, or other resources and websites necessary for lessons; these will be provided for you in the course's General Information and Forums area, and throughout the term via the weekly course Unit areas and the Learning Guides.

- Herman, E. & Strang, G. (2020). *Calculus volume 1*. OpenStacks. Rice University. https://openstax.org/books/calculus-volume-1/pages/2-introduction also available in the Textbook page as a pdf.
- Students should also have access to a calculator or calculation software available online.

Software Requirements/Installation: No special requirements.

Learning Objectives and Outcomes:

By the end of this course students will be able to:

1. Analyze the graph of polynomial, rational, exponential, logarithmic, and trigonometric functions; critically assess their limits and continuity.
2. Employ various differential rules, including the chain rule and implicit differentiation, to compute derivatives of polynomial, rational, exponential, logarithmic, trigonometric, composite, and implicitly defined functions.
3. Utilize derivative techniques to analyze functions for extreme values; employ L'Hopital's Rule to solve equations and address complex limit problems.
4. Apply derivatives to solve real-world problems involving related rates and optimization.
5. Explain the Fundamental Theorem of Calculus and compute indefinite and definite integrals to find areas under curves.

Course Schedule and Topics: This course will cover the following topics in eight learning sessions, with one Unit per week. The Final Exam will take place during Week/Unit 9 (UoPeople time).

Week 1: Unit 1 - Functions and Graphs

Unit Learning Outcomes:

1. Describe different types of functions.
2. Analyze graphs of functions to identify key features such as intervals of increase or decrease.

Week 2: Unit 2 - Limits and Continuity

Unit Learning Outcomes:

1. Describe the limit definition of a derivative.
2. Apply limit laws to calculate the limits of functions.
3. Analyze the continuity of functions at specific points using limits.

Week 3: Unit 3 - Fundamentals of Differentiation
Unit Learning Outcomes:

1. Explain the concept of rates of change and how they are represented by derivatives.
2. Apply differentiation rules to find the derivatives of various functions (such as Polynomial, Rational, Trigonometric, Exponential and Logarithmic Functions).

Week 4: Unit 4 - Advanced Differentiation Techniques
Unit Learning Outcomes:

1. Implement the chain rule to differentiate composite functions.
2. Solve problems using implicit differentiation to find derivatives of implicitly defined functions and determine the equation of a tangent and normal line.

Week 5: Unit 5 - Extreme values, Mean Value Theorem (MVT) and L'Hôpital's Rule
Unit Learning Outcomes:

1. Explore critical points and extreme values of functions using derivative tests.
2. Explain the application of the Mean Value Theorem in understanding the behavior of functions over intervals.
3. Apply L'Hôpital's Rule to evaluate limits of indeterminate forms.

Week 6: Unit 6 - Applications of Derivatives
Unit Learning Outcomes:

1. Apply derivatives to solve related rates problems involving real-world scenarios.
2. Analyze optimization problems to find the maximum and minimum values of functions.

Week 7: Unit 7 - Introduction to Integrals
Unit Learning Outcomes:

1. Explain the concept of antiderivatives and demonstrate how to compute indefinite integrals.
2. Apply the Fundamental Theorem of Calculus to connect the processes of differentiation and integration.
3. Perform basic integration techniques, including substitution, to solve integrals.

Week 8: Unit 8 - Definite Integrals and Their Applications
Unit Learning Outcomes:

1. Evaluate definite integrals using proper limits of integration and appropriate techniques.
2. Apply definite integrals to calculate the area under the curve.

Course Requirements:

Discussion Assignments & Response Posts
Some units in this course require that you complete a Discussion Assignment. You are required to develop and post a substantive response to the Discussion Assignment in the Discussion Forum. A substantive response is one that fully answers the question that has been posted

by the instructor. In addition, you must extend the discussion by responding to at least two (2) of your peers' postings in the Discussion Forum. Your discussion posts will be assessed by your instructor. Discussion Forums are only active for each current and relevant learning week, so it is not possible to contribute to the forum once the learning week has come to an end. Failure to participate in the Discussion Assignment by posting in the Discussion Forum and responding to peers as required may result in failure of the course.

Assignment Activities

The assignment activities are graded by your instructor. The grading rubric is listed under the assignment instructions. The grading rubric is a document that outlines the criteria that your instructor will use to grade your work.

Course Forum

The Course Forum is the place to raise issues and questions relating to the course. It is regularly monitored by the instructors and is a good place to meet fellow students taking the same course. While it is not required to participate in the Course Forum, it is highly recommended.

Class Introductions

This section is your opportunity to introduce yourself to your classmates and create a vibrant learning community. By sharing your background, interests, and goals, you can create meaningful connections and discover commonalities with your peers.

Course Policies:

Grading Components and Weights

Each graded component of the course will contribute some percentage to the final grading scale, as indicated here:

Items	Number of assignments	Weight
Discussion Forum	3	20%
Assignment Activities	8	55%
Graded Quizzes (Unit 3 & 6)	2	10%
Final Exam	1	15%

Grading Scale

This course will follow the standard 100-point grading scale defined by the University of the People, as indicated here:

Letter Grade	Grade Scale	Grade Points
A+	98-100	4.00
A	93-97	4.00
A-	90-92	3.67
B+	88-89	3.33
B	83-87	3.00
B-	80-82	2.67
C+	78-79	2.33
C	73-77	2.00
C-	70-72	1.67
D+	68-69	0.00
D	63-67	0.00
D-	60-62	0.00
F	Under 60	0.00

Grade Appeal

If you believe that the final grade you received for a course is erroneous, unjust, or unfair, please contact your course instructor. This must be done within seven days of the posted final grade. For more information on this topic, please review the Grade Appeal Procedure in the University Catalog.

Participation

Non-participation is characterized by lack of any assignment submissions, inadequate contributions to the Discussion Forums, and/or lack of peer feedback to Discussion/Written Assignments. Also, please note the following important points about course participation:

- Assignments must be submitted on or before the specified deadline. A course timeline is provided in the course schedule, and the instructor will specify deadlines for each assignment.
- Any student showing non-participation for two weeks (consecutive or non-consecutive) is likely to automatically fail the course.
- Occasionally there may be a legitimate reason for submitting an assignment late. Most of the time, late assignments will not be accepted and there will be no make-up assignments.
- All students are obligated to inform their instructor in advance of any known absences which may result in their non-participation.

Academic Honesty and Integrity

When you submit any work that requires research and writing, it is essential to cite and reference all source material. Failure to properly acknowledge your sources is known as "plagiarism" – which is effectively passing off an individual's words or ideas as your own. University of the People adheres to a strict policy of academic honesty and integrity. Failure to comply with these guidelines may result in sanctions by the University, including dismissal from the University or course failure. For more information on this topic, please review the Academic Integrity Policy in the University Catalog.

Any materials cited in this course should be referenced using the style guidelines established by the American Psychological Association (APA). The APA format is widely used in colleges and universities across the world and is one of several styles and citation formats required for publication in professional and academic journals. Refer to the UoPeople APA Tutorials in the LRC for help with APA citations. For help with using library, kindly refer to UoPeople Library.

Code of Conduct

University of the People expects that students conduct themselves in a respectful, collaborative, and honest manner at all times. Harassment, threatening behavior, or deliberate embarrassment of others will not be permitted. Any conduct that interferes with the quality of the educational experience is not allowed and may result in disciplinary action, such as course failure, probation, suspension, or dismissal. For more information on this topic, please review the Code of Conduct Policy in the University Catalog.