

**SAINT BASIL ACADEMY  
MATHEMATICS DEPARTMENT**

**INSTRUCTOR:** Ms. Brown

**DATE:** September, 2020

**COURSE TITLE:** Pre-Calculus/Trigonometry

**TEXT:** Honors Pre-Calculus: A Graphing Approach, Hungerford, Jovell, Mayberry, Holt 2007

**TECHNOLOGY USED:** Desmos Graphing Calculator

**COURSE DESCRIPTION:** The course begins with an examination of graphical techniques used to solve a variety of equations many of which cannot be solved algebraically. Modeling problem situations with an appropriate equation or inequality and utilizing technology to find solutions when is emphasized. A review of the general notion of a function leads to evaluating functions with algebraic inputs with an emphasis on those used in difference quotients. The notion of the average rate of change in a function over an interval is the slope of the secant line through the graph leads to further discussion about difference quotients and their place in developing the concept of the derivative function in calculus. Analyzing the behavior of a function over intervals of the domain and the general transformation of a function is also included. The remainder of the course of study is devoted to defining the preferred way of measuring angles, known as a radian, and this leads to understanding the trigonometric ratios are periodic functions of real numbers. The course includes the application of our general study of functions in the first semester to the family of trigonometric functions and their various transformations. As we progress in our study of trigonometry, we emphasize the real-world applications that trigonometry delivers and effectively utilize the online graphing calculator Desmos to assist in our problem solving.

The course is designed to provide students with the prerequisite topics and concepts that will be needed for an introductory course in calculus.

**GOALS:**

1. To reinforce and expand fundamental concepts learned in previous math courses.
2. To prepare students for Calculus.
3. To build new mathematical knowledge through problem solving that involves a balanced approach to solving problems achieved through the use of analytic, graphical, and tabular methods.
4. To master the language of mathematics by expressing mathematical ideas precisely using correct mathematical notation.
5. To use graphing calculators and graphing utilities to analyze, solve, visualize, and clarify mathematical concepts.

**APPROACHES TO TEACHING THE COURSE:**

1. Lecture, demonstration, and presentation by the instructor.
2. Problem-solving and application activities.
3. A balanced approach to real world problem solving with a graphing utility (Desmos) as students explore mathematical concepts and their appropriate application.

## **OUTLINE OF COURSE CONTENT:**

### Unit 1: Introduction to Desmos & Graphical Methods for Equations and Inequalities

1. The Intersection Method
2. The x-intercepts Method
3. Intervals
4. Inequalities

### Unit 2: Functions and Graphs

1. Functions reviewed
2. Graphs of functions, Vertical Line Test
3. Function behavior previewed
4. Domain & Range revisited
5. Horizontal asymptotes & end behavior
6. Representations of Functions
7. Intercepts
8. Evaluating functions with algebraic inputs
9. A preview of limits and
10. Average Rate of Change & an introduction to instantaneous change
11. Difference quotients

### Unit 3: Piecewise-defined Functions

1. Definition
2. Evaluating
3. Domain
4. Range
5. A preview of discontinuity & continuity
6. The Absolute Value Function piecewise-defined
7. Progressive Tax application

### Unit 4: Function Behavior

1. Increasing intervals
2. Decreasing intervals
3. Constant intervals
4. Introduction to relative extrema
5. Application of relative extrema
6. Introduction to optimization problems & graphical solutions
7. Introduction to concavity & inflection

### Unit 5: Trigonometry

1. Right-angle trigonometry
2. Trigonometric applications
3. Angles and radian measure
4. Trigonometric functions
5. Basic trigonometric identities

Unit 6: Trigonometric Graphs

1. Graphs of the Sine, Cosine, and Tangent functions
2. Periodic graphs and amplitude
3. Periodic graphs and phase shift
4. Other trigonometric graphs

Unit 6: Solving Trigonometric Equations

1. Graphical solutions to trigonometric equations
2. Algebraic solution of trigonometric equations
3. Simple harmonic motion and modeling

Unit 7: Trigonometric Identities and Proof

1. Identities and proof
2. Addition and subtraction identities
3. Other identities
4. Using trigonometric identities

Unit 8: Trigonometric Applications

1. The Law of Cosines
2. The Law of Sines

**PROCEDURE FOR EVALUATION AND GRADING:**

**Grading:**

Grading is based on a points system. Each assessment will have a specific point value. To determine the quarter grade, the ratio is simply: points earned / total points possible.

Grades are assigned according to the SBA grading scale- see SBA website for details.

*IF we transition to a virtual learning environment, then class policies and grading may be adjusted as needed.*

Please see Microsoft Teams for your classes individual code.