MATH 151 – BUSINESS CALCULUS

A. **TITLE:** BUSINESS CALCULUS

B. **COURSE NUMBER:** MATH 151

C. **CREDIT HOURS:** 4

D. **WRITING INTENSIVE COURSE:** N/A

E. **COURSE LENGTH:** 15 weeks

F. **SEMESTER(S) OFFERED:** Fall / Spring

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:** Three hours of lecture per week.

H. **CATALOG DESCRIPTION:** This course is an intuitive introduction to the Calculus. Topics include: Review of functions, analytical geometry of the line, properties of limits; the derivative with applications; transcendental functions; and integrals with applications. Selected additional topics will be offered, as time permits, at the discretion of the instructor.

I. **PRE-REQUISITES/CO-COURSES:** College Algebra (MATH 121) (or Precalculus MATH 123) with a grade of C or better, or 3 years of high school mathematics with a grade of 75 or above on the third New York State Regents mathematics examination, or permission of instructor.

J. **GOALS (STUDENT LEARNING OUTCOMES):**
By the end of this course, the student will be able to:

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<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
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<tr>
<td>a. Interpret and draw inferences from mathematical models such as formulas, graphs, tables, and schematics;</td>
<td>Critical Thinking, Communication</td>
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<td>b. Represent mathematical information symbolically, visually, numerically, and verbally; and perform operations in different bases</td>
<td>Critical Thinking, Communication</td>
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<tr>
<td>c. Employ quantitative methods such as, arithmetic, algebra, geometry, or statistics to solve problems;</td>
<td>Critical Thinking</td>
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<td>d. Estimate and check mathematical results for reasonableness;</td>
<td>Critical Thinking, Inter-Intrapersonal Skills</td>
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<td>e. Recognize the limits of mathematical and statistical methods</td>
<td>Critical Thinking, Communication</td>
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K. **TEXTS:** Members of the Mathematics Department who will be teaching the course will select the appropriate text. Audio-visual aids and computer software will be used when appropriate and available.

L. **REFERENCES:** none

M. **EQUIPMENT:** A graphing calculator may be required for portions of this course.

N. **GRADING METHOD:** A - F

O. **MEASUREMENT CRITERIA/METHODS:** Homework, Quizzes, Tests, and Projects

P. **DETAILED COURSE OUTLINE:** See Appendix A

Q. **LABORATORY OUTLINE:**
APPENDIX A
MATH 151 BASIC CALCULUS
DETAILED OUTLINE

I. Functions, Graphs, and Limits
   A. The Cartesian Plane and Distance Formula
   B. Graphs of equations
   C. Lines in the plane and slope
   D. Functions
      1. Notation
      2. Evaluation
      3. Domain, range, zeros
      4. Linear functions
      5. Graphs
      6. Economic functions
   E. Limits
      1. Estimate limits using tables and graphs
      2. Find limits using algebra
      3. Determine when limits exist and when they do not exist.
   F. Continuity
      1. Definition of continuity
      2. Removable and non-removable discontinuity

II. Differentiation
   A. The derivative and the slope of a graph
   B. Basic rules for differentiation
      1. Constant rule
      2. Power rule
      3. Sum and difference rules
   C. Rates of change
      1. Velocity
      2. Marginal cost, revenue, and profit
   D. The product and quotient rules
   E. The chain rule
   F. Higher-order derivatives
      1. Acceleration
   G. Implicit differentiation
   H. Related rates

III. Applications of the Derivative
   A. Increasing and decreasing functions
   B. Extrema and the First-Derivative test
      1. Critical points
   C. Concavity and the Second-Derivative test
      1. Inflection points
   D. Asymptotes
      1. Limits involving infinity
   E. Curve-sketching
   F. Optimization Problems
      1. Maximum and minimum applications
      2. Area
      3. Business and economic problems
   G. Differentials and marginal analysis

IV. Integration
   A. Exponential and logarithmic functions
      1. Review of natural exponential and logarithmic properties
2. Derivatives of exponential and logarithmic functions
3. Exponential growth and decay
B. Antiderivatives and indefinite integrals
C. The general power rule
D. Integration by substitution
E. Exponential and logarithmic integrals
F. Evaluate definite integrals
G. Area under a curve
H. The Fundamental Theorem of Calculus
I. The area of a region bounded by two graphs
J. Approximate area
   1. Midpoint rule
   2. Trapezoidal rule