

Syllabus for Math 156 Calculus I

Course Description: Differentiation of algebraic and transcendental functions, applications of the derivative, differentials, indefinite integrals, definite integrals. This course partially fulfills Core Mathematics requirement. The goal here is developing the student's geometric insight into the concepts of differentiation and integration, and applying these concepts to problem solving and "real world application".

REQUIRED TEXT: Calculus, Early Transcendentals 8th Edition by Stewart

Prerequisites: A satisfactory grade (C or better) in pre-calculus or a satisfactory score on the mathematics placement exam.

Student Learning Outcomes:

- Apply arithmetic, algebraic, geometric, statistical and logical reasoning to solve problems.
- Represent and evaluate basic mathematical and/or logical information numerically, graphically, and symbolically.
- Interpret mathematical and/or logical models such as formulas, graphs, tables and schematics, and draw inference from them.
- Students will become proficient in techniques of taking limits, differentiation, understand the concept of rate of change and how to use it to solve real world problems, the concept of definite and indefinite integral and their relations to area and rate of change. In particular, the students will
 - a. Know the definition of a limit
 - b. Be able to explain the concept of continuous functions and know the definition
 - c. Compute instantaneous rate of change
 - d. Compute derivatives of polynomial and transcendental functions
 - e. Differentiation to solve related rate and optimization problems
 - f. Compute definite and indefinite integrals

Academic Code of Student Conduct (please see Howard University handbook): No copying, unauthorized use of calculators, books, or other materials, or changing of answers or other academic dishonesty will be tolerated. Cheating will not be tolerated. Anyone caught cheating will receive an F for the course and may be expelled from the university.

AMERICAN DISABILITIES ACT: Howard University is committed to providing an educational environment that is accessible to all students. In accordance with this policy, students in need of accommodations due to a disability should contact the Office of the Dean for Special Student Services (202-238-2420, bwilliams@howard.edu) for verification and determination of reasonable accommodations as soon as possible after admission and at the beginning of each semester as needed.

Statement on Interpersonal Violence: Howard University takes sexual assault, dating violence, domestic violence, stalking and sexual harassment seriously. If a student reveals that he or she needs assistance with any of these issues, all responsible employees, including faculty, are required to share this information with the University Title IX Office (202-806-2550) or a student can be referred for confidential services to the Interpersonal Violence Prevention Program (IVPP) (202-238-2382) or the University Counseling Services (202-806-6870). For more information, please go to www.CampusSafetyFirst.Howard.Edu

Course Content:

CHAPTER 1 Functions and Models

- Section 1.1 Four Ways to Represent a Function
- Section 1.2 Mathematical Models
- Section 1.3 New Functions from Old Functions
- Section 1.5 Exponential Functions
- Section 1.6 Inverse Functions and Logarithms

CHAPTER 2 Limits and Derivatives

- Section 2.1 Tangent and Velocity Problems
- Section 2.2 The Limit of a Function
- Section 2.3 Calculating Limits Using Limit Laws .
- Section 2.4 The Precise Definition of a Limit
- Section 2.5 Continuity
- Section 2.6 Limits at Infinity; Horizontal Asymptotes
- Section 2.7 Derivatives and Rates of Change
- Section 2.8 The Derivative of a Function

CHAPTER 3 Differentiation Rules

- Section 3.1 Derivatives of Polynomial and Exponential Functions
- Section 3.2 The Product and Quotient Rules
- Section 3.3 Derivatives of Trigonometric Functions
- Section 3.4 Chain Rule
- Section 3.5 Implicit Differentiation
- Section 3.6 Derivatives of Logarithmic Functions
- Section 3.7 Rates of Change in the Natural and Social Sciences
- Section 3.8 Exponential Growth and Decay
- Section 3.9 Related Rates
- Section 3.10 Linear Approximations and Differentials

CHAPTER 4 Application of Differentiation

- Section 4.1 Maximum and Minimum Values
- Section 4.2 The Mean Value Theorem
- Section 4.3 How Derivatives Affect the Shape of a Graph
- Section 4.4 Indeterminate Forms and l'Hospital's Rule
- Section 4.5 Summary of Curve Sketching
- Section 4.7 Optimization Problems
- Section 4.9 Antiderivatives

CHAPTER 5 Integrals

- Section 5.1 Area and Distances
- Section 5.2 The Definite Integral
- Section 5.3 The Fundamental Theorem of Calculus
- Section 5.4 Indefinite Integrals and The Net Change Theorem
- Section 5.5 The Substitution Rule

CLASSROOM POLICIES:

1. **No cell phone or computer usage during class, including texting.** Please turn your ringer off before the start of class and keep your laptop closed.

2. Research has shown that students who regularly attend class tend to do better than those who do not. Please be on time.
3. Please see your instructor for the classroom calculator policy. Some classes do not allow graphics calculators.