East Penn School District
Secondary Curriculum

A Planned Course Statement
for
CALCULUS (C.P.)

Course # **340** Grade(s) **11, 12**

Department: MATHEMATICS

Length of Period (mins.) 42 Total Clock Hours: 126

Periods per Cycle: 6 Length of Course (yrs.) 1

Type of Offering: _____ required ✓ elective

Credit: 1

Adopted: 6/28/10

Developed by:

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Description of Course #340

Course Title: CALCULUS (C.P.)

Description: This course is offered for a better than average student who plans to continue studying such fields as business, management, economics or life and social sciences in college. This is intended as an introductory course only, covering much of the material of a first semester college course, but at a much slower rate, to provide students with a deeper understanding of concepts and theories often misunderstood by college students.

Goals:

- To learn fundamental concepts in differential calculus
- To represent functions graphically, numerically, analytically, and verbally

Requirements:

- Algebra III/Trigonometry CP (84% or better) or Algebra III Trigonometry/Honors (74% to 83%)
- TI – 83 or TI – 84 is used extensively in this course.

Text: Calculus with Applications, 9th Edition. Lial, Greenwell, Ritchey.

***** *A graded project will be completed during each semester in this course.***

***** *Careers that utilize the mathematics taught in this course will be discussed during the first semester.***

Key to Levels of Achievement (Listed with each learning objective)

Awareness (A):	Students are introduced to concepts, forms, and patterns.
Learning (L):	Students are involved in a sequence of steps and practice activities which involved further development and allow evaluation of process.
Understanding (U):	Students demonstrate ability to apply acquired concepts and skills to individual assignments and projects on an independent level.
Reinforcement (R):	Students maintain and broaden understanding of concepts and skills to accomplish tasks at a greater level of sophistication.

Course Objectives – CP Calculus **Page 1**

Unit	Num	Objective	Level	Content	Evaluation	Standard
Linear Functions	**1**	Students will examine various linear models, create scatter plots to model data, and make predictions based on the data.	L U	• Use various formulae to find equations of lines – point slope form, two point form, slope and y intercept form. • Identify parallel and perpendicular lines by examining the slopes of the lines • Calculate x and y-intercepts of a line. • Write linear equations from verbal models. • Use least squares line method to analyze data to model linear equations.	• Quizzes / Tests • Use of Graphing Calculator • Spreadsheets or graphing calculator for regression analysis	2.6.A2.C 2.6.11.E 3.7.10
Nonlinear Functions	**2**	Students will graph and describe functions in terms of domain and range.	L	• Describe graphically and in terms of inequalities, open, closed, and infinite intervals. • Define and evaluate a function using appropriate notation • Identify domain and range of a given function. • Describe a function – analytically, graphically, and numerically • Determine if a function is even or odd. • Sketch linear, quadratic, piece wise, step, polynomial, exponential, rational, and absolute value functions. • Use shifts, translations, and reflections to generate a quick graph. • Use algebraic operations on functions – addition, subtraction, multiplying, dividing, and composition. • Calculate zeros of functions using the quadratic formula and factoring.	• Quizzes/ Tests • Use of Graphing Calculator	2.8.11.B 2.8.11.D 2.1.11.F 3.6.12 3.7.10

Unit	Num	Objective	Level	Content	Evaluation	Standard
			U U	• Utilize the zero function of a graphing calculator to compute zeros of functions and points of intersection. • Use algebraic techniques to solve exponential and logarithmic equations. • Model and solve problems involving exponential growth and decay. • Model application problems using appropriate functions. Interpret graphs of functions		
Limits and Continuity	**3**	Students will define and use the concepts of limits Students will analyze the continuity of a function	L	• Evaluate limits of functions graphically, algebraically, numerically (table of values), and by using limit theorems • Describe asymptotic behavior in terms of limits involving infinity • Identify points of discontinuity of a function	• Quizzes/Tests • Use of Graphing Calculator	2.11.8.A 3.7.10
Rates of Change	**4**	Students will understand how rates of change are calculated and the difference between average and instantaneous rates of change.	L	• Calculate average rate of change with formula and using secant line. • Calculate instantaneous rate of change with formula and using tangent line • Identify the slope of a curve at a point to be the slope of the tangent line	• Quizzes/Tests • Use of Graphing Calculator	2.8.11.K 2.11.8.B 3.7.10

Derivatives	**5**	Students will understand the derivative when presented graphically, numerically, and analytically.	L	• Define the derivative of a function as the limit of the difference quotient. • Use the definition of the derivative and limit techniques to compute the derivative of a function. • Use the rules for differentiation to calculate derivatives and use this to find the slope of the curve at a given point. • Find the equation of tangent lines to a curve at a specific point. • Compute the derivatives of functions using product, quotient, and chain rule. • Graph the derivative function using slope. • Compute derivatives implicitly.	• Quizzes/Tests • Use of Graphing Calculator	2.8.11.L 2.11.8.A 2.5.11.B 2.4.11.C 3.7.10
Applications of the Derivative	**6**	Students will learn how the derivative can be used to solve problems in business and economics and how it can be used in optimization and related rates problems.	L U	• Use the first derivative to find intervals where a function is increasing or decreasing • Determine relative maximum and minimum values of a graph • Use the second derivative to find intervals where a function is concave up or concave down. • Determine inflection points and points where the rate of change is a maximum or minimum. • Use first and second derivatives to draw a sketch of a function. • Use relative extrema to calculate maximum and minimum values of functions in various applications. • Determine economic lot size, economic order quantity, and elasticity of demand. • Determine rates of change with respect to time. • Use differentials to approximate the value of a function	• Quizzes/Tests • Projects • Use of Graphing Calculator	2.11.11.A 2.11.11.B 3.6.12 3.7.10

Antidifferentiation	**7**	Students will learn how the anti-derivative represents area under the curve	L	• Use rectangle approximations to estimate area under a curve • Use the basic power rule to anti-differentiate derivatives	• Use of Graphing Calculator • Quizzes/Tests	2.11.11.C