

MIAMI-DADE COMMUNITY COLLEGE
INTERAMERICAN CAMPUS

Mathematics Department

MAC 2311 – CALCULUS I

COURSE SYLLABUS AND COMPETENCIES

Instructor: Dr. Jose Serpa **Office:** 1369
E-mail: jserpa@mdc.edu
Website: <http://faculty.mdc.edu/jserpa/>
Ref. #: 827782 **Time:** TR 12:40-2:50 pm
Room: 1126

Textbook: Thomas' CALCULUS (Early Transcendentals) 13th Edition
Weir/Hass/Giordano

Course Description:

Calculus I integrates concepts of Analytic Geometry with concepts of limits, continuity, differentiation, and integration of the most important algebraic and transcendental functions. Applications of these concepts are used to solve problems.

Pre-requisite: MAC 1140 and MAC 1114 or MAC 1147 with a C or better or equivalent.

Testing and grading policy : There will be five tests worth 100 points each and a comprehensive mandatory Final Exam. HW will be posted online and will count as extra credits 10 points each. The lowest grade among all five tests will be dropped. **There will be no makeups.** The Final Exam may **NOT** be dropped. Your final grade will be based on the average of your four best test scores and the Final Exam. I may assign the seating during any of the tests or Final Exam.

Grading formula : (sum of four best test scores with extra credits included+ final exam) / 5

Grading scale:

90 – 100 = A
80 – 89 = B
70 – 79 = C
60 – 69 = D
0 – 59 = F

Attendance:

Attendance is highly encouraged. Students are responsible for all material covered in class. Students who attend and do not appear on the class roll will be asked to report to the Registrar's Office to obtain a paid/validated schedule.

Math Lab:

The math lab is located in room 1214. It is highly recommended.

Withdrawal Policy:

If you decide to withdraw from this course, it is your responsibility to do so in order to receive a grade of "W". Drop/Withdraw should be conducted through the office of the registrar. However, I periodically purge my class roster. If you are continuously absent and do not inform me of a reason, you may be purged from the class.

CLASSROOM BEHAVIOR:

Bleepers, cellular phones and any electronic devices must be turned off before class.

Please, be prompt. Late arrivals are very disturbing for the instructor and disruptive to fellow students. You should plan to leave enough time to allow for traffic, parking, inclement weather, etc.

Calculators:

You will need a scientific calculator. If you have a graphing calculator, you are encouraged to use it; however, you will not be allowed to use it on exams.

Incompletes:

Incompletes will be given only in very limited circumstances. The student must have a passing average and have a serious personal illness, family death, or unexpected crisis.

Cheating:

Cheating will not be tolerated in this course. Any student caught will receive an automatic F in the test

Course Outline (*Subject to change*):

I reserve the right to make changes in the test dates as needed. Any changes will be announced in class as early as possible

TENTATIVE BREAKDOWN OF EXAMS.

Exam 1: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6

Exam 2: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6

Exam 3: 3.7, 3.8, 3.9, 3.10, 3.11

Exam 4: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.8

Exam 5: 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 6.1, 6.2

Final Exam: Cumulative

Week 1

Introduction

2.1 Rates of Change and Tangents to Curves

2.2 Limit of a Function and Limit Laws

Week 2

2.3 The Precise Definition of Limit

2.4 One-Sided Limits

Week 3

2.5 Continuity

2.6 Infinite Limits and Vertical Asymptotes

Review

Week 4**Exam 1**

3.1 Tangents and the Derivative at a Point

3.2 The Derivative as a Function

Week 5

3.3 Differentiation Rules for Polynomials, Exponentials, Products and Quotients

3.4 The Derivative as a Rate of Change

3.5 Derivatives of Trigonometric Functions

Week 6

3.6 The Chain Rule

Review, Exam 2

Week 7

3.7 Implicit Differentiation

7.1 (3.8) Derivatives of Inverse Functions and Logarithms

(3.9) Inverse Trigonometric Functions

Week 8

3.8 (3.10) Related Rates

3.9 (3.11) Linearization and Differentials

Week 9

Review, Exams 3

4.1 Extreme Value of Functions

Week 10

4.2 The Mean Value Theorem

4.3 Monotonic Functions and the First Derivative Test

4.4 Concavity and Curve Sketching

Week 11

7.5 (4.5) Indeterminate Forms and L'Hôpital's Rule

4.5 (4.6) Applied Optimization Problems

4.7 (4.8) Antiderivative

Week 12

Review, Exam 4

Week 13

5.1 Area and Estimating with Finite Sums

5.2 Sigma Notation and Limits of Finite Sums

5.3 The Definite Integral

Week 14

5.4 The Fundamental Theorem of Calculus

5.5 Indefinite Integrals and the Substitution Rule

Week 15

5.6 Substitution and Area Between Curves

6.1 Volumes using Cross-Sections

6.2 Volumes using Cylindrical Shells

Week 16

Review

Exam 5

Review

Week 17

Cumulative Final Exam

Course Competencies:

Competency 1:

The Student will demonstrate knowledge of limits by:

- a. computing limits at a point and at infinity algebraically
- b. finding limits using L'Hôpital's Rule
- c. Applying the definition of continuity
- d. Determining where a function is continuous or discontinuous

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

- a. defining the derivative of a function as a limit
- b. finding the derivative of a function using the definition
- c. finding the equation of the line tangent to a curve at a point using a derivative
- d. finding the rate of change of a function using a derivative
- e. finding derivatives of polynomials, trigonometric, exponential, logarithmic, and hyperbolic functions using differentiation rules
- f. finding derivatives using the chain rule
- g. implicitly differentiating equations
- h. computing higher order derivatives
- i. determining maximum and minimum points of a function and intervals where it increases or decreases
- j. determining points of inflection of a function and intervals where it is concave upward or concave downward
- k. using the first and second derivative tests to find local extrema
- l. applying Rolle's theorem and the mean value theorem
- m. solving optimization problems
- n. solving problems involving related rates

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

- a. finding antiderivatives involving polynomial, trigonometric, inverse trigonometric, exponential, logarithmic, and hyperbolic function techniques
- b. evaluating a definite integral as a limit of a Riemann sum
- c. computing the average value of a function over an interval
- d. computing definite integrals using the fundamental theorem of calculus
- e. solving applied problems using definite integrals
- f. finding indefinite integrals with a change of variables
- g. finding the area or region under and between curves
- h. finding the volume of solids of revolution

**Miami Dade College/InterAmerican Campus
Mathematics Department**

How do the course objectives relate to the Miami Dade College Learning Outcomes?

What follows below is a list of the ten learning outcomes that have recently been agreed upon by Miami Dade College faculty and administrators.

As graduates of Miami Dade College, students will be able to:

1. Communicate effectively using listening, speaking, reading, and writing skills.
2. Use quantitative analytical skills to evaluate and process numerical data.
3. Solve problems using critical and creative thinking and scientific reasoning.
4. Formulate strategies to locate, evaluate, and apply information.
5. Demonstrate knowledge of diverse cultures, including global and historical perspectives.
6. Create strategies that can be used to fulfill personal, civic, and social responsibilities.
7. Demonstrate knowledge of ethical thinking and its application to issues in society.
8. Use computer and emerging technologies effectively.
9. Demonstrate an appreciation for aesthetics and creative activities.
10. Describe how natural systems function and recognize the impact of humans on the environment.

Each course taken at the college addresses some of these learning outcomes. MAC2311, addresses outcomes 1, 2, 3, 4, 5, 8, 9.