**Calculus 12**

**"Calculus is the most powerful weapon of thought yet devised by the wit of man."**

-- W. B. Smith

**" Calculus is the greatest aid we have to the application of physical truth in the broadest sense of the word."**

-- W. F. Osgood

Calculus is a fascinating, powerful, and challenging topic. It is the mathematics of change. While much of what we do in Mathematics is somewhat artificial, Calculus is the mathematic of real life. For example:

* In algebra we find the slopes of straight lines. In calculus we find the slopes of complex curves.
* In algebra we find the area of triangles and rectangles. In calculus we find the areas under curves.
* In algebra we deal with constant speeds and motion. In calculus we deal with varying speeds and motion.
* Algebra is more regular and less real. Calculus is more real and less regular.

**There are three basic parts to Calculus:**

1. Limits – the tools we use to precisely describe how a function approaches a value
2. Derivatives – the tools we use for describing how a function changes
3. Integrals / Antiderivatives – the tools used to give the area under the curve of a function

**TextBook** Calculus: A First Course. (James Stewart) \*\*\* do not lose / abuse it \*\*\*

This book is also available on-line! http://goo.gl/AUoWMB

**Major Units/Topics:**

Chapter 0: Review of Pre-Calculus **FLIP Method**

Chapter 1: Limits and Rates of Change **GB Method**

Chapter 2: Derivatives **FLIP Method**

Chapter 3: Applications of Derivatives **GB Method**  \*\* 3.5 Related Rates \*\*

Chapter 4: Extreme values **FLIP Method**  \*\* 4.4 Applied Maximum and Minimum Problems \*\*

Chapter 5: Curve sketching **GB Method**

Chapter 6: Review of Trigonometry **FLIP Method**

Chapter 7: Derivatives of Trigonometric Functions **GB Method**  \*\* 7.4 Applications \*\*

Chapter 8: Exponential and Logarithmic Functions **FLIP Method**

Chapter 9: Differential Equations **???**

**Prescribed Learning Outcomes:**

• It is expected that students will use a variety of methods to solve real-life, practical, technical, and theoretical problems.

• It is expected that students will understand that calculus was developed to help model dynamic situations.

• It is expected that students will understand the historical background and problems that led to the development of calculus.

• It is expected that students will represent and analyze rational, inverse trigonometric, base *e* exponential, natural logarithmic, elementary implicit, and composite functions, using technology as appropriate.

• It is expected that students will understand the concept of a limit of a function, notation used, and be able to evaluate the limit of a function.

• It is expected that students will understand the concept of a derivative and evaluate derivatives of a function using the definition of derivative.

• It is expected that students will determine derivatives of functions using a variety of techniques.

• It is expected that students will solve applied problems from a variety of fields including the Physical and Biological Sciences, Economics, and Business.

• It is expected that students will use the first and second derivatives to describe the characteristic of the graph of a function.

• It is expected that students will recognize anti-differentiation (indefinite integral) as the reverse of the differentiation process.

• It is expected that students will use anti-differentiation to solve a variety of problems.

**Equipment Needed:**

* a three ring binder
* lined (foolscap) paper
* graph paper (or purchase “Instagraphs” from me)
* pencil and eraser
* graphing calculator (borrow one from me or use Desmos)

**Marks Breakdown:**

* Tests (75%)
* Quizzes (10%)
* Homework Assignments (5%)
* Term Projects (10%)
* ROAR (0%)

**Examinations:**

* Midterm Examination (15% of term 2)
* Final Examination (20% of the entire year)