BRONX COMMUNITY COLLEGE
of the City University of New York
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

SYLLABUS: MTH 31 - Analytic Geometry and Calculus I (4 credits/6 hours per week)

PREREQUISITE: MTH 30 or equivalent; and CUNY English Proficiency, or ENG 100 or 110, if required

TEXT: Calculus (9th Edition) by Stewart et al., Cengage Learning. ISBN 978-1-337-62418-3
Students who do not need MTH 33 may use
Single Variable Calculus (9th Edition) by Stewart et al., Cengage Learning. ISBN 978-0-357-04291-5

This course is a **Pathways Core B (Mathematical and Quantitative Reasoning) Course**:
A course in this area must meet all of the following learning outcomes. A student will:

a) Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.
b) Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.
c) Represent quantitative problems expressed in natural language in a suitable mathematical format.
d) Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.
e) Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.
f) Apply mathematical methods to problems in other fields of study.

Course Learning Outcomes **(Pathways Learning Outcomes contributed to)**
On successful completion of this course a student will be able to:

1. Evaluate limits at a value and at infinity by using limit laws and the Squeeze Theorem (a, b, c, e)
2. Differentiate algebraic and trigonometric functions including by use the limit definition; Product, Quotient, and Chain Rules; and implicit differentiation (a, b)
3. Use differentiation to compute instantaneous rates of change and tangent lines (c, d, e, f)
4. Compute maxima and minima of functions using calculus to solve optimization problems arising in applications and other fields of study (b, c, d, e, f)
5. Model and solve related rates problems (b, c, d, f)
6. Apply methods of calculus to curve sketching (a, b, e)
7. Anti-differentiate algebraic and trigonometric functions (a, b)
8. Approximate integrals by Riemann sums (b, d, e)
9. Evaluate elementary integrals, including by use of substitution and the Fundamental Theorem of Calculus (b, d, e)
10. Compute definite integrals geometrically or using calculus to determine areas enclosed by curves (a, b, c, d, f)

SECTION	TOPIC	SUGGESTED EXERCISES
	Chapter 1: Functions and Limits	
1.4	The Tangent and Velocity Problems	50/ 1, 3, 5, 7
1.5	The Limit of a Function	60/ 1-5, 12-14, 17, 23-28
1.6	Calculating Limits Using the Limit Laws	70/ 1, 3-23 odd
1.8	Continuity	92/ 3, 7, 9, 15-21 odd, 25, 33, 37, 39, 41, 44, 45, 47, 49, 53, 55, 57
	Review Exercises	96/ 1-11 odd, 17, 23, 27, 29
	Chapter 2: Derivatives	
2.1	Derivatives and Rates of Change	116/ 1, 3, 7, 21-31 odd, 39-47 odd, 53, 57, 59
2.2	The Derivative as a Function	128/ 1, 3, 4, 7, 19, 20, 21, 25-33 odd, 39-51 odd
2.3	Differentiation Formulas	143/ 1-43 odd, 51, 53, 69, 77
2.4	Derivatives of Trigonometric Functions	154/ 1-17 odd, 25, 29, 39-49 odd
2.5	The Chain Rule	162/ 1-45 odd, 47, 51, 55, 69, 71
2.6	Implicit Differentiation	169/ 1-19 odd, 25, 27, 31, 35, 43, 45
2.7	Rates of Change in the Natural and Social Sciences	181/ 1-9 odd, 15, 18
2.8	Related Rates	189/ 1, 3, 9, 10, 11, 13-33 odd
2.9	Linear Approximations and Differentials	196/ 1, 3, 5, 7-25 odd, 31
	Review Exercises	200/ 3, 5, 11, 13-37, 45, 51, 59, 61, 75, 77, 79, 82
	Chapter 3: Applications of Differentiation	
3.1	Maximum and Minimum Values	216/ 3, 5, 15-27 odd, 29-55 odd
3.2	The Mean Value Theorem	225/ 1, 11, 13, 17, 21
3.3	What Derivatives Tell Us about the Shape of a Graph	234/ 1, 5, 7, 8, 9-17 odd, 33-41 odd
3.4	Limits at Infinity; Horizontal Asymptotes	247/ 3, 9-29 odd, 37, 41
3.5	Summary of Curve Sketching	256/ 1-35 odd
3.7	Optimization Problems	270/ 3, 5, 7, 11, 17, 21, 27, 31
3.8	Newton's Method	283/ 5, 7, 13-19 odd, 29
3.9	Antiderivatives	290/ 1-41 odd, 43, 45, 47
	Review Exercises	293/ 1-27 odd, 38, 41, 46, 49, 55, 57
	Chapter 4: Integrals	
4.1	The Area and Distance Problems	311/ 1, 3, 5, 13, 15, 21, 25
4.2	The Definite Integral	324/ 3, 5, 9, 17, 21-25 odd, 31, 33, 37
4.3	The Fundamental Theorem of Calculus	335/ 3, 7-35 odd, 45, 51, 53
4.4	Indefinite Integrals and the Net Change Theorem	345/ 1-11 odd, 19-41 odd, 55, 57
4.5	The Substitution Rule	355/ 1-29 odd, 35-51 odd
	Review Exercises	358/ 2, 5, 11-29 odd, 35, 37, 39

Academic Integrity
Academic dishonesty (such as plagiarism and cheating) is prohibited at Bronx Community College and is punishable by penalties, including failing grades, dismissal and expulsion. For additional information and the full policy on Academic Integrity, please consult the BCC College Catalog.

Accommodations/Disabilities
Bronx Community College respects and welcomes students of all backgrounds and abilities. In the event you encounter any barrier(s) to full participation in this course due to the impact of a disability, please contact the disAbility Services Office as soon as possible this semester. The disAbility Services specialists will meet with you to discuss the barriers you are experiencing and explain the eligibility process for establishing academic accommodations for this course. You can reach the disAbility Services Office at: disability.services@bcc.cuny.edu, Loew Hall, Room 211, (718) 289-5874.

If you test positive for COVID while taking an in-person/hybrid course:

- Using your BCC email account, please email all your **in-person and/or hybrid** professors of your status.
    - Please include your emplid # and current phone number in your email.
    - Please also email us at healthservices@bcc.cuny.edu .
    - Your professor will work with you to complete class work while you are in quarantine.
- You will be called by a Health Services staffer. It is critical that you connect in a timely matter with this staff member for contact tracing information.
- You will need to submit a negative COVID test to Health Services (healthservices@bcc.cuny.edu) before you are allowed access to the campus.
- Your negative test result must come from your doctor or a medical provider (e.g. CityMD, Urgent Care, etc.). We will **not** accept a negative home test result.

08/03 C.O'S.
08/07 MM
07/11 MM
09/11 AM
06/12 EA new ed.
01/16 EA new ed.
10/17 EA for Pathways compliance
08/22 RG new ed.
01/23 EA COVID