

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, if required, ENG 2 and RDL 2

TEXT: Calculus (8th Edition) by James Stewart, Cengage Learning. ISBN 978-1285740621

Students who do not need MTH 33 may use

Single Variable Calculus (8th Edition) by James Stewart, Cengage Learning ISBN 978-1305266636

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)

<u>SECTION</u>	<u>TOPIC</u>	<u>SUGGESTED EXERCISES</u>
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Chapter 1: Functions and Limits

1.4	The Tangent and Velocity Problems	49/ 1, 3, 5, 7
1.5	The Limit of a Function	59/ 1-5, 12-14, 17, 23-28
1.6	Calculating Limits Using Limit Laws	70/ 1, 3-23 odd
1.8	Continuity	91/ 3, 7, 9, 15-21 odd, 25, 33, 37, 39, 41, 44, 45, 47, 49, 53, 55, 57
	<i>Review</i>	96/ 1-11 odd, 17, 23, 27, 29

Chapter 2: Derivatives

2.1	Derivatives	113/ 1, 3, 7, 21-31 odd, 39-47 odd, 53, 57, 59
2.2	The Derivative as a Function	125/ 1, 3, 4, 7, 19, 20, 21, 25-33 odd, 39-51 odd
2.3	Differentiation Formulas	140/ 1-43 odd, 51, 53, 69, 77
2.4	Derivatives of Trigonometric Functions	150/ 1-17 odd, 25, 29, 39-49 odd
2.5	The Chain Rule	158/ 1-45 odd, 47, 51, 55, 69, 71
2.6	Implicit Differentiation	166/ 1-19 odd, 25, 27, 31, 35, 43, 45
2.7	Rates of Change in the Natural and Social Sciences	178/ 1-9 odd, 15, 18
2.8	Related Rates	185/ 1, 3, 9, 10, 11, 13-33 odd
2.9	Linear Approximations and Differentials	192/ 1, 3, 5, 7-25 odd, 31
	<i>Review</i>	196/ 3, 5, 11, 13-37, 45, 51, 59, 61, 75, 77, 79, 82

Chapter 3: Applications of Differentiation

3.1	Maximum and Minimum Values	211/ 3, 5, 15-27 odd, 29-55 odd
3.2	The Mean Value Theorem	219/ 1, 11, 13, 17, 21
3.3	How Derivatives Affect the Shape of a Graph	227/ 1, 5, 7, 8, 9-17 odd, 33-41 odd
3.4	Limits at Infinity; Horizontal Asymptotes	241/ 3, 9-29 odd, 37, 41
3.5	Summary of Curve Sketching	250/ 1-35 odd
3.7	Optimization Problems	256/ 3, 5, 7, 11, 17, 21, 27, 31
3.8	Newton's Method	276/ 5, 7, 13-19 odd, 29
3.9	Antiderivatives	282/ 1-41 odd, 43, 45, 47
	<i>Review</i>	286/ 1-27 odd, 38, 41, 46, 49, 55, 57

Chapter 4: Integrals

4.1	Areas and Distance	303/ 1, 3, 5, 13, 15, 21, 25
4.2	The Definite Integral	316/ 3, 5, 9, 17, 21-25 odd, 31, 33, 37
4.3	The Fundamental Theorem of Calculus	327/ 3, 7-35 odd, 45, 51, 53
4.4	Indefinite Integrals and the Net Change Theorem	336/ 1-11 odd, 19-41 odd, 55, 57
4.5	The Substitution Rule	346/ 1-29 odd, 35-51 odd
	<i>Review</i>	349/ 2, 5, 11-29 odd, 35, 37, 39

8/03 C.O'S.

8/07 MM

7/11 MM, 9/11 AM

6/12 EA new ed

1/16 EA new ed

10/17 EA for Pathways compliance