**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:

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 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 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

*Review* 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 178/ 1-9 odd, 15, 18

 Social Sciences

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

*Review* 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

*Review* 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

*Review* 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