STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
MATH 151 – Business Calculus

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CANINO SCHOOL OF ENGINEERING TECHNOLOGY
MATHEMATICS DEPARTMENT
Semester/Year: March 2019

A. **TITLE**: Business Calculus

B. ! **COURSE NUMBER:** MATH 151

C. ! **CREDIT HOURS: (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)**

 # Credit Hours: 4
 # Lecture Hours: 4 **per week**
 # Lab Hours: 0 **per week**
Other: 0 **per week**

Course Length: 15 **Weeks**

D. **WRITING INTENSIVE COURSE**: Yes ☐ No ☒

E. **GER CATEGORY: None:** ☐ **Yes:** GER 1 Mathematics
***If course satisfies more than one*:** GER

F. **SEMESTER(S) OFFERED: Fall** ☐ **Spring** ☐ **Fall & Spring** ☒

G. **COURSE 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.

H. ! **PRE-REQUISITES: None** ☐ **Yes** ☒ **If yes, list below:**

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.

CO-REQUISITES: None ☒ **Yes** ☐ **If yes, list below:**

I. STUDENT LEARNING OUTCOMES: (*see key below*)

By the end of this course, the student will be able to:

Course Student Learning Outcome [SLO]	***Program Student Learning Outcome [PSLO]***	***GER*** *[If Applicable]*	***ISLO & SUBSETS***	
Intuit the limit of a function from a sketch, compute the limit at a point and at infinity, and determine where it is continuous		1	**3 - Foundational Skills**	QTR
Compute derivatives of functions using sum, difference, product, quotient and chain rules, and use implicit differentiation for relations		1	**3 - Foundational Skills**	QTR
Use derivatives to investigate the properties of functions and sketch the graph		1	**3 - Foundational Skills**	QTR
Use derivatives to solve optimization problems		1	**3 - Foundational Skills**	QTR
Use implicit differentiation to solve related rates problems		1	**3 - Foundational Skills**	QTR
Use derivatives to solve exponential growth and decay problems		1	**3 - Foundational Skills**	QTR
Compute anti-derivatives and use the Fundamental Theorem of Calculus to compute the area under a curve		1	**3 - Foundational Skills**	QTR

KEY	**Institutional Student Learning Outcomes [ISLO 1 – 5]**
ISLO #	**ISLO & Subsets**
1	**Communication Skills** Oral [O], Written [W]
2	**Critical Thinking** *Critical Analysis [CA] , Inquiry & Analysis [IA] , Problem Solving [PS]*
3	**Foundational Skills** *Information Management [IM], Quantitative Lit,/Reasoning [QTR]*
4	**Social Responsibility** *Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]*
5	**Industry, Professional, Discipline Specific Knowledge and Skills**

*Include program objectives if applicable. Please consult with Program Coordinator

J. APPLIED LEARNING COMPONENT: Yes ☐ No ☒

If YES, select one or more of the following categories:

- ☐ Classroom/Lab
- ☐ Internship
- ☐ Clinical Placement
- ☐ Practicum
- ☐ Service Learning
- ☐ Community Service
- ☐ Civic Engagement
- ☐ Creative Works/Senior Project
- ☐ Research
- ☐ Entrepreneurship (program, class, project)

K. TEXTS:

Brief Calculus: An Applied Approach (9th edition) by Larson, Houghton Mifflin Company 2011

L. REFERENCES:

M. EQUIPMENT: None ☐ **Needed:** Technology enhanced classroom

N. GRADING METHOD: A - F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:

Homework !
Quizzes !
Exams !
Projects !

P. DETAILED COURSE 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

Q. <u>LABORATORY OUTLINE</u>: None ☒ Yes ☐