Miami Dade College

Course Description

MAC2311 | Calculus and Analytical Geometry 1 | 5.00 credits

In this course, students will develop problem solving skills, critical thinking, computational proficiency, and contextual fluency through the study of limits, derivatives, and definite and indefinite integrals of functions of one variable, including algebraic, exponential, logarithmic, and trigonometric functions, and applications. Topics will include limits, continuity, differentiation and rates of change, optimization, curve sketching, and introduction to integration and area. Computational course

Course Competencies:

Competency 1: The student will demonstrate knowledge of limits by:

1. Computing limits at a point and infinity algebraically
2. Finding limits using L'Hôpital's Rule
3. Applying the definition of continuity
4. Determining where a function is continuous or discontinuous

Competency 2: The student will demonstrate knowledge of differentiation by:

1. Defining the derivative of a function as a limit
2. Finding the derivative of a function using the definition
3. Finding the equation of the line tangent to a curve at a point using a derivative
4. Finding the rate of change of a function using a derivative
5. Finding derivatives of polynomial, trigonometric, exponential, logarithmic, and hyperbolic functions using differentiation rules
6. Finding derivatives using the chain rule
7. Implicitly differentiating equations
8. Computing higher-order derivatives
9. Determining the maximum and minimum points of a function and the intervals where it increases or decreases
10. Determining points of inflection of a function and intervals where it is concave upward or concave downward
11. Using the first and second derivative tests to find local extrema
12. Applying Rolle's theorem and the mean value theorem
13. Solving optimization problems
14. Solving problems involving related rates

Competency 3: The student will demonstrate knowledge of integration by:

1. Finding antiderivatives involving polynomial, trigonometric, inverse trigonometric, exponential, logarithmic, and hyperbolic functions
2. Evaluating a definite integral as a limit of a Riemann sum
3. Computing the average value of a function over an interval
4. Computing definite integrals using the fundamental theorem of calculus
5. Solving applied problems using definite integrals
6. Finding indefinite integrals with a change of variables
7. Finding the area or regions under and between curves
8. Finding the volume of solids of revolution

General Education Learning Outcomes:

- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning