East Penn School District
Secondary Curriculum

A Planned Course Statement
for

Analytic Geometry and Calculus (AB) AP

Course # **360** Grade(s) 11—12

Department: Math

Length of Period (mins.) 41 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:

Richard Mondschein

Course Title: **Analytic Geometry and Calculus (AB) AP**

Description of Course

This course is intended for students with thorough backgrounds in mathematics who plan to pursue higher mathematics or science in college. Students who satisfactorily complete this course will be prepared to take the College Board's A.P. Calculus (AB) exam. A full first semester college course will be presented including an extensive study of functions and graphs, limits, derivatives and methods of integration. Students who wish to take Advanced Calculus (Course #353) should plan to take AP Calc (BC). This course requires almost daily use of graphing calculators. It is strongly recommended that students have their own graphing calculator. ****This course is not a prerequisite for Advanced Calculus, AP (weighted)**.

Goals:

- To introduce students to an extensive study of functions and graphs, limits, derivatives and methods of integration.
- To prepare students to take the AP Calculus AB exam.

Requirements:

- Algebra III/Trigonometry Honors (recommended 84% or better) **OR** Algebra III/Trigonometry, CP (recommended 92% or better) **OR** Calculus CP (recommended 84% or better))

Text: Anton, Bivens, and Davis. (2009). Calculus with Early Transcendentals 7th Edition

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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.

Unit	Num	Objective	Level	Content	Evaluation	Standard
Chapter 2-Limits & Continuity	2	Students will be able to define and use the concepts of limits (Sections 2.1–2.3, 4.5) Students will analyze the continuity of a function (Sections 2.5-2.6)	L	• Definition and computation of the limit of an algebraic expression in one variable • Limit notation and calculations • Limits of sums, differences, products, and quotients • Limits of composite functions • Use of limits to analyze horizontal and vertical asymptotes • Use of L'Hopital's Rule to determine the limit of an expression of indeterminate form (Section 4.5) • Definition and determination of continuity at a point c • Determination of the domain for which a given function is continuous • Removable and nonremovable discontinuity	• Quizzes • Use of graphing calculator • Test	2.2.11f 2.4.11b,c 2.5.11b,c,d
Chapter 3&4-The Derivative	3	Students will be able to use the definition of the derivative and the rules of differentiation.	L	• Definition of the derivative of a function as a limit (Section 3.1-3.2) • Use of the definition to compute the derivative of various functions (Section 3.3) • Differentiability of a given function • Use of the derivative to find the slope of a tangent line • Derivatives of sums, differences, products and quotients • Derivatives of a composite function the "Chain Rule" (Section 3.5) • Derivative of an inverse function (Section 4.1) • Recognition of a relation requiring implicit differentiation (Section 3.6) • Computation of derivatives implicitly • Definition of "differential" (Section 3.8) • Derivatives of differential notation • Increment of a function • Exponential functions and their derivatives (Sections 4.2-4.3) • Logarithmic functions and their	• Quizzes • Graded assignments • Test • Use of graphing calculator	2.2.11f 2.4.11b,c 2.5.11b,c,d 2.8.11s,t

Unit	Num	Objective	Level	Content	Evaluation	Standard
				derivatives • Trigonometric functions and their derivatives (Section 3.4) • Inverse trigonometric functions and their derivatives (Section 4.4)		
Chapter 5-Derivative Application	4	Students will be able to apply the concept of derivatives to curve sketching and modeling.	L	• Equation of tangent and normal lines • Linear approximation (Section 3.8) • Related rates (Section 3.7) • Average and instantaneous rates of change • Curve analysis: including …(Sections 5.2-5.3, 5.5) Vertical and horizontal asymptotes Intercepts Intervals of increase/decrease/concavity Extreme (relative and absolute) Inflection points Points of nondifferentiability • Applied extrema problems (Section 5.6) • Rolle's Theorem (Section 5.8) • Mean Value Theorem (for derivatives) • The Intermediate Value Theorem • Newton's Method (Section 5.7)	• Quizzes • Use of graphing calculator • Graded assignments • Test	2.2.11f 2.4.11b,c 2.5.11b,c,d 2.8.11t 2.9.11i 2.10.11a,b
Chapter 6-Integratoin	5	Students will be able to use techniques of integration.	L	• Integration of x^a (power rule) (Section 6.2) • Integration using u substitution (Section 6.3) • Integration of Trigonometric Functions	• Quizzes • Graded assignments • Use of graphing calculator • Test	2.2.11f 2.4.11b,c 2.5.11b,c,d
		Students will be able to solve problems using the indefinite integral.	L	• Definition and computation the indefinite integral • Initial value problems and the constant of integration (Section 6.2) • Integrating separable differential equations (Section 9.1) • Rectilinear motion-derivative (Section 5.4) • Rectilinear motion-integral (Section	• Quizzes • Graded worksheets • Test	2.4.11b,c 2.5.11b,c,d

Unit	Num	Objective	Level	Content	Evaluation	Standard
				6.7) • Euler's method and slope fields (Section 9.2) • Exponential growth/decay (Section 9.3) • Newton's Law of Cooling (Section 9.3)		
		Students will be able to utilize limits as a means of determining the area under a curve.	L	• Estimation of the area under a curve using a finite number of rectangles (left hand/right hand) (Section 6.4) • Using limits, determining the exact area under a curve (Section 6.5) • Estimation of the area using the trapezoidal and midpoint rules	• Quizzes • Graded worksheets • Use of graphing calculator	2.2.11f 2.4.11b,c 2.5.11b,c,d 2.9.11i
		Students will apply the Definite Integral to analyze functions.	L	• The Fundamental Theorem of Calculus (Section 6.6, 6.8) • Functions defined by integration • Integrals involving In(x) and exp(x) (Section 6.9)	• Quizzes • Graded worksheets • Test	2.4.11b,c 2.5.11b,c,d 2.10.11c
Chapter 7- Applications of The Definite Integral	6	Students will apply the Definite Integral to solve Practical Problems	L	• Area under a curve (or between curves) (Section 7.1) • Volumes of solids (Section 7.2-7.3) of rotation around a horizontal of vertical axis (Disk/Washer method) formed by perpendicular slices to a given axis • Displacement and distance traveled in a specific time interval (Section 6.7) • Average value problems	• Quizzes • Graded worksheets • Test	2.4.11b,c 2.5.11b,c,d 2.9.11i 2.10.11e
Chapter 8-Principals of Integral Evaluation	7			• Volumes of solids (Section 7.2-7.3) (Cylindrical Shell Method) • Integration by Parts (Section 8.2) • Integration by Trig. Substitution (Section 8.3-8.4) • Integration by completing the square	• Quizzes • Test	