**Course Description:**

We will generally follow the order of topics in the text, *Calculus of a Single Variable: 7th Edition by Larson,* but we will stress some topics and pass over some others. To view a complete topical overview click the link to see the [Class Webpage](http://math-science.weebly.com/calculus-page-unit-1.html). We will begin the year with a “**Review and Preview”** of previous mathematical concepts.

**Preview**:

Calculus is about the relation between a quantity and its rate of change. Simply stated Algebra solves for a constant answer, where as Calculus solves for a varying answer at some point in time instantaneously. For an example, if the quantity is the distance travelled at a given time, then its rate of change is velocity. If the velocity is constant, then calculus is not required: the distance travelled is the product of the elapsed time and the velocity. But when the velocity is not constant, then this formula doesn't apply. Nonetheless, the distance and velocity are intimately related. If the distance travelled at all times is known, then the velocity at any given time can be determined; and if the velocity at all times is known, then the distance travelled at any given time can be determined. These two operations are called *differentiation* and *integration*.

Much of calculus involves analyzing and developing these concepts and their applications.

**Review**:

The review only contains things that you should already know, but it helps to see them again just before you use them. Concepts under review are real numbers, functions, intervals and inequalities, graphs of functions, absolute value, piecewise defined functions, symmetry and even and odd functions, operations on graphs, and composition of functions. A variety of functions are reviewed including linear functions (and with them slopes of lines), power functions, polynomials, rational functions, trigonometric, exponential, and logarithmic functions. Notations under review include functional notation and substitution, interval notation, unions, intersections, set notation, and algebra of functions.

**Limits and Continuity**

We first must clarify the concept of derivative. In some ways it is intuitively clear that a travelling body has a velocity, or more generally, any changing quantity has a rate of change. But just what is the rate of change? The answer is the rate of change at an instant is the limit of the average rates of change near that instant. The concept of limit is much more subtle than it first appears. We will discuss it in some detail and develop a formal definition of a limit and a formal notation to go along with it.

Key concepts associated to the concept of limit are tangent lines, limit laws, continuity, the pinching theorem, left- and right-limits, trigonometric limits, the intermediate value theorem (IVT), and the extreme value theorem (EVT).

Limits and Continuity topics to be covered:

* The Idea of Limit
* Definition of Limit
* Some Limit Theorems
* Additional information on Infinite Limits
* Continuity
* The Pinching Theorem; Trigonometric Limits
* Two Basic Properties of Continuous Functions

**Derivatives**

With a solid definition of limit, we can proceed to define a derivative (instantaneous rate of change) as the limit of average rates of change, and then develop the properties of derivatives. There are a number of rules for differentiation (finding derivatives), mostly easily learned, although the chain rule, for some reason, can be more difficult to master. There are a couple of different notations for derivatives that everyone uses.

It is assumed that you know the trig functions, sine, cosine, etc., and we will find and use their derivatives.

Further topics in differentiation include implicit differentiation, and higher order derivatives.

Differentiation Topics to be covered:

* The Derivative
* Some Differentiation Formulas
* The *d/dx* Notation; Derivatives of Higher Order
* The Derivative as a Rate of Change
* The Chain Rule
* Differentiating the Trigonometric Functions
* Implicit Differentiation; Rational Powers

**The Mean Value Theorem and Curve Sketching**

The purpose of curve sketching is not so much to draw the graph of the function, but to get a better understanding of the relation between a function and its derivative. For instance, if the derivative is positive, then the function is increasing; at a maximum or a minimum of a function, the derivative is zero. We will prove these (obvious) statements using a theorem called the mean value theorem. We'll also see what second and third order derivatives have to do with the graph of a function.

The applications of derivatives are numerous. Besides classical applications in physics and the natural sciences, there are applications in the social sciences, for instance, marginal profits are just derivatives of profits.

Mean-Value Theorem and Applications to be covered:

* The Mean-Value Theorem
* Increasing and Decreasing Functions
* Local Extreme Values
* Endpoint and Absolute Extreme Values
* Some Max-Min Problems
* Concavity and Points of Inflection
* Vertical and Horizontal Asymptotes
* Curve Sketching
* Velocity and Acceleration; Speed
* Related Rates of change per Unit Time

Topics of integration…If time permits:

* [**Integration by Parts**](http://tutorial.math.lamar.edu/Classes/CalcII/IntegrationByParts.aspx)

Of all the integration techniques covered in this chapter this is probably the one that students are most likely to run into down the road in other classes.

* [**Integrals Involving Trig Functions**](http://tutorial.math.lamar.edu/Classes/CalcII/IntegralsWithTrig.aspx)

In this section we look at integrating certain products and quotients of trig functions.

* [**Trig Substitutions**](http://tutorial.math.lamar.edu/Classes/CalcII/TrigSubstitutions.aspx)

Here we will look using substitutions involving trig functions and how they can be used to simplify certain integrals.

***Modes of Assessment:***

**Written Tests:**

Written tests will be administered periodically in order to assess the students’ knowledge of topics within Calculus.

**Homework Assignments:**

***The importance of homework is to be emphasized in this course.*** Homework is given on a regular basis and students are to complete the assignments in a thorough manner. Homework is given to develop skills taught in class and benefits the student, and is therefore not optional.

**Projects:**

In order to fully implement the concept of Calculus, application is essential. Therefore, students will be expected to perform in-depth research and create projects on topics assigned. This component of the course will be conducted on an individual or group basis.

**Class Work/Activities:**

Students are expected to actively and respectfully participate in all activities and assignments. ***Courtesy, consistency and work ethic are major factors in grading*** these activities.

**Oral Presentations:**

Students will be expected to present topics that will adequately demonstrate their understanding of Calculus concepts.

***Grading Scale:***

A = 90 to 100%

B = 80 to 89%

C = 70 to 79%

D = 60 to 69%

F = 0 to 59%

***Course Evaluations:***

Averages for each quarter shall be determined as follows:

**Class work – 40%**

* Labs, Projects, Independent Work, Research Assignments, Presentations

**Assessments – 35%**

* Quizzes, Tests, Final Exams, Benchmarks, EOC exams, AP exams

**Participation – 15%**

* Do Now, Journals, Discussion Posts, Exit Slips, Leadership Roles

**Homework – 10%**

***Main Textbook:***

**Calculus of a Single Variable: 7th Edition by Larson**

**Classroom Rules:**

* **WE WILL RESPECT ONE ANOTHER**
  + Course language is unacceptable
  + Inappropriate physical contact is unacceptable
* **WE WILL BE PUNCTUAL**
  + Be in room and on task on time everyday
* **WE WILL BE PREPARED**
  + Bring textbook, calculator, paper, pencil and eraser everyday
* **WE WILL BE PROFESSIONAL**
  + Stay seated and working
  + Respectfully raise hands for help
  + Maintain reasonably quiet room for everyone’s benefit
  + Dress according to school codes
  + Damage or destroy nothing
  + Do not leave seats or room until officially dismissed

**Consequences:**

* VERBAL WARNING
* LOSS OF BONUS POINTS
* REFERRAL AND PARENTAL NOTIFICATION
* PRINCIPAL DISCIPLINARY ACTION(S)
* *Consequences may not always occur in this order. Disturbances will result in appropriate consequences*.

**Course Evaluations:**

Averages for each quarter shall be determined as follows:

**Class work – 40%**

* Labs, Projects, Independent Work, Research Assignments, Presentations

**Assessments – 35%**

* Quizzes, Tests, Final Exams, Benchmarks, EOC exams, AP exams

**Participation – 15%**

* Do Now, Journals, Discussion Posts, Exit Slips, Leadership Roles

**Homework – 10%**

**Parents:**

If you have any questions or concerns about your student’s achievement, or if there is anything that I should know that might help me to teach your student, please feel free to contact me [gregory.taylor@slps.org](mailto:gregory.taylor@slps.org) throughout the school year. Electronic copy of the syllabus is available at: <http://math-science.weebly.com/calculus-syllabus.html>

I am here to prepare your child for college and/or the adult working environment. Good citizenship is highly emphasizes and factored in the grades using cooperative activities, peer and self assessments. Whether this is a freshman or up to a senior level course, citizenship and work ethic shall be emphasized and expected. Any help you might offer will be greatly appreciated and utilized. Thank you.

Finally there is an expectation that you will assume the responsibility of maintaining a current phone number with me, or the main office, to ensure my ability to contact you with issues of concern, or excellence, as necessary throughout the year.

I have read and understand the rules and regulations for Mr. Taylor’s class:

***Parent phone for immediate discretionary contact: ( ) -***

Parent Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student Signature\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Print Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_\_\_

Returning this portion of the syllabus document completed and signed in a prompt manner is the ***first assignment*** of the year and ***does carry point value*** for your student grade. Failure to complete this will result in a PAN *(parental appearance notification).*

Thank you for all of your support.

Gregory L. Taylor - B.S., M.S.