

Syllabus for Calculus I

Fall 2023, Howard University

Course & Section #: Math 156 - 02 (Honors)
Class time: Mon-Tue-Wed-Fri, 2:10-3:00pm
Classroom: Academic Services Building B - #100
Website: <http://www.samuelhopkins.com/classes/156.html>

Instructor: Sam Hopkins
Email: sam.hopkins@howard.edu
Office: Annex III (Graduate School) - #220
Office Hours: Tue 1-2pm (or by appointment)

Course content: We will study differentiation of algebraic and transcendental functions, applications of the derivative, differentials, indefinite integrals, and definite integrals. 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 applications."

Prerequisites: Math 007 or outstanding score on Mathematics Placement Examination
Textbook: *Calculus, Early Transcendentals*, 9th Edition, by J. Stewart et al.

Grading: 35% Quizzes • Each of three Midterms 15% • Final 20%

In-class **quizzes** will happen every Tuesday, except for weeks when midterms take place. There will be 11 total quizzes and your lowest 2 scores will be dropped (so 9 of the 11 quizzes will count). Additional problems for practice may be assigned but not collected.

There will be three in-class **midterms** in the semester. They will take place on Tuesdays and be announced 1-2 weeks in advance. The **final** will happen after the end of classes, during finals week.

You will not receive full credit if you only write only the answers. Please always explain your work and present solutions step by step.

Collaboration on graded assignments is not permitted. The use of calculators, outside notes, or other tools from the Internet, is not permitted. Don't use your phone during class, especially not during tests.

Grades will be posted to the Canvas site. I may consider other factors, like class participation, when determining final letter grades, especially in borderline cases.

Detailed outline: We will cover material from Chapters 1, 2, 3, 4, and 5 of the textbook. The topics we will discuss include:

Chapter 1: Functions and Models

- 1.1 Four Ways to Represent a Function
- 1.2 Mathematical Models: A Catalog of Essential Functions
- 1.3 New Functions from Old Functions
- 1.4 Exponential Functions
- 1.5 Inverse Functions and Logarithms

Chapter 2: Limits and Derivatives

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

Chapter 3: Differentiation Rules

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

Chapter 4: Application of Differentiation

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

Chapter 5: Integrals

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

Reproduced below this line are various department- and school-wide policy statements.

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.

Grievance Procedure: If you have any problems with the policies or rules of this course, discuss your concerns with your instructor. If you are still unable to come to a satisfactory arrangement, you may contact (depending on your status) the Director of Undergraduate Studies, Dr. Jill McGowan, jmcgowan@howard.edu, or the Director of Graduate Studies, Dr. Henok Mawi, henok.mawi@howard.edu, and then, finally, the Chair of the Department, Dr. Bourama Toni, bourama.toni@howard.edu.

Americans with 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 Student Services (202-238-2420, oss.disabilityservices@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 Sex and Gender-Based Discrimination, Harassment and Violence: Howard University's Policy Prohibiting Sex and Gender-Based Discrimination, Sexual Misconduct and Retaliation (aka, the Title IX Policy) prohibits discrimination, harassment, and violence based on sex, gender, gender expression, gender identity, sexual orientation, pregnancy, or marital status. With the exception of certain employees designated as confidential, note that all Howard University employees – including all faculty members – are required to report any information they receive regarding known or suspected prohibited conduct under the Title IX Policy to the Title IX Office (TitleIX@howard.edu or 202-806-2550), regardless of how they learn of it. For confidential support and assistance, you may contact the Interpersonal Violence Prevention Program (202-836-1401) or the University Counseling Service (202-806-7540). To learn more about your rights, resources, and options for reporting and/or seeking confidential support services (including additional confidential resources, both on and off campus), visit <https://howard.edu/title-ix>.