Course Syllabus

Course Information

Course Title: Calculus and Analytical Geometry 1

Subject and Number: MAC 2311

Course Description: 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. Student learning outcomes: students will calculate a limit, derivative, or integral using appropriate techniques; students will determine the continuity and differentiability of a function; students will use limits and derivatives to analyze relationships between the equation of a function and its graph; students will apply differentiation techniques to model and solve real world problems; and students will use integrals and the fundamental theorem of calculus to analyze the relationship between the integral of a function and the related area. Prerequisites: MAC1106 and MAC1114, or MAC1114 and MAC1140, or MAC1147 with a grade of "C" or better or departmental permission. Fulfills Gordon Rule computational requirement.

Class Number: LOREM IPSUM

Term and Year: LOREM IPSUM

Course Modality: MDC Modalities

Instructor Information

Name: LOREM IPSUM

Department and Campus: LOREM IPSUM

Office location: LOREM IPSUM

Office hours: *(communicate course office hours with students)*

Phone number: 123-456-7890

Email: LOREM IPSUM

Communication Policy: *(Faculty will establish protocols for communication with students)*

Required Textbook, Course Materials, and Technology

Required course materials: *(Textbook(s), library reserves, shark pack, and/or other required readings. Include ISBN Number and author(s))*

List optional/supplemental materials/OER: LOREM IPSUM

Technology & Technical Skill Requirements: *(Technology tools or equipment students need to complete this course are included)*

Grading Policy & Assessment Methods

List all activities, papers, quizzes, tests, etc. including grading scale used for final grade calculation. Relationships between the final grade and the learner's accumulated points or percentages/weights breakdown for each assessment or component of the course grade.

Include policy on late submissions.

For MDC Live and MDC Online courses, include policy regarding exams (e.g., ProctorU, Respondus Lockdown and Monitor, etc.)

If applicable, include guidelines for extra credit.

Incomplete Grades: View the college's procedures for Incomplete Grades

Miami Dade College Policies

Attendance Policy: *(Faculty include precise statements about illnesses/emergencies/ tardiness, missed assignments/make-up.)*

Students Rights and Responsibilities: *Policies addressing academic integrity and plagiarism, code of conduct, grade appeals, religious observations, services for students with special needs, student complaints, and other.*

For more information, visit the Student's Rights and Responsibilities page

Available Support Services & Resources

- Tutoring Labs and Technology – Learning Resources
- Virtual Tutoring through Learning Resources or Smarthinking Online Tutoring
- ACCESS: A Comprehensive Center for Exceptional Student Services
- Advisement
- Password and Login Technical Support
- Technical Support for MDC Live and MDC Online Courses
- SMART Plan

(Faculty select from the above if applicable and include additional course/campus specific resources)

Available Support Services & Resources

- Public Safety - Services
- Hurricane and Other Natural Disasters: In the event of a hurricane or other disaster, the class follows the schedule established by the College for campus-based courses. Please visit the MDC website or call the MDC Hotline (305-237-7500) for situation updates.

Course Description

MAC2311 | Calculus and Analytical Geometry 1 | 5 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. Student learning outcomes: students will calculate a limit, derivative, or integral using appropriate techniques; students will determine the continuity and differentiability of a function; students will use limits and derivatives to analyze relationships between the equation of a function and its graph; students will apply differentiation techniques to model and solve real world problems; and students will use integrals and the fundamental theorem of calculus to analyze the relationship between the integral of a function and the related area. Prerequisites: MAC1106 and MAC1114, or MAC1114 and MAC1140, or MAC1147 with a grade of "C" or better or departmental permission. Fulfills Gordon Rule computational requirement.

Course Competencies

Competency 1:

The student will demonstrate knowledge of limits by:

- Computing limits at a point and at infinity algebraically.
- Finding limits using L'Hopital's Rule.
- Applying the definition of continuity.
- Determining where a function is continuous or discontinuous.

Learning Outcomes

- Critical thinking
- Information Literacy
- Numbers / Data

Competency 2:

The student will demonstrate knowledge of differentiation by:

- Defining the derivative of a function as a limit.
- Finding the derivative of a function using the definition.
- Finding the equation of the line tangent to a curve at a point using a derivative.
- Finding the rate of change of a function using a derivative.
- Finding derivatives of polynomial, trigonometric, exponential, logarithmic, and hyperbolic functions using differentiation rules.
- Finding derivatives using the chain rule.

- Implicitly differentiating equations.
- Computing higher order derivatives.
- Determining maximum and minimum points of a function and intervals where it increases or decreases.
- Determining points of inflection of a function and intervals where it is concave upward or concave downward.
- Using the first and second derivative tests to find local extrema.
- Applying Rolle's theorem and the mean value theorem.
- Solving optimization problems.
- Solving problems involving related rates.

Learning Outcomes

- Communication
- Critical thinking
- Information Literacy
- Numbers / Data
- Social Responsibility

Competency 3:

The student will demonstrate knowledge of integration by:

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

Learning Outcomes

- Communication
- Critical thinking
- Information Literacy
- Numbers / Data
- Social Responsibility