MIDDLESEX COLLEGE, Edison, New Jersey

Master Syllabus

**Course ID and Name**: MAT 141, Calculus for Business and Economics

**Department**: Mathematics

**Prerequisite:** Precalculus, MAT 129,

Precalculus for Business and Economics, MAT 139, or

the equivalent as demonstrated through multiple measures.

**Co-requisite**: None

**Course Description:** This course includes a survey of differential and integral calculus with special attention to business and economics applications. Students will continually reinforce basic algebraic and trigonometric skills while learning calculus concepts related to differentiation, optimization, integration, and exponential growth and decay.

**General Education Status:**

**Credits:** 4 **Lecture Hours:** 4 **Lab Hours:** 0

**Textbook(s) and Other Course Materials**:

e-tbook:

Author: Hartman, Siemers, Heinold, Calishajar

Title: Apex Calculus, Version 4.0

Online Platform: MyOpenMath

Supplies: TI 84, TI 83Plus, or TI Inspire Graphing Calculator required.

**Core Learning Outcomes**:  
Upon successful completion of the course, the student will be able to:

1. Use appropriate mathematical and statistical concepts and operations to interpret data and to

solve problems.

a. Translate quantifiable problems into mathematical terms and solve these problems using mathematical or statistical operations.

b. Construct graphs and charts, interpret them, and draw appropriate conclusions.

1. Communicate accurate mathematical terminology and notation to explain strategies to solve

problems and interpret solutions.

1. Use technology correctly to solve mathematical problems.
2. Analyze and utilize the language of calculus, as well as the formal and mathematical definitions that accompany them.

**Course Content Areas:**

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| **Content Strands** | **Students will be able to…** |
| Limits and Continuity  (CLO 1, 2, 3, 4) | * Determine the limit of a function using graphical, numerical, and analytical means. * Find limits of exponential, logarithmic, and trigonometric functions. * Distinguish between an infinite limit and a limit at infinity. * Interpret limits at infinity as they pertain to average cost, average revenue, and average profit. * Test a function for continuity at a point. |
| Differentiation and Marginal Analysis  (CLO 1, 2, 3, 4) | * Interpret the value of the derivative at a point. * Find derivatives using a difference quotient. * Find derivatives of the first-order and higher using analytical means. * Analyze profit, revenue, and cost for a business by using the marginal profit, marginal revenue, and marginal cost functions. * Analyze average profit, average revenue, and average cost for a business by using the average marginal profit, average marginal revenue, and average marginal cost functions. * Construct revenue functions in-terms of pricing functions. |
| Exponential, Logarithmic, and  Trigonometric Functions,  Derivative Rules, Related Rates, and  Elasticity of Demand  (CLO 1, 2, 3, 4) | * Solve problems related to continuously compounded interest. * Find derivatives of exponential and logarithmic functions. * Find derivatives of trigonometric functions. * Find derivatives for products and quotients of functions. * Find derivatives for composite functions. * Find derivatives using implicit differentiation. * Solve related rate problems using simple geometric situations. * Solve related rate problems using profit, revenue, and cost. * Interpret the elasticity of demand as a relative rate-of-change. * Determine the conditions under which demand will be elastic. |
| Optimization, Antiderivatives, and  Definite Integrals  (CLO 1, 2, 3, 4) | * Find critical values of functions. * Determine where a function is increasing and decreasing. * Find the absolute extrema of a function on a closed interval. * Solve applied optimization problems using geometric situations. * Solve applied optimization problems using profit, revenue, and cost. * Find antiderivatives for elementary functions. * Find antiderivatives for which a substitution is required. * Solve a differential equation which models exponential growth or decay. * Evaluate definite integrals graphically, geometrically, and by the Fundamental Theorem of Calculus. * Calculate the average value of a function. |
| Applications of Definite Integrals  (CLO 1, 2, 3, 4) | * Find the area between two curves. * Calculate the Gini Index of Income Concentration. * Calculate the future value of an income stream. * Determine a consumers’ surplus and a producers’ surplus. * Calculate an equilibrium price and equilibrium quantity. |

**Policies**:

Disability Support: Students with disabilities, whether physical, learning or psychological, who believe that they may need accommodations in this class, are encouraged to contact Disability Services as soon as possible to ensure that the accommodations are implemented.  Please meet with the Disability Services staff in Edison Hall, Room 100, (732) 906-2546.

Code of Student Conduct: To foster a productive learning environment, the College requires that all students adhere to the Code of Student Conduct which is published in the college catalog and website.