A.P. Calculus Course Syllabus
September 2011 – June 2012

Course: AP Calculus
Credit: 1
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Education: Saint Xavier University, BS Mathematics (1996)
Roosevelt University, MA Economics (2012)

PROGRAM SCHEDULE 2011-12

Period	Time	Instructor Schedule	Room
1st	8:00-8:46	Algebra II w/Trig	313
2nd	8:50-9:36	Prep	
3rd	9:40-10:26	Precalculus	313
4th	10:30 – 11:16	Prep	
5th	11:20 – 12:06	Precalculus	313
6th	12:10 – 12:56	College Math	313
7th	1:00 – 1:46	AP Calculus	313
8th	1:50 – 2:36	Prep	

COURSE PREREQUISITE:
Successful completion of Algebra 1, Advanced Algebra with Trig, Geometry and Precalculus

REQUIRED TEXT:
Calculus of a Single Variable,
Larson, Edwards & Hostetler, 2006

REQUIRED MATERIALS:
TI-84 or TI-89 Graphing Calculator
One-inch Binder with 5 dividers
Loose leaf paper & graph paper
Pencils and a handy sharpener or mechanical pencils

INTRODUCTION:
Successful math students are effective problem solvers who can accurately communicate mathematical ideas and concepts. During the upcoming year we will use a variety of manipulatives (including technology) and problem solving strategies to establish explore the topics of calculus. It is necessary that every student demonstrate their ability to integrate basic math skills, algebraic math skills, and problem solving skills throughout the curriculum.

COURSE DESCRIPTION:
This Calculus course is a College Board-approved, advanced mathematics class that consists of work comparable to a first-semester Calculus course in college and at a university. Calculus consists of theoretically unique topics. The topics will be introduced through functions, graphs and limits, building up to the derivative—an extension of slope and the rate of change it calculates. Integration is described as taking the area under the curve to find further information of a given function. Students will utilize all the mathematics covered in Algebra, Geometry, Trigonometry, and PreCalculus into a comprehensive problem-solving course. We will study reasoning, understanding inter-relationships and applying problem-solving skills to real life situations. Many of instructional tasks in AP Calculus will require the student to think critically.

PREREQUISITES:
Before studying calculus, students should complete four years of secondary mathematics designed for college-bound students: courses in which they study algebra, geometry, trigonometry, analytic geometry, and elementary functions. These functions include those that are linear, polynomial, rational, exponential, logarithmic, trigonometric, inverse trigonometric, and piecewise defined. In particular, before studying calculus, students must be familiar with the properties of functions, the algebra of functions, and the graphs of functions. Students must also understand the language of functions (domain and range, odd and even, periodic, symmetry, zeros, intercepts, and so on) and know the values of the trigonometric functions of the numbers 0, π/6, π/4, π/3, π/2, and their multiples.

ILLINOIS LEARNING STANDARDS:

- **State Goal 6**: Demonstrate and apply a knowledge and sense of number, including numerations and operations (addition, subtraction, multiplication, division), patterns, ratios and proportions.
- **State Goal 7**: Estimate, make and use measurements of objects, quantities and relationships and determine acceptable levels of accuracy.
- **State Goal 8**: Use algebraic and analytical methods to identify and describe patterns and relationships in data, solve problems and predict results.
- **State Goal 9**: Use geometric methods to analyze, categorize and draw conclusions about points, lines, planes and space.
- **State Goal 10:** Collect, organize and analyze data using statistical methods; predict results; and interpret uncertainty using concepts of probability.

COURSE GOALS:

- 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. (IL State Goal 8)
- 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. (IL State Goal 7)
- Students should understand the meaning of the definite integral both as a limit of Riemann sums and as the net accumulation of change and should be able to use integrals to solve a variety of problems. (IL State Goal 8)
- Students should understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus. (IL State Goal 8)
- Students should be able to communicate mathematics and explain solutions to problems both verbally and in written sentences. (IL State Goal 6)
- Students should be able to model a written description of a physical situation with a function, a differential equation, or an integral. (IL State Goal: 8)
- Students should be able to determine the reasonableness of solutions, including sign, size, relative accuracy, and units of measurement. (IL State Goal 6)
- Students should develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment.

CLASSROOM RULES & ROUTINES:

NO ONE has the right to interfere with anyone else's learning.

1. Be Respectful
2. Be Prepared
3. Be On Time

DISCIPLINE:

Attendance is vital to success in any course. The amount of material covered in this course will be extremely difficult to master if you have excessive absences.

Students and their parent(s) guardian are to refer to the Student Code of Conduct for information regarding specific information regarding CPS policies pertaining to discipline and misconducts.

GRADING SCALE:

The quarterly grade will be determined according to the following breakdown:

• Exams	40%
• Quizzes	30%
• Class work / Bell work	10%
• Homework	10%
• Binder	10%
Total	100%

TEST SCHEDULE

Date	Type of Assessment
September 30	Exam I
October 29	Exam II
November 4	Midterm Exam
December 9	Exam III
December 23	Exam IV
January 17-18	Semester I Final Exam
February 10	Exam V
March 20	Exam VI
March 27	Midterm Exam
April 18	Exam VII
May 4	AP Calculus Exam
June 4-5	Semester II Final Exam

GRADING SCALE:

A = 100 – 90%
B = 89 – 80%
C = 79 – 70%
D = 69 – 60%
F = Below 60

ASSESSMENT:

Weekly Quizzes

Weekly quizzes will be on Wednesdays and/or Fridays. Quizzes will cover material being covered in class and homework for the past few days. Every quiz is worth 100 points. Each quiz will be 20-30 minutes; additional time will not be given. If you miss a quiz, you must make it up within a week. Before or after school are the only times you will be allowed to make up a quiz.

Chapter Exams

Chapter exams will be given at the conclusion of each chapter (or at ½ the chapter dependent on the information covered). The scheduled dates for the exams are given in the calendar above. Each exam will be 20 questions and will be worth 200 points. 15 questions will be multiple choice and 5 will be free response. The exam will consist of questions and will permit the use of the TI83 or TI84 graphing calculator although all problems can be answered without the use of the calculator.

Classwork:

Any class work conducted will be student-centered and student-driven. Attendance and participation in class every day is crucial to being successful in this course. The students will express their knowledge of these concepts through writing, oral presentation (both group and individual), and through the use of technology.

Homework:

Homework will be assigned daily to ensure students are receiving adequate practice for mastery of covered topics.

Math Binder:

You are required to maintain a binder that only contains material for this course. It must be at least 1.5 inches thick and must contain dividers. You must keep track of your notes, quizzes, tests, homework and vocabulary here. Notes must be in the AVID/Cornell Notes style. Failure to use Cornell Notes will result in a 50% reduction of your binder grade. Binders will be checked periodically throughout the semester.

Cheating:

Cheating will NOT be tolerated! Cheating or plagiarism will automatically warrant a phone call home and a zero on the assignment or assessment with no opportunity for makeup.

TECHNOLOGY:

Students will use a variety of technological tools to supplement their mathematical learning; the most important of which is a graphing calculator. The Bowen Mathematics Department strongly encourages students to invest in a TI-83 Plus, TI-84 or TI-89 Graphing Calculator. Regular use of graphing calculators during class will give the student the requisite skills for success in college mathematics courses. Computer technology will be used during class work, projects, and research projects, as applicable.

TUTORING:
Communication is vital if you need help. Talk with your teachers, ask questions and write notes to your teachers if you need any sort of help. Tutoring arrangements can be made for almost any day after school. Students having difficulty can request a peer tutor in addition to or in lieu of after school tutoring.

Thematic Unit Breakdown

Week	Topics Covered	Chapter
1-4	Review of Graphing Calculator, Review problems • Set Notation • Degrees & Radians • Graph of an equation • Intercepts of a graph • Symmetry of a graph • Point of intersections • Point-slope equation • Slope-intercept equation • Parallel and perpendicular lines • Function and function notation • Evaluating a function • Domain and range • Graphs of functions • Basic transformations • Combination and composition of functions • Inverse functions • Linear Models • Technology Exploration #1 – characteristics of functions. • Technology Exploration #2 – Basic transformations of functions • Technology Exploration #3 – Odd and even functions • Internet exploration #1 – Linear modeling of data samples. • Section Project #1 – The art of functions • Section Project #2 – Data set variations	P.1-4
5-9	Limits and Continuity • Tangent lines and secant lines • Finding limits graphically and numerically • Limits that do not exist • Evaluating limits analytically • Properties of limits • Squeeze theorem • Continuity • One-sided limits • Intermediate Value Theorem • Infinite limits • Vertical asymptotes • Technology Exploration #4 – Linear approximation • Technology Exploration #5 – Using a table to find a limit. • Technology Exploration #6 – Continuity on the graphing calculator • Section Project #1 – Graphs and Limits of Trigonometric Functions	Chapters 1-2

Week	Topics Covered	Chapter
10-15	Differentiation • Tangent line problem • Definition of derivative • Differentiability and continuity • Basic rules of differentiation • Rates of change • Finding equation of tangent • Average velocity • Product and quotient rules • Higher order derivatives • Chain rule • Implicit differentiation • Related rates • Slope fields • Technology Exploration #7 – Chain rule • Technology Exploration #8 – Graphing an implicit equation • Exploration #1 – Particle Man • Section Project #2 – Gravity • Section Project #3 – Inflating a balloon	Chapter 2 Chapter 7 Chapter 8
16-18	Applications of Differentiation • Extema on an interval • Relative vs absolute extrema • Critical numbers • Rolle's Theorem • Mean value theorem • First derivative test with table values • Concavity with second derivative test • Limits at infinity • Horizontal asymptotes • Curve sketching • Optimization problems • Newton's Method • Linear Approximation • Differentials • Error propagation • Derivative of natural log and exponential functions • Derivative of trig functions • Technology exploration #9 – Linear values in a derivative function • Technology exploration #10 – Tangent line approximation • Section project #4 – Packaging problem • Section project #5 -- Connecticut River	Chapter 3 Chapter 5

Week	Topics Covered	Chapter
19	Semester Final Exam • Review for final exam	
20-26	Integration of Polynomial Functions • Antiderivatives • Indefinite integration • Rules of basic integration • Initial conditions • Summation formulas • Upper and lower sums • Riemann sums • Areas of regions • Fundamental Theorem of Calculus • Mean value theorem for integrals • Average value of a function • Second fundamental theorem of calculus • Integration by substitution • Trapezoidal rule • Integral of natural log and exponential functions • Integral of trig functions • L'Hopital's Rule • Improper Integrals • Integration by parts • Technology exploration #11 – Integrals of trig functions • Section project #6 – Wankel rotary engine and area • Section project #7 – Demonstrating the fundamental theorem	Chapter 4 Chapter 5 Chapter 7
27-30	Applications of Integration • Area between two curves • Volume: Disk method • Volume: shell method • Surface areas of revolution • Arc length • Work • Mass • Fluid pressure and fluid force • Section Project #8 – Saturn	Chapter 6 Chapter 7
30-32	Review for AP Exam	Chapters 1-7
33-36	Senior Design Project	

PARENT INFO & SIGNATURE REQUIRED:
Please print all information

Please sign below to indicate you and your child have read the information contained in this syllabus. I understand that there is a correlation between willingness to participate, class work, and homework as it pertains to success in **AP Calculus**. I will do my best to help my child reach his/her academic goals.

Date: _____

Student Name: _____

Student Signature: _____

Parent Name: _____

Parent/Guardian Signature: _____

Parent Phone ( ) _____best time _____ am pm

Parent email address _____

Preferred to be contacted by **phone** or **email** (circle one)