**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: Early Transcendentals (Ninth Edition) by Stewart et al., Cengage Learning. ISBN 978-1337613927

Students who do not need Math 33 may use Single Variable Calculus: Early Transcendentals (Ninth Edition) by Stewart et al., Cengage Learning. ISBN 978-0357022269

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:

1. Interpret and draw appropriate inferences from quantitative representations, such as formulas, graphs, or tables.
2. Use algebraic, numerical, graphical, or statistical methods to draw accurate conclusions and solve mathematical problems.
3. Represent quantitative problems expressed in natural language in a suitable mathematical format.
4. Effectively communicate quantitative analysis or solutions to mathematical problems in written or oral form.
5. Evaluate solutions to problems for reasonableness using a variety of means, including informed estimation.
6. 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 transcendental 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 transcendental functions (a, b)
8. Approximate integrals by Riemann sums (b, d, e)
9. Evaluate elementary integrals (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

**Week 1**

Chapter 2: Limits and Derivatives

2.1 The Tangent and Velocity Problems 82/ 1, 3,5, 7

2.2 The Limit of a Function 92/ 1-9, 11, 29-39 odd

2.3 Calculating Limits Using the Limit Laws 103/ 1-33 odd, 41, 43, 45, 47

**Week 2**

2.5 Continuity 124/ 1-6, 13, 17, 19, 21, 23, 29, 35, 41, 43, 51, 55, 57

2.6 Limits at infinity; Horizontal Asymptotes 138/ 3, 5, 7, 15-41 odd, 47, 49

**Week 3**

2.7 Derivatives and Rates of Change 149/ 3, 5, 7, 9, 13, 15, 19, 21, 23, 25, 29

2.8 The Derivative as a Function 162/ 1, 3, 21-31 odd, 41, 43

 Review 168/ 1-19 odd, 29-39 odd, 45, 49

**Week 4**

 Exam

Chapter 3: Differentiation Rules

3.1 Derivatives of polynomials and Exponential functions 182/ 3-41 odd, 53, 59, 61

3.2 The Product and Quotient rule 190/ 1-37 odd, 43, 44, 49

**Week 5**

3.3 Derivatives of Trigonometric Functions 198/ 1-29 odd, 35, 39

3.4 The Chain Rule 206/ 1-59 odd, 65

3.5 Implicit Differentiation 215/ 1-21 odd, 27-41 odd, 47

**Week 6**

3.6 Derivatives of Logarithmic and Inverse
Trigonometric Functions 225/ 63-31 odd, 43-55 odd, 61-71 odd

3.7 Rates of Change in the Natural and Social Sciences 235/ 1-4, 7, 9, 11, 33

**Week 7**

3.9 Related Rates 252/ 1-4, 7, 9, 11, 17, 21

3.10 Linear Approximations and Differentials 259/ 1-9 odd, 19, 45, 47

3.11 Hyperbolic Functions 267/ 1-6, 7-17 odd, 35-47

**Week 8**

 Review 270/ 1-53 odd

 Exam

Chapter 4: Applications of Differentiation

4.1 Maximum and Minimum Values 287/ 3-6, 7-13 odd, 29-47, 51-65 odd

**Week 9**

4.2 The Mean Value Theorem 296/ 5-8, 9, 11, 13, 15, 17, 23, 27, 29, 39

4.3 What Derivatives Tell Us about the Shape of a Graph

 305/ 1, 2, 5, 6, 8, 9-27 odd, 31, 43, 45-59 odd, 76, 77

**Week 10**

4.4 Indeterminate Forms and l’Hospital’s Rule 317/ 5, 7, 9-69 odd, 77

4.5 Summary of Curve Sketching 328/ 1-53 odd

**Week 11**

4.7 Optimization Problems 343/ 3,5,7,8,15,19,21,25,27,31,47,55,63,79

4.8 Newton’s Method 355/ 1-7 odd, 11, 13, 29

4.9 Antiderivatives 362/ 1-4, 5-25 odd, 29, 31, 35, 43, 49, 54, 65-69 odd

**Week 12**

 Review 365/ 1-17 odd, 19-33, 45, 65-73 odd

 Exam

Chapter 5: Integrals

5.1 The Area and Distance Problems 384/ 1-23 odd

**Week 13**

5.2 The Definite Integral 397/1-13 odd, 19-47 odd, 51-75 odd

5.3 The Fundamental Theorem of Calculus 408/ 1-53 odd, 67-73 odd

5.4 Indefinite Integrals and the Net Change Theorem 418/ 1-23 odd, 27-53 odd, 69, 71

**Week 14**

5.5 The Substitution Rule 428/ 1-53 odd, 59-79 odd

 Review for the final exam

**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.

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 – removed 07/23

03/23 IP