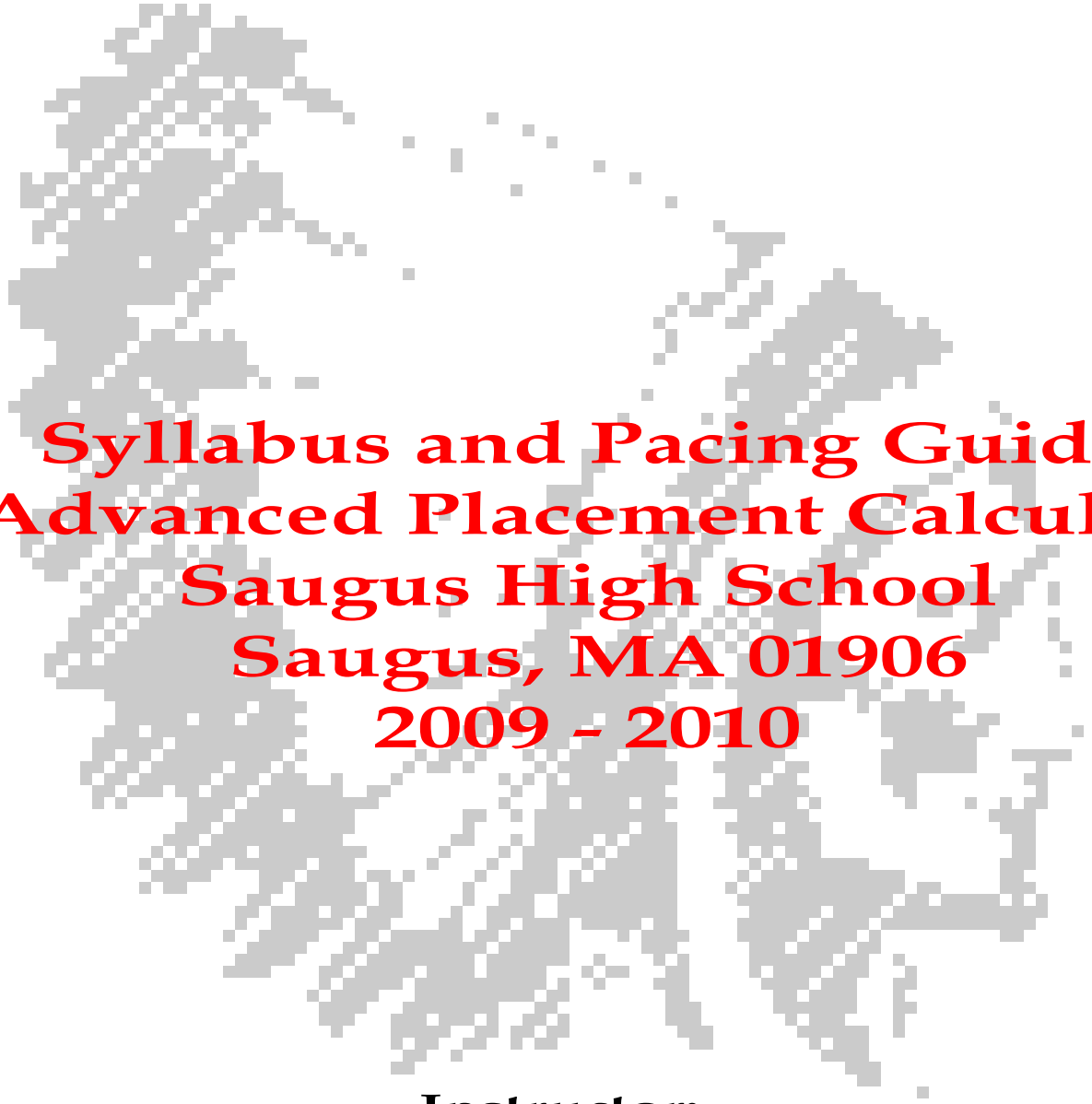

Syllabus and Pacing Guide
Advanced Placement Calculus
Saugus High School
Saugus, MA 01906
2009 - 2010

Instructor:

Course Name and Number: *Advanced Placement Calculus (345)*

Instructor: ***Room:***

Email Address: ***Phone:*** *(781) 231-5027*

Prerequisites: *A student must receive a grade of no less than 88 in Precalculus Honors and have a teacher recommendation. Students enrolled in this course are required to take the Advanced Placement Examination for Calculus AB in May 2010. Students taking this course will receive a Summer Assignment that will be given in June and collected and graded within the first week of classes. Also within the first week of class a Test will be given on these review topics that were the focus of the Summer Assignment. These two grades will be included in First Term and students must average an 80 on these assessments in order to continue in the AP Calculus course. If a student fails to meet these requirements they will be placed in the Honors Calculus course.*

Primary Text: *Calculus: Concepts and Calculators Best (2006)*
Other supplements will be prepared by the instructor.

Course Description: *This course covers all of the topics for Calculus AB as outlined in the AP Calculus Course Description. Primary topics include the concepts and applications of limits, derivatives, and integrals. Students are required to have a graphing calculator and the calculators recommended are the TI-83, the TI-84, TI-nspire or the TI-89. The students are required to perform the following skills using the graphing calculator; plot the graph of a function within an arbitrary viewing window, find the zero(s) of a function, numerically calculate the derivative of a function, and numerically calculate the value of a definite integral.*

Course Goals: *The goals of this course follow the standards outlined for Advanced Placement Calculus. They are numbered and will be inserted into the pacing guide to indicate when various lessons target an individual goal.*

G1: *Students should be able to work with functions represented in a variety of ways: graphical, numerical, analytical, or verbal. They should understand the connections among these representations.*

G2: *Students should understand the meaning of the derivative in terms of a rate of change and local linear approximation and should be able to use derivatives to solve a variety of problems.*

G3: *Students should understand the meaning of the definite integral both as a limit of Riemann sums and as a net accumulation of a rate of change and should be able to use integrals to solve a variety of problems.*

G4: *Students should understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus.*

G5: *Students should be able to communicate mathematics both orally and in well written sentences and should be able to explain solutions to problems.*

G6: *Students should be able to use technology to help solve problems, experiment, interpret results, and verify conclusions.*

G7: *Students should bed able to determine the reasonableness of solutions, including sign, size, relative accuracy, and units of measurement.*

G8: *Students should develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment.*

Course Materials and Requirements: *Students will be required to come prepared to class each day, which requires that each student bring his/her textbook, notebook, assignment, graphing calculator, and pen or pencil. Students are graded each term on their performances on tests, projects, problems, homework assignments, and participation in class discussion. There will be both a Midyear and Final Exam that will be required.*

Grading Breakdown: *Tests 60%, Problem Sets and/or Projects 30%, Homework 5%, and Class Participation 5%*

Tests *will be given in class and will be of many different forms. Questions will be short answer, multiple choice, and open response. They will often mirror the questioning style of the AP Exam. Tests will vary in time and topic coverage. Students are expected to not only solve each problem, but on an open response question they will be required explain the solution.*

Problem Sets *will be given to supplement the class, outside of the classroom period. These problem sets will cover the same topics as the tests, but focus on more global concepts. Because time is less of a factor, these problem set will ask the students to work with functions in various ways. They will be required to solve problems graphically, analytically, and numerically. They will be expected to incorporate theses solutions and understand how they relate to one another. Class time will be given for discussion of problems, and the teacher will answer all related questions. The typically time frame for a problem set will be roughly one week.*

The ***homework grade*** *will reflect the percentage of homework that is completed on a daily basis. Students at this level are expected to do daily homework as a learning tool and ask questions as needed.*

The ***class participation grade*** *will reflect both active discussion and the relevance of the discussion to the concepts. Students will be expected to answer questions verbally as well as on paper. They will be expected to carry on a discussion of calculus concepts and make mathematical connections between concepts. The amount each student is involved in the discussion is less important is the quality of concept connections that they demonstrate on a daily basis.*

Final Grade Breakdown: *Term One 20%, Term Two 20%, Midyear Exam 10%, Term Three 20%, Term Four 20%, Final Exam 10%*

Graphing Calculator Policy: *Students will be required to have a graphing calculator for this AP class. The suggestion will be for a TI product, specifically a TI-83, TI-84, TI-nspire or a TI-89. Students will be required to use these calculators as tools towards solving various problems. They will be expected to be able to perform the outlined tasks as required by the AP curriculum. The stated are as follows:*

1. *be able to plot a graph of a function within an arbitrary viewing window.*
2. *be able to graph any function in an appropriate viewing window, so as to solve a given problem.*
3. *be able to find the zeros of a function.*
4. *be able to find the intersection of two or more functions.*
5. *be able to numerically calculate the derivative of a function at a given point.*
6. *be able to numerically calculate the value of a definite integral.*
7. *be able to interpret the nature of a function from a graph or table.*
8. *be able to graph derivatives of a function to analyzing the nature of the original function.*

Days	AP Calculus AB Goal Covered	Topics/Units/Lessons	Completed
Days 1 – 4	*G5 and G6*	***TERM ONE*** *Review of Pre-Calculus Topics* *Real Numbers and the Real Line* *The Cartesian Plane* *Graphs of Equations* *Lines in the Plane* *Functions* *Trigonometric Functions*	
Days 5-6	*G5,G6, and G8*	*Limits* *Formal Definition*	
Days 7-8	*G5,G6, and G8*	*Limits* *Properties of Limit*	
Days 9-10	*G5,G6, and G8*	*Limits* *Evaluations Limits*	
Days 11-12	*G5,G6, and G8*	*Limits* *One Sided Limits*	
Days 13-14	*G5,G6, and G8*	*Limits* *Infinite Limits*	
Days 15-16	*G5,G6, and G8*	*Limits*	

		Asymptotic/Unbounded Behavior	
Days 17-18	*G5,G6, and G8*	*Continuity* *Definition and Properties*	
Days 19-20	*G5,G6, and G8*	*Continuity* *Intermediate Value Theorem*	
Days 21-22	*G5 and G8*	*Derivatives* *Tangent Line Problem*	
Days 23-24	*G5 and G8*	*Derivatives* *Derivative of a Function*	
Days 25-26	*G5 and G8*	*Derivatives* *Differentiability and Continuity*	
Days 27-28	*G5 and G8*	*Derivatives* *Basic Differentiation Rules*	
Days 29-30	*G2,G5, and G8*	*Derivatives* *Rates of Change*	
Days 31-32	*G5 and G8*	*Derivatives* *Product/Quotient Rules*	
Days 33-34	*G5 and G8*	*Derivatives* *Higher-Order Derivatives*	
Days 35-36	*G5,G6, and G8*	*Derivatives* *Derivatives as a Point*	
Days 37-38	*G5 and G8*	*Derivatives* *The Chain Rule*	
Days 39-40	*G5 and G8*	*Derivatives*	

		Implicit Differentiation	
Days 41-44	*G2,G5,G6,G7, and G8*	***TERM TWO*** *Derivatives (Applications)* *Related Rates*	
Days 45-46	*G1,G2,G5,G6,G7, and G8*	*Derivatives (Applications)* *Curve Analysis of Various Functions* *Extrema on an Interval* *Analytically and Graphically*	
Days 47 – 48	*G1,G2,G5,G6,G7, and G8*	*Derivatives (Applications)* *Curve Analysis of Various Functions* *Rolle's Theorem /Mean Value Theorem*	
Days 49 – 50	*G1,G2,G5,G6,G7, and G8*	*Derivatives (Applications)* *Curve Analysis of Functions* *Increasing/Decreasing Functions* *Analytically and Graphically*	
Days 51-52	*G1,G2,G5,G6,G7, and G8*	*Derivatives (Applications)* *Curve Analysis of Functions* *The First Derivative Test*	
Days 53-54	*G1,G2 G5,G6,G7, and G8*	*Derivatives (Applications)* *Curve Analysis of Functions* *Concavity* *Analytically and Graphically*	
Days 55-56	*G1,G2,G5,G6,G7, and G8*	*Derivatives (Applications)* *Curve Analysis of Functions* *The Second Derivative Test*	

Days 57-58	*G1,G2,G5,G6,G7, and G8*	*Derivatives (Applications)* *Curve Analysis of Functions* *Limits at Infinity* *Analytically and Graphically*	
Days 59-60	*G1,G2,G5,G6,G7, and G8*	*Derivatives (Applications)* *Curve Analysis of Functions* *Horizontal Asymptotes* *Analytically and Graphically*	
Days 61-63	*G1,G2, G5, G6, G7, and G8*	*Derivatives (Applications)* *Optimization Problems*	
Days 64-66	*G1,G2,G5,G6,G7, and G8*	*Derivatives (Applications)* *Applied Maximum/Minimum Problems*	
Days 67-69	*G1,G2,G5,G6,G7, and G8*	*Derivatives (Applications)* *Newton's Method*	
Days 70-71	*G1,G2,G5,G6,G7, and G8*	*Derivatives (Applications)* *Differentials*	
Days 72-73	*G1,G5, and G8*	*Antiderivatives and Indefinite Integrations* *Antiderivatives*	
Days 74-76	*G1,G5, and G8*	*Antiderivatives and Indefinite Integrations* *Basic Integration Rules*	
Days 77-79	*G1,G5,G6,G7, and G8*	*Antiderivatives and Indefinite Integrations* *Initial Conditions and Particular Solutions*	
Day 80	*G1,G2,G5,G6,G7, and G8*	*Review for Mid-Year Exam*	

		Limits *Derivatives*	
Days 81-82	*G1,G3,G5,G6, and G8*	***TERM THREE*** *Area* *Sigma Notation*	
Days 83-84	*G1,G3,G5,G6,G7 and G8*	*Area* *Area of a Plane Region*	
Days 85-86	*G1,G3,G5,G6, and G8*	*Area* *Upper/Lower Sums*	
Days 87-88	*G1,G3,G5,G6, and G8*	*Area* *Definite Integrals*	
Days 89-90	*G1,G3,G5,G6, and G8*	*Area* *Riemann Sums*	
Days 91-92	*G1,G3,G4,G5,G6, and G8*	*The Fundamental Theorem of Calculus*	
Days 93-94	*G1,G3,G4,G5,G6, and G8*	*The Mean Value Theorem for Integrals*	
Days 95-96	*G1,G3,G4,G5,G6, and G8*	*Average Value of a Function*	
Days 97-98	*G1,G3,G4,G5,G6, and G8*	*The 2nd Fundamental Theorem of Calculus*	
Days 99-100	*G1,G3,G4,G5,G6, and G8*	*Techniques for Integration* *Change of Variables*	
Days 101-102	*G1,G3,G4,G5,G6, and G8*	*Techniques for Integration* *The General Power Rules for Integration*	
Days 103-	*G1,G3,G4,G5,G6, and G8*	*Techniques for Integration*	

105		*Integration by Substitution*	
Days 106-107	*G1,G3,G4,G5,G6,G7 and G8*	*Numerical Integration* *The Trapezoid Rule*	
Days 108-109	*G1,G3,G4,G5,G6,G7 and G8*	*Numerical Integration* *Simpson's Rule*	
Day 110	*G1,G5,G6, and G8*	*The Natural Logarithm Function* *Definition*	
Day 111	*G1,G5,G6, and G8*	*The Natural Logarithm Function* *Derivatives*	
Day 112	*G1,G5,G6, and G8*	*The Natural Logarithm Function* *Integration*	
Day 113	*G1,G5,G6, and G8*	*The Exponential Function* *Definition*	
Day 114	*G1,G5,G6, and G8*	*The Exponential Function* *Derivatives*	
Day 115	*G1,G5,G6, and G8*	*The Exponential Function* *Integration*	
Days 116-117	*G1,G3,G5,G6,G7, and G8*	*Area of Region Between Two Curves*	
Day 118	*G1,G3,G5,G6,G7, and G8*	*Volume of Solids of Revolution* *Disc Method*	
Days 119-120	*G1,G3,G5,G6,G7, and G8*	*Volume of Solids of Revolution* *Washer Method*	

Days 121-122	*G1,G3,G5,G6,G7, and G8*	***TERM FOUR*** *Volume of Solids of Revolution* *Solids with Known Cross Sections*	
Days 123-126	*G1,G2,G5,G6,G7, and G8*	*Slope Fields*	
Days 127-129	*G1,G5,G6, and G8*	*L'Hopital's Rule - Indeterminate Forms*	
Days 130-140	*G1,G2,G3,G4,G5,G6,G7, and G8*	*Review for AP Exam*	
Days 141-142	*G1,G3,G5,G6,G7, and G8*	*Volume of Solids of Revolution* *Shell Method*	
Days 143-144	*G1,G3,G5,G6,G7, and G8*	*Arc Length and Surfaces of Revolution*	
Day 145	*G1,G5,G6, and G8*	*Sequences* *Limits*	
Day 146	*G1,G5,G6, and G8*	*Sequences* *Pattern Recognition*	
Day 147	*G1,G5,G6, and G8*	*Sequences* *Monotonic/Bounded*	
Day 148	*G1,G5,G6, and G8*	*Series* *Infinite Series*	
Day 149	*G1,G5,G6, and G8*	*Series* *Geometric Series*	
Day 150	*G1,G5,G6, and G8*	*Series* *Convergent/Divergent Series*	
