AP CALCULUS BC 2010-2011
COURSE SYLLABUS

Instructors: Andrew J. Spieker, Michael P. Garcia   **Course E-mail**: 2010CalcBC@gmail.com
Location: TBA   **Course Time**: Sundays from 1:00 PM to 5:00 PM
Texts: Worldwide Differential Calculus, Massey;
      Worldwide Integral Calculus, Massey

Course Description: Advanced placement Calculus BC covers a two-semester sequence of college calculus. The three major topics of the course covered are differential calculus, integral calculus, and polynomial approximations of functions. The goal of the course is, naturally, to prepare students for the advanced placement examination offered by the college board in May of 2011. Doing well on the examination may exempt you from having to take calculus in college at some universities; some universities even offer credit.

EXPECTATIONS*

You can expect us to…

-Show up to class, on time, and prepared to teach.
-Grade assignments in a timely fashion.
-Respond to your e-mails in a timely fashion.
-Have a to-date grade calculated for you at any given time.
-Discuss a grade with you before and after class, or via e-mail.
-Be willing to answer your questions about things you don't understand in class.
-Be polite and respectful to each other, to you, to the classroom, and the property.
-Make you feel safe in the classroom.

We expect you to…

-Have taken and mastered ($\geq$ B+ on average) algebra, geometry, and precalculus.
-Show up to class on time, ready to learn.
-Hand in assignments on time.
-Have a TI83 / TI84 graphing calculator.
-Speak up if you are having trouble. In the words of Professor Albus Dumbledore, you will find that help will always be given to those who *ask* for it!
-Be polite and respectful to each other, to us, to the classroom, and the property.
-Actively participate in classroom activities.
-Be safe in the classroom.

ASSIGNMENTS

Homework – Each week, you will receive a homework sheet with problems from the textbook to be completed and addition problems either coming from previous AP exams or written by us. Both sections are mandatory; the solutions are to be written neatly on either lined paper or blank printer paper, stapled with the homework sheet attached and your name on top.

In-Class Assignments – The vast majority of in-class activities will not be collected and graded; however, we may decide that we would like to collect something and offer feedback on it. Type of in-class activities include sample AP multiple choice problems or free response problems, worksheets, games, and discussions.

Tests/Quizzes – There will generally be a test or quiz after each unit, each varying in length. They will always be announced ahead of time.

Final Exam: There will be one cumulative exam each semester; it may be a take-home exam, an in class exam, or a combination of both. You will be given plenty of notice.

We will occasionally give supplemental material out which is not required, but we will make it clear when this is the case. If we are not clear, never hesitate to ask us about expectations.

GRADES

Grades are not the most important aspect of the course; however, they are a good reference point as to how you are doing in the course, and help us determine what we need to review more thoroughly. It is common for students to ask for a grade for this course to present to their high school, so we will keep track of your grade according to the following criteria (note that one grade will be given per semester):

Homework – 15%   In-Class Assignments – 15%;   Tests/Quizzes – 40%

Attendance and Participation – 10%   Final Exam – 20%.

POLICIES

<u>Attendance</u>: Please do not miss class. Each class period amounts to a whole week of material; consequently, students are expected to have a justifiable reason to not be in class including, but not limited to religious observance, moderate to severe illness, a team of Charizards and/or Pikachus blocking your way to MIT.

<u>Late Work</u>: Late homework will generally **not** be accepted, *even if you have a perfectly justifiable reason not to hand something in*. If the reason for your not handing in an assignment is justifiable, it will not be factored into your average (i.e., you will not receive a zero if your reason is justified.) Alternatives to handing in homework late that are acceptable include scanning and e-mailing, typing and e-mailing, giving to a friend in class to hand in.

<u>Disabilities and Accommodations</u>: We'll never call you out on it in class; if you need some sort of accommodation, we **will** make appropriate adjustments for you, whatever the extent. For example, if you are color blind, we won't use colors on the board that you can't see. If you have a hard time seeing or hearing, and there is a certain part of the room that suits you better, just let us know! If you have any food allergies, let us know (we may have occasional snacks in class, but we will never bring in anything that someone is allergic to). Also, if you are bringing in your own food, that's fine, but out of respect for others, do not bring in anything that has common allergens like nuts. This has to be a comfortable environment for everyone.

Topical Course Outline

Unit "0" (Two Weeks) – Review of Precalculus

September 19, 2010: Jeopardy review!

September 26, 2010: More review (Worksheets, in class examples, etc.)
Introduction to limits

Unit 1 (Two Weeks) – Limits and Continuity

October 3, 2010*: Limits and techniques for evaluating limits

October 10, 2010: Point-wise continuity
The intermediate value theorem and the extreme value theorem

Unit 2 (Three Weeks) – The Definition of the Derivative and Rules for Differentiation

October 17, 2010: Average rate of change
Instantaneous rate of change and the definition of the first derivative
The power rule and basic derivative rules
Applications to physics and motion

October 24, 2010*: The product, quotient, and chain rules
More applications to physics, motion, and other real-life situations

October 31, 2010: Derivatives of trigonometric functions
Implicitly defined functions and implicit differentiation
Higher order derivatives

Unit 3 (Two Weeks) – Curve Sketching and Graph Analysis

November 7, 2010: Increasing and decreasing functions
Critical points and the first derivative test
Concavity and convexity
Inflection points and the second derivative test
Techniques for curve sketching and graph analysis

November 14, 2010*: Rolle's Theorem and the Mean Value Theorem
L'Hopital's rule

Unit 4 (One Week) – Properties of Differentiable Functions

November 21, 2010(H): Differentiability as local linearity
Differentials and linearization
Newton's method for approximating zeros of a function

Unit 5 (Two Weeks) – Applications of Differentiation

December 5, 2010: Related Rates

December 12, 2010: Optimization

Unit 6 (Two Weeks) – Riemann Sums and the Definite Integral

    January 2, 2011:   Riemann sums
                                   LRAM, RRAM, MRAM, and trapezoid approximations of area
                                   The definite integral
                                   The first fundamental theorem of calculus

    January 9, 2011*:   The second fundamental theorem of calculus
                                     Indefinite integrals and antidifferentiation
                                   Applications to physics and modeling real-life situations

Unit 7 (One Week) – Coordinate Changes; Preliminary Applications to Integration

    January 16, 2011:   Substitution and coordinate changes in definite and indefinite integrals
                                     Average value of a function on an interval
                                   Area bounded between curves

Unit 8 (Two Weeks) – Applications to Integration: Solids of Revolution; Work

    January 23, 2011:   Volumes of solids by slicing
                                     Volumes of solids by disks and washers

    January 30, 2011*:   Work; springs, pumping, and lifting
                                     Hooke's Law

Unit 9 (One Week) – Calculus of Transcendental Functions

    February 6, 2011:   Transcendental functions
                                     Calculus with the exponential and logarithm functions
                                   Calculus with inverse trigonometric functions
                                   Calculus of inverse functions in general

Unit 10 (One Week) – Techniques for Antidifferentiation

    February 13, 2011:   Integration by parts
                                     Partial fraction reduction
                                   Trigonometric substitution
                                   General integration techniques

Unit 11 (Two Weeks) – Infinite Series of Real Numbers and Convergence Tests

    February 20, 2011(H): Infinite series of real numbers
                                     Geometric series
                                     p-series
                                     Direct and limit comparison tests

    February 27, 2011*: The ratio test
                                     The root test
                                     Alternating series and the alternating series test

Unit 12 (Two Weeks) – Infinite Series of Functions

March 6, 2011:   Power series of functions
Finding the radius and interval of convergence for power series

March 13, 2011:   The Taylor series of a function
Finding a Taylor series
Controlling error on Taylor series

Unit 13 (One Week) – Differential Equations

March 20, 2011*:   Differential equations
Slope fields
Separable differential equations
Euler's method for approximating solutions to a differential equation
Population models and logistic growth; phase diagrams

Unit 14 (Two Weeks) – Vector Functions, Parametric Equations, and Polar Coordinates

March 27, 2011:   Parametric equations and vector valued functions
Modeling motion and physics applications
Calculus with parametric equations and vector valued functions

April 3, 2011:   Polar coordinates; polar functions and their graphs
Calculus with polar coordinates

Crunch Month! – Review, Etc.

April 10, 2011:   First practice test

April 17, 2011:   Review first practice test and all material

April 24, 2011:   NO CLASS – Although Delve will run, we will not be holding class on Easter Sunday.

May 1, 2011:   Final exam (second practice test) / Last day!

*   Indicates Delve Spicy Day
(H)   Indicates Delve Half-Day

<u>Advanced Placement Examination for AP Calculus BC: Wednesday, May 4, 2011.</u>

Regular Schedule:
1:00 – 2:30:   CLASS BLOCK A
2:30 – 3:00:   DELVE LUNCH
3:00 – 4:30:   CLASS BLOCK B
4:30 – 5:00:   DELVE OFFICE HOURS

Spicy Schedule:
1:00 – 2:30   CLASS BLOCK A
2:30 – 3:00   DELVE LUNCH
3:00 – 4:00   CLASS BLOCK B
4:10 – 5:30   SEMINAR A
5:30 – 7:00   SEMINAR B

(Half-day schedules will be announced on a case-by-case basis.)