Miami Dade College

Course Description

MAC2312 |Calculus & Analytical Geometry II |4.00 credits

This second semester calculus course the student will examine techniques of integration, applications of integration in stem subjects, sequences and series, representation of functions by Taylor series, parametric equations, calculus in polar coordinates, and improper integrals. Computational course.

Course Competencies:

Competency 1: The student will demonstrate knowledge of integrating functions by:

1. Using integration by parts
2. Computing trigonometric integrals
3. Using appropriate trigonometric substitutions
4. Using partial fractions
5. Using rationalizing substitutions

Competency 2: The student will demonstrate knowledge of approximate integration by:

1. Using mid-point rule
2. Using trapezoidal rule
3. Using Simpson's rule

Competency 3: The student will demonstrate knowledge of improper integrals and their convergence by:

1. Computing convergent improper integrals of type-1 and type-2
2. Identifying improper integrals that are divergent
3. Using comparison theorems to test their convergence

Competency 4: The student will demonstrate knowledge of applications of integrals by:

1. Finding the arc length
2. Finding the area of the surface of the revolution
3. Finding moments and centers of mass

Competency 5: The student will demonstrate knowledge of differential equations by:

1. Modeling differential equations
2. Solving separable equations

Competency 6: The student will demonstrate knowledge of curves defined by parametric and polar equations by:

1. Drawing graphs of such curves
2. Finding tangents and areas that involve such curves
3. Finding arc lengths and areas of the surface of revolutions of such curves

Competency 7: The student will demonstrate knowledge of sequences and series by:

1. Determining the convergence or divergence of a sequence with different techniques
2. Computing the limits of convergent sequences
3. Recognizing types of series, such as geometric, telescopic, harmonic, alternating, p-series, and power series
4. Determining convergence or divergence of a series by comparison test, limit-comparison test, integral test, alternating series test, and p-series test
5. Determining the absolute convergence or conditional convergence by ratio test and/or root test
6. Determining the radius of convergence and the interval of convergence of a power series
7. Finding the Taylor and Maclaurin series of an analytic function
8. Finding binomial series

Learning Outcomes:

- Communicate effectively using listening, speaking, reading, and writing skills
- Use quantitative analytical skills to evaluate and process numerical data
- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information