Course Title: Algebra 1A

Course #: 1413-1414

Course Description: Algebra 1A is a fast paced first year high school algebra course that begins with solving and graphing linear equations and inequalities. Students must already have an understanding of the language of algebra and strong basic skills in operations with the Real Number System to continue their studies of polynomials and their factors, quadratic equations, rational expressions, radicals, and rational functions. Students utilize technology for linear and quadratic modeling and receive an introduction to probability, data analysis and statistics.

UC/CSU Approval: “C” approved

Grade Level: 9-10

Estimated Homework Per Week: 2-3 hours

Prerequisite: HSPT placement or completion of Beginning Algebra with a C or higher.

Recommended Prerequisite Skills: Strong Pre-Algebra Skills

Course Grade Scale:
- Homework 25%
- Quizzes 25%
- Tests 35%
- Final Exam 15%

Major Assessments/Units/Topics:
I. Solving Linear Equations- (1 quiz, 1 test)
   Students will solve one-step, two step and multi-step linear equations. In addition, students will apply their equation solving abilities to word problem. Students will discover what makes up a proportion, and they will solve both simple proportions and word problems involving proportions. Students will also solve absolute value equations.

II. Solving Linear Inequalities and graphing solutions-(1 quiz, 1 test)
Students will use inverse operations, order of operations, and other basic mathematical properties to solve inequalities. Students will translate verbal phrases and sentences into inequalities and solve them.

III. Introduction to linear functions- (1 quiz, 1 test)
Students will be able to use a variety of methods to graph a linear equation. Students will also learn about domain and range and how to tell the difference.

IV. Graphing linear functions and investigation rate of change in functions-(1 quiz, 1 test)
Students will be able to write linear equations in a variety of forms. Students will need to use linear models to solve word problems and to discover what a line of best fit is.

V. Solving systems of linear equations (1 quiz, 1 test)
Students will be able to solve a system of linear equations using three different methods. Students will be able to apply their knowledge for systems of equations to real life word problems.

VI. Simplifying radicals and applying laws of exponents (1 quiz, 1 test)
Students will be able to apply the laws of exponents to simplify expressions.

VII. Adding, subtracting and multiplying polynomials- (1 quiz, 1 test)
Students will be able to classify polynomials and write polynomial expressions in standard form. Students will be able to add, subtract, and multiply polynomial expressions. Students will use their knowledge regarding polynomials to solve word problems.

VIII. Factoring polynomials- (1 quiz, 1 test)
Students will be able to factor polynomials using multiple different methods. Students will also be able to solve area problems using their skills and knowledge of factoring polynomials.

IX. Solving and graphing quadratic equations- (2 quizzes, 2 tests)
Students will be able to graph quadratic equations and be able to describe the different characteristics of quadratic equations. Students will also use a number of methods to solve quadratic equations. Students will apply their knowledge of solving quadratic equations to solve word problems.
Course Title: Algebra 2

Course #: 1431-1432

Course Description: Algebra 2 completes the CCHS Algebra requirement. Students learn to solve polynomial equations utilizing the Fundamental Theorem of Algebra, rational, exponential, and logarithmic functions, and introductory trigonometry. This course is designed to prepare students for Pre-Calculus (not Honors Pre-Calculus).

UC/CSU Approval: “C” approved

Grade Level: 9-12

Estimated Homework Per Week: 1-3 hours per week

Prerequisite: Completion of Geometry H, Geometry or Geometry B with a grade of “C” or higher

Recommended Prerequisite Skills:

Solving linear equations including
- Order of Operations
- Distributive Property
- Evaluating Algebraic Expressions
- Simplifying Algebraic Expressions
- Solving Equations with Distributive Property
- Fractions, and Solving Equations with Variables on Both Sides
- Analyze and solve systems of linear equations in two variables.

Graphing and writing equations of lines
- Graphing Using a Table of Values
- Calculating and graphing slope
- Using Slope Intercept and Point slope Form
- Writing Equations in Slope-Intercept Form
- Writing Equations in Standard Form

Exponents
- Laws of Exponents
- Multiplying and Dividing Monomials

Quadratic Equations
- Square Roots - Simplifying square roots into simplest form
- Solving Quadratic Equations by Factoring
- Solving Quadratic Equations using Quadratic Formula

Standards for Mathematical Practice
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning

Course Grade Scale:
- Homework: 15%
- Quizzes: 25%
- Tests: 40%
- Final: 20%

Major Assessments:
Students are assessed with one or two quizzes and a test each Chapter. Each semester concludes with a cumulative final exam.

Units/Topics:

1st Semester
Review of Algebra 1 Topics: Algebra 1 fundamentals are reviewed. It is assumed the students have learned these topics in Algebra 1, but we review solving linear equations, graphing linear functions using slope and intercept, x and y-intercepts, or a table of values. Students are expected to write the equation of straight lines in slope-intercept form given a point and the y-intercept, a point and the slope, or two points. Systems of linear equations are solved by graphing, substitution, and elimination. Students are introduced to the graphs of absolute value functions in vertex form.

Chapter 2: Quadratics Lessons 2.1-2.7, Complex Number Operations Lessons 2.9
Students will graph and identify the vertex of quadratic function in vertex and standard form. Quadratic equations will be solved by factoring, square roots, completing the square, and the Quadratic Formula.
Chapter 3: Polynomials Lessons 3.1.-3.7
Students will add, subtract, multiply and divide polynomials. Students will solve polynomial equations by factoring and using synthetic division. Students will apply the Fundamental Theorem of Algebra and its corollary to understand the number and nature of the roots. Students will understand the basic shape and end behavior of both odd degree and even degree functions.

Chapter 5: Rational and Radical Functions Lessons 5.1 – 5.5
Students will simplify, multiply, divide, add and subtract rational expressions. Rational equations will be solved and extraneous roots identified. Graphs of rational functions will be created by finding horizontal and vertical asymptotes and any holes in the graph.

2nd Semester
Chapter 5: Rational Functions Lessons 5.6 – 5.8
Students will graph radical functions (square root and cube root). Radical equations will be solved and students will also solve radical equations with rational exponents.

Chapter 4: Exponentials/Logs Lessons 4.1-4.7
Students will understand the differences between exponential growth and decay, model situations with algebraic functions, and graph each. Students will understand how to express exponential relationships as logarithms. Logarithmic expressions will be expanded and compressed. Exponential and Logarithmic equations will be solved by using inverse operations or re-expressing the exponential as a logarithm or vice versa.

Mathematical Modeling: Lessons 2.8, 3.9, 4.8, 6.7
Students will look at real data sets and model relationships with lines of best fit using linear regression. Non-linear modelling will allow students to model relationships with power functions or exponential functions. Students will have to understand how to determine which model is best, explain why they chose to model the relationship with a particular type of function, and interpret values within the functions.

Chapter 9: Sequences/Series Lessons 9.1-9.5
Students will look for patterns in sequences and model the pattern with an algebraic function if the pattern displays an arithmetic or geometric sequence. Students will calculate partial sums of arithmetic and geometric series and calculate sums of infinite geometric series if the series converges.

Chapter 10: Trigonometry Lessons 10.1-10.4
Students will use the sine, cosine, and tangent ratios (and their reciprocals) to solve right triangles. Students will use the unit circle or reference triangles to find exact trig function values for all angles that are multiples of 30-degree and 45-degree angles. Students will use the Law of Sines and the Law of Cosines to solve triangles that are not right triangles.
Course Title: Algebra 2/Trig Honors

Course #: 1425-1426

Course Description: Algebra 2 / Trigonometry Honors is an accelerated course that reviews and solidifies Algebra 1 concepts and introduces more advanced concepts in algebra and trigonometry. After reviewing linear and quadratic functions, students are introduced to polynomial, rational, exponential, and logarithmic functions. Sequences and Series as well as trigonometric functions, identities and graphs are also covered. This course is designed to prepare students to take Pre-Calculus Honors.

UC/CSU Approval: “C” approved
*Local honors weight only, not UC/CSU approved as an honors course

Grade Level: 9-12

Estimated Homework Per Week: 4 hours per week

Prerequisite: Completion of Geometry or Geometry (H) with a grade of “B” or higher

Recommended Prerequisite Skills:
If a student completes Geometry (instead of Geometry H), a B+ both semesters is recommended. To be successful in this class, student will need to be:
- A quick learner of new concepts
- Self-motivated
- Willing to work hard outside of class to master new concepts
- Willing to learn and master rigorous mathematical notation and concepts
- Able to perform computations without a calculator, including fractions and decimals

Course Grade Scale:
- Quizzes: 20%
- Tests: 50%
- Homework: 15%
- Semester Final: 15%

Major Assessments:
- Five Unit tests per Semester
- Three to Five Mid-Unit Quizzes per semester
- Semester Final
Major Units/Topics:

<Semester 1>

**Algebra 1 Review**: Linear equations, absolute value functions, systems of equations, factoring

**Ch 2 Quadratic functions**: Vertex form, standard form, graphing, factoring, completing the square,
Quadratic Formula, vertical projectile motion, quadratic inequalities, complex numbers

**Ch 3 Polynomial Functions**: Classification of polynomials, Polynomial operations, Factoring polynomials, Finding real-roots of polynomials, Fundamental Theorem of Algebra, Graphing polynomials

**Ch 5 Rational and Radical Functions**: Operations of rational expressions, graphing rational and radical functions, solving radical and rational equations

<Semester 2>

**Ch 4 Exponential and Logarithmic Functions**: Graphing and solving exponential and logarithmic equations, inverses of relations and functions

**Ch 6 Properties of Functions**: Multiple representation of functions, comparing functions, piecewise functions, transforming functions, operations with functions, inverse functions

**Ch 9 Sequences and Series**: Series and summation notation, Arithmetic sequences and series, Geometric sequences and series, Infinite geometric series

**Ch 10/11 Trigonometric Functions**: Right-angle trigonometry, angles of rotation, the Unit Circle, inverses of trigonometric functions, Law of Sines, Law of Cosines, graphs of trig functions, fundamental trig identities
Course Title: AP Calculus AB

Course #: 1461-1462

Course Description:
AP-Calculus AB is designed to be the equivalent of a first semester college calculus course treating important topics in both differential and integral calculus. AP-Calculus-AB students need to have a strong foundation in reasoning with algebraic symbols and working with algebraic structures. Strong performance is Algebra-2, Trigonometry and Pre-calculus is a reliable indicator of success in AP-Calculus-AB. This course is fast-paced and students need to be pro-active learners, willing to do a significant amount of work outside the classroom. *Students are strongly encouraged to take the AP Exam in May.*

UC/CSU Approval: “C” approved

Grade Level: 10-12

Estimated Homework Per Week: 2 to 3 hours per block-class period

Prerequisite: Completion of Pre-Calculus or Pre-Calculus H with a grade of “B” or higher OR completion of Calculus with a “B” or higher

Recommended Prerequisite Skills: The AP-Calculus-AB is a rigorous and fast-paced course. To be successful in this class, an AP-Calculus student will need to be:
- A quick learner of new concepts
- Self-motivated
- Willing to work hard outside of class to master new concepts
- Willing to learn and master rigorous mathematical notation and concepts

Course Grade Scale:
- Tests: 50%
- Quizzes: 20%
- Homework: 10%
- Final: 20%

Assessments: 5 unit tests per semester, 4 to 5 mid-unit quizzes per semester, occasional short quizzes, and a semester final
**Course Content: Major Ideas (Source: College-Board)**

- **CHANGE:** The use of derivatives to describe rates of change of one variable with respect to another or using definite integrals to describe the net change in one variable over an interval of another allows students to understand change in a variety of contexts. It is critical that students grasp the relationship between integration and differentiation as expressed in the Fundamental Theorem of Calculus – a central idea in AP-Calculus
- **LIMITS:** Beginning with a discrete model and then considering the consequences of a limiting case allows us to model real-world behavior and to discover and understand important ideas definitions, formulas and theorems in calculus: for example, continuity, differentiation and integration.
- **ANALYSIS OF FUNCTIONS:** Calculus allows us to analyze the behaviors of functions by relating limits to differentiation, integration and infinite series and relating each of those concepts to the others.

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unit 1:</strong> Limits and Continuity</td>
<td><strong>Unit 6:</strong> Integration</td>
</tr>
<tr>
<td><strong>Weeks 1 – 3</strong></td>
<td><strong>Weeks 1 – 5</strong></td>
</tr>
<tr>
<td>Defining Limits</td>
<td>Accumulations of change</td>
</tr>
<tr>
<td>Using Limit notation</td>
<td>Riemann Sums</td>
</tr>
<tr>
<td>Limits from graphs/tables</td>
<td>Definite Integrals</td>
</tr>
<tr>
<td>Algebraic limits</td>
<td>Fundamental theorem of Calculus</td>
</tr>
<tr>
<td>Squeeze theorem</td>
<td>Behavior of accumulation functions</td>
</tr>
<tr>
<td>Connecting multiple representations of limits</td>
<td>involving area</td>
</tr>
<tr>
<td>Continuity</td>
<td>Properties of Definite integrals</td>
</tr>
<tr>
<td>Types of discontinuities</td>
<td>Fundamental Theorem of Calculus and Definite Integrals</td>
</tr>
<tr>
<td>Defining continuity</td>
<td>Finding Antiderivatives and Indefinite Integrals</td>
</tr>
<tr>
<td>Intermediate Value theorem</td>
<td>Integration by Substitution</td>
</tr>
<tr>
<td>Infinite limits and limits at infinity (vertical and horizontal asymptotes)</td>
<td>Integration of functions by long division and completing the square</td>
</tr>
</tbody>
</table>

| **Unit 2:** Differentiation: Definition and Fundamental Properties | **Unit 7:** Applications of Integration |
| **Weeks 4 – 6** | **Weeks 6 – 10** |
| Avg/Instant. Rates of Change | Average value of a function |
| Definition of the derivative | Position/Velocity/Acceleration |
| Estimation of derivatives | Accumulation/Def. Integrals applied |
| Differentiability and Continuity | Area between curves (x and y) |
| Power Rule | Volume – Cross-sections |
| Constant/Sum/Prod/Quotient | Volume – Disk method |
| Trig function derivs | Volume – Washer method |
| Exponential and Log derivs. | |

| **Unit 3:** Differentiation: Composite, Implicit / Inverse | **Unit 8:** Differential Equations |
| **Weeks 7 – 9** | **Weeks 11 – 13** |
| Inverse Functions and derivatives | Modeling with Differential Equations |
| Composite Functions / chain rule | Verifying solutions of Diff. Eqs. |
| Implicit Differentiation | Slope Fields |
| | Separable Equations Initial conditions |
| | Exponential Models/ Population Growth |

<p>| <strong>Unit 4:</strong> Contextual Applications of Differentiation | <strong>AP Exam Review</strong> |
| <strong>Weeks 14 – 17</strong> | <strong>AP Exam / Final</strong> |
| (Easter Break – Week 15) | All AP-Exam topics |
| | Practice Tests |
| | Test-taking strategies |
| | Final Exam |
| | AP EXAM |</p>
<table>
<thead>
<tr>
<th>Weeks 9 - 12</th>
<th>Local Linearity</th>
<th>Final Project</th>
<th>Advanced Topics of interest in Calculus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Unit 5:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Analytical</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Applications of</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Differentiation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weeks 13-16</strong></td>
<td>Absolute Extrema</td>
<td>Rolle’s theorem</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean Value theorem</td>
<td>First derivative test</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Second Derivative test</td>
<td>Curve Sketching</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Optimization</td>
<td></td>
</tr>
<tr>
<td><strong>Review / Final</strong></td>
<td>Review</td>
<td>Final Exam</td>
<td></td>
</tr>
<tr>
<td><strong>Weeks 17 and 18</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mathematical Practices:**
Throughout this course students will be required to
- Implement mathematical processes
- Connect representations by translating information across graphical, numerical, verbal and analytical representations
- Justify reasoning and solutions
- Communicate their results or solutions using rigorous and correct mathematical language, notations and conventions.
Course Title: AP Calculus BC

Course #: 1463-1464

Course Description:
This is a full-year course in the calculus of functions of a single variable. It includes all topics covered in Calculus AB plus additional topics. The content of Calculus BC is designed to qualify the student for placement and credit in a course that is one course beyond that granted for Calculus AB.

AP Calculus BC is the study of limits, derivatives, definite and indefinite integrals, polynomial approximations and (infinite) series. Though this is considered a study of single-variable calculus, parametric, polar, and vector functions will be studied. Consistent with AP philosophy, concepts will be expressed and analyzed geometrically, numerically, analytically, and verbally. Calculus BC covers topics that are usually included in the first 2-3 semesters of college calculus. Students are strongly encouraged to take the AP Exam in May.

UC/CSU Approval: “C” approved

Grade Level: 10-12

Estimated Homework Per Week: 5 Hours (2 Hours per assignment)

Prerequisite: Completion of Pre-Calc Honors with a grade of “B” or higher

Recommended Prerequisite Skills: Completion of Pre-Calc Honors with a grade of “A.” While the primary focus of the course will be on fundamental Calculus concepts, a strong background in algebra, geometry, and trigonometry is needed. Students should:

● Be comfortable graphing linear, polynomial, rational, radical, logarithmic, exponential, and trigonometric functions.

● Be able to solve multi-step equations involving trig, exponentials, logarithms, and polynomials (where often solving by factoring or with the quadratic formula is important).

● Know the basic trig identities and be familiar with the values identified by the Unit Circle.

Course Grade Scale:

● Tests ~ 50%

● Quizzes ~ 20%
- Homework ~10%
- Final ~20%

**Major Assessments/Units/Topics:**
There is typically one test and one quiz per unit.

*Topics preceded by an “*” are BC only.

**Unit 1 – Limits Review and Differentiation**
The definition of limits and continuity are fine-tuned. Then the tangent line and the derivative are introduced along with the foundational rules for finding derivatives.

Topics: Limits, continuity, differentiability, basic differentiation rules, tangent lines, Intermediate Value Theorem

**Unit 2 – Differentiation Continued**
More functions and their derivatives are explored as well as the relationship between a function and its derivative. This is a heavily skills-based unit prioritizing how derivatives are found.

Topics: Exponential/logarithmic/inverse/implicit differentiation techniques and rules, Extreme Value Theorem, Mean Value Theorem

**Unit 3 – Applications of Differentiation**
The relationships between function, derivative, and second derivative are analyzed. Graphs of each will be examined and connections are made to help sketch the graph of one if we know the other. In the second half of this unit, several applications of the derivative’s relationship to a function are explored. This includes optimization problems, tangent line approximations, and related rates.

Topics: F and F’ and F””, concavity, the second derivative, curve sketching, optimization, related rates, linear approximation, differentials.

**Unit 4 – Integration**
The concept of the antiderivative is introduced and it’s relationship to the derivative is explored. Some, but not all techniques for anti-derivation will be learned. Students will work to find the area under a curve by both approximation (Riemann Sums) and through calculus with the definite integral. The Fundamental Theorem of Calculus that defines the integral as the inverse operation to the derivative is also dealt with heavily in this unit.

Topics: The Antiderivative, Riemann Sums (left, right, mid, trapezoid), area under the curve, Fundamental Theorem of Calculus, U-Substitution

**Unit 5 – Differential Equations & Modeling**
This unit seeks to fully develop a student’s understanding of the integral-derivative relationship and will focus on the rest of the necessary integration techniques. Another main point of emphasis for this unit is the solving of a differential equation. Differential equations are a vast field on their own and in Calculus BC only one or two “types” of equations will be looked at, mainly ones known as separable.


Unit 6 – Applications of Integration
Just as the derivative is one pillar of Calculus, Integration is the other. Using integration to model area, volume, and arc length are the three primary targets of this unit. Improper integrals are also considered and L'Hopital's rule is addressed as both a way to help evaluate them.

Topics: Area between curves, solids of revolution, volume by disk/washer (and shell) methods, *arc length, L'Hopital's Rule, *improper integrals

Unit 7 – *Polar and Parametric Calculus
This unit focuses on two common ways to express the relationship of two variables depending separately with respect to a third parameter variable. Polar functions relate horizontal and vertical position to functions of an angle measure, and parametric functions most often (in this course at least) relate horizontal and vertical position to functions of time. Students will learn how to graph these functions as well as describe their behaviors using calculus terminology. Both derivatives and antiderivatives will be taken.

Topics: *Polar functions, *parametric functions, *vector calculus, *polar area

Unit 8 – *Infinite Sequences and Series
In the first part of this unit, convergence and divergence of both sequences and their corresponding series will be addressed, including all the methods for determining convergence. In the second part of the unit, students will learn to construct taylor polynomials and use them to approximate values and integrals. Students will also learn a couple methods for determining the error of those approximations.

Course Title: AP Statistics

Course #: 1465-1466

Course Description: Students learn the four major themes of outlined by the College Board for AP Statistics: Exploratory data analysis, planning a study, anticipating patterns, and statistical inference. Motivated math students may take this course concurrently with Pre-Calculus or AP Calculus. Students are encouraged to take the AP Statistics Exam in May.

This course is ideal for students who will be going on to college and majoring in humanities, social sciences, psychology, etc. If a student is planning on majoring in a science, engineering, or in a math field, it is necessary to have at least Pre-Calculus completed prior to graduation. Students are strongly encouraged to take the AP Exam in May.

UC/CSU Approval: “c” approved

Grade Level: 10-12

Estimated Homework Per Week: 1.5 - 3 Hours per week

Prerequisite: Completion of Algebra 2 with a grade of “B” or higher OR completion of Algebra 2/Trig Honors, Precalculus, Pre-Calculus Honors, Calculus, AP Calculus AB, or AP Calculus BC, with a grade of “C” or higher.

Recommended Prerequisite Skills: Students enrolling into A.P. Statistics should...
- Think and process information at an honors and/or A.P. level.
- Reason quantitatively and be able to set-up and solve word problems.
- Read at a high level to process information provided in paragraph form.
- Write effectively to support and validate a claim.
- Understand slope and intercept of linear relations.
- Be able to use their graphing calculators to graph functions and calculate zeros.

Course Grade Scale:
- Homework = 15%
- Mid-Chapter Quizzes = 25%
- Chapter Tests = 40%
- Semester Final Exam = 20%
Major Assessments/Units/Topics: A.P. Statistics is comprised of 4 Major Themes of Study - 1. Exploratory Data Analysis, 2. Planning a Study, 3. Probability, and 4. Statistical Inference. The course will be arranged into the following units/chapters:

A. Exploratory Data Analysis
   1. Organizing Quantitative Data with Number and Graphs
      a. Graphs - bar graphs, pie graphs, dotplots, stemplots, histograms, and boxplots
      b. Statistics - median, mean, range, standard deviation, Interquartile Range
      c. Describing and comparing distributions including outlier calculations
         Quiz mid-way through this unit and a chapter test at the end

   2. Density Curves and the Normal Distribution
      a. Measure of relative position - percentiles and z-scores
      b. Concept of a density curve as a way to summarize a distribution
      c. The Normal Distribution
         Quiz mid-way through this unit and a chapter test at the end

   3. Correlation and Regression
      a. Scatterplots and correlation coefficients
      b. Least-squares regression equations
      c. Analyzing Residuals, interpreting r-squared, and the standard error of the line.
         Quiz mid-way through this unit and a chapter test at the end

B. Planning a Study
   1. Designing a Survey
      a. Effective and ineffective sampling methods
      b. Challenges to gathering accurate sample data
   2. Designing an Experiment
      a. Completely Randomized Designs
      b. Blocking Strategies and Minimizing Confounding
         Quiz mid-way through this unit and a chapter test at the end

C. Probability
   1. Probability Theory
      a. Addition and Multiplication Rules
      b. Complement Rule
      c. Conditional Probability and Baye’s Theorem
         Quiz mid-way through this unit and a chapter test at the end
   2. Random Variables
      a. Mean and Standard Deviation of Discrete Random Variables
      b. Rules for Means and Variances when combining multiple random variables
      c. The Binomial random variable
         Quiz mid-way through this unit and a chapter test at the end
3. Sampling Distributions
   a. Sampling distributions of the sample proportion
   b. Sampling distribution of the sample mean and the Central Limit Theorem

Quiz mid-way through this unit and a chapter test at the end

D. Statistical Inference
1. Confidence Intervals
   a. One proportion confidence interval for a proportion
   b. One sample confidence interval for a mean

Quiz at the end of this unit

2. Hypothesis Testing
   a. One proportion Z-Test on a proportion
   b. One sample t-Test on a mean

Quiz on this unit and a test on Units 1 and 2 of Statistical Inference

3. Comparing Two Populations
   a. Comparing two proportions with a two proportion z confidence interval and a two proportions
   b. Comparing two means with a two sample t-interval and a two sample t-test

Quiz at the end of this unit

4. Analyzing Distributions of Categorical Data
   a. Chi-Square test for Goodness of Fit
   b. Chi-Square test for Homogeneity and Independence

Quiz at the end of this unit and a test over topics 3 and 4 of this unit
Course Title: Beginning Algebra

Course #: 1409-1410

Course Description: Beginning Algebra reviews all critical elements in secondary mathematics education. The primary goal in this course addresses any misunderstandings or gaps students may still have from middle school math courses. Topics reviewed in beginning algebra provide the foundation students require for future success in high school mathematics involving critical thinking, and problem solving. Beginning Algebra is to help students solidify and transfer their concrete mathematical knowledge to more abstract algebraic generalizations. Students will explore operations on algebraic expressions, and apply mathematical properties to algebraic equations by solving problems using equations, graphs and tables to investigate linear relationships.

UC/CSU Approval: “c” approved

Grade Level: 9

Estimated Homework Per Week: 1-2 hours

Prerequisite: HSPT placement

Recommended Prerequisite Skills:
- Connecting ratio and rate to whole number multiplication and division
- Using concepts of ratio and rate to solve problems.
- Performing operations with positive and negative rational numbers.
- Understanding the use of variables in mathematical expressions and equations.
- Writing, interpreting, and using expressions, equations, and inequalities that correspond to given situations and solve problems.
- Finding common factors and multiples.

Course Grade Scale:
- Tests (35%)
- Quizzes (25%)
- Assignments (25%)
- Final (15%)
**Major Assessments/Units/Topics:** Topics include recognizing and developing patterns using tables, graphs and equations. In addition, students will explore operations on algebraic expressions, apply mathematical properties to algebraic equations. A midterm test and final will be given.

Semester 1 units will cover the following:

- Solving and understanding equations and inequalities
- Working with functions and understand their relationships as well as modeling with functions
- Solve linear equations and systems of equations using various methods.
- Comparing and solving for rational numbers
- Solving Absolute value equations

Semester 2 units will cover the following:

- Understanding how figures behave under translations, reflections, dilations, and rotations.
- Using transformations to understand congruence and similarity, describe and analyze two-dimensional figures, and to solve problems.
- Solving problems about lines, angles, triangles, and quadrilaterals.
- Using a coordinate system to verify geometric relationships.
- Representing and analyzing quantitative relationships between dependent and independent variables.
- Develop understanding of statistical variability.
- Summarizing and describing numerical data sets and distributions, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data was collected.
Course Title: Business Accounting and Personal Finance

Course #: 1449-1450

Course Description:

**Business Accounting**: Students will investigate personal equity statements and compute their personal net worth and the net worth of a sole proprietorship. In addition, students will learn to journalize transactions and post to the general ledger. They will complete the Accounting Cycle by making a worksheet, determining adjusting entries, and creating financial statements for a sole proprietorship. They will then close revenue and expense accounts, prepare closing entries, and determine net income and loss. Additionally, students will prepare checks, complete a bank reconciliation and account for petty cash. Current business and financial issues will be discussed and analyzed throughout the course. Students will develop their own business ethics statement and apply it to several ethical dilemma scenarios during the course. Finally, students will demonstrate their understanding of concepts taught by completing the entire accounting cycle for a sole proprietorship as their Final Project.

**Personal Finance**: Students will first discuss expenses and how they spend their money. Next we will explore banking, balancing a checkbook, and the different types of ways to save their money. Credit and credit cards in particular will be a major focus in the first quarter. What a FICO score is and how it affects their lives in many ways. How to build credit and improve and keep your FICO score high. Auto and home purchasing/loans will be simulated along with the monthly payment formula being used to see the how it affects how much interest they will pay over the course of a loan. Employment basics will be covered including resumes and paychecks. Budgeting and Retirement vehicles will be the concluding topics that will tie things all together. If time remains, we will work on stock market basics.

**UC/CSU Approval**: “g” approved

Grade Level: 10-12

**Estimated Homework Per Week:*

- **Business Accounting Semester**: 30 minutes a week
- **Personal Finance Semester**: 1-2 hours a week reading & HW

Prerequisite: Completion of Algebra 2 with a C or higher
**Recommended Prerequisite Skills:** Interest in business, finances and related topics. Strong basic math skills.

**Course Grade Scale:**

**Business Accounting Semester:**
- Classwork/Assignments: 25%
- Quizzes: 25%
- Tests: 35%
- Final Project: 15%

**Personal Finance Semester:**
- Homework: 20%
- Quizzes: 25%
- Tests: 40%
- Final: 15%

**Major Assessments/Units/Topics:**

**Business Accounting Units:**
- I. Accounting Cycle, Equity statements, Net Worth- Students will learn what makes up the accounting cycle and investigate the Net Worth equation. Students will complete their own Statement of Net Worth. (Quiz)
- II. Journalizing Transactions in a Multi-Column Journal-Students will learn what a multi-column journal is and what its function is in accounting. Students will journalize all types of transactions in the journal for a service proprietorship. (Quiz & Test)
- III. Posting to a General Ledger-Students will post all transactions from the journal to the ledger for a proprietorship. Students will learn how to maintain a ledger and keep all account balances up to date. (Quiz & Test)
- IV. Accounting for Cash- Students will learn what petty cash is, how to complete a bank reconciliation, and what different endorsements on checks are for. Students will journalize and post all activities that have to do with accounting for cash. (Quiz & Test)
- V. The Worksheet, adjusting and closing entries-Students will discover what a worksheet is and what it is used for in the final step of the accounting cycle. Students will create a trial balance, adjusting entries and adjusted trial balance. Students will journalize and post all relevant entries associated with the adjusting and closing of the accounting cycle. (Quiz)
- VI. Financial Statement-Students will create financial statements for a service business structured as a sole proprietorship. They will compute net income or loss, calculate
basic ratios for sales, expenses and net income or loss, and create an Income Statement and a Balance Sheet.(Quiz & Test)

Accounting Assessments:
I. Class Assignments
II. Unit Quizzes
III. Unit Tests
IV. Final Project

Personal Finance Units:
I. Discretionary Spending
   Students will be looking into all the things we spend your money on and whether it is essential or just for fun spending. (1 quiz)

II. Banking & Credit
   Students will learn about different bank accounts, how to write a check, balance a checkbook, the different types of interest, and the time value of money. We will also explore topics in credit, including student loans, credit cards, FICO scores, how to read a credit card statement and the dangers students face when they step onto a college campus. (1 quiz & 1 test)

III. Car ownership
   Students will learn about the important parts of automobile ownership including insurance, depreciation, auto loans, and driving safety. (1 quiz & 1 test)

IV. Employment & Independent Living
   We will cover basics in finding employment, how you get paid, benefits and taxes. Options for where and how you can be sheltered (own vs. rent) will be explored as well as mortgages and expenses involved with ownership. (1 quiz & 1 test)

V. Budgeting and Retirement
   Different methods of budgeting will be discussed along with the essential items for which you need to budget. Retirement planning will be a major emphasis including matching 401K’s, starting to save early, Social Security, pensions, and life insurance. (1 quiz & 1 test)

Personal Finance Assessments:
1. Homework
2. Quizzes
3. Tests
4. Final
Course Title: Calculus

Course #: 1433-1434

Course Description: This course is a two-semester course that covers the elements of beginning college calculus. Topics to be studied include limits, differentiation and integration of polynomial, trigonometric, logarithmic, exponential and other functions. Their applications to area, volume, arc length, optimization, rates of change, position, velocity, and acceleration problems will be studied. This course does not follow the curriculum needed to take the Advanced Placement Exam in Calculus. This course is still challenging and rigorous due simply to the fact that Calculus is very advanced mathematics. This course is ideal for students who would like an introduction to Calculus for college preparation, but do not desire the rigor or pace of the Advanced Placement Course.

UC/CSU Approval: “c” approved

Grade Level: 10-12

Estimated Homework Per Week: 2-4 Hours/week

Prerequisite: Completion of Pre-Calculus or Pre-Calculus H with a grade of “C” or higher

Recommended Prerequisite Skills: Students should have a strong foundation in Algebra. These students should have done very well in Algebra 1, Algebra 2/Trig and Pre-Calculus level courses. These students are potentially going to major in a STEM field, but do not want to take the AP Calculus course and want to be ready to excel in college-level Calculus during their freshman year of college. Students must understand this is a rigorous course, and Calculus should only be taken by students truly interested in mathematics.

Course Grade Scale: Homework: 20%
Quizzes: 25%
Tests: 40%
Final Exam: 15%

Major Assessments/Units/Topics:
I. Unit 1 - Precalculus Review
   • Review of functions - linear, quadratic, polynomial, exponential, logarithmic, rational
   • Understanding of domain, range, intercepts
• Intervals of increase/decrease
• Local min/max
  ○ This units will consist of at least two quizzes and two major tests

II. Unit 2 - Limits
• Limits of functions analytically, graphically, and numerically
• Determine one-sided limits and continuity
• Infinite Limits
  ○ This unit will consist of at least one quiz and one major unit exam

III. Unit 3 - Differentiation
• Calculate the derivative of a function using the definition and the sum, difference, product, quotient, and chain rules.
• Calculate max and min points using the derivative and its properties
• Solve optimization problems
  ○ This unit will consist of at least 2 to 3 quizzes and 2 to 3 major tests

IV. Unit 4 - Integration
• Calculate the integral of functions
• Connect the integral to the area under the graph of the function over a defined interval
  ○ This unit will consist of at least 2 to 3 quizzes and 2 to 3 major tests
Course Title: Geometry

Course #: 1423-1424

Course Description: Designed for students with a solid foundation in Algebra I, students learn deductive proof writing, properties of angles, perpendicular and parallel lines, congruent triangles, similar polygons, circles, right triangles, areas and volumes of solids, coordinate geometry and constructions.

UC/CSU Approval: “C” approved

Grade Level: 9-12

Estimated Homework per week: 2-4 hours per week. Approximately 10-20 problems per assignment

Prerequisite: Completion of Algebra 1A with a “C-” or higher second semester

Recommended Prerequisite Skills:
- Solve simple multi-step equations
- Understanding radicals and integer exponents
- Graph Coordinate Pairs
- Find the square of a number
- Find the square root of a number
- Understand the connection between proportional relationships, lines, and linear equations.
- Solving linear equations as well as apply graphical and algebraic methods to analyze and solve systems of linear equations in two variables.
- Defining, evaluating, and comparing functions, and use them to model relationships among quantities.
- Solving real-world and mathematical problems using linear mathematical models.

Course Grade Scale:
- Tests: 45%
- Quizzes: 25%
- Homework: 15%
- Final Exam: 15%
Major Assessments
Students are assessed with a Quiz and Test each Chapter. Assessments include application of geometric properties with figures and Algebra to solve problems.

Units/Topics:
I. **Foundations of Geometry (all sections)**
   Students will identify and name points, lines, rays, segments, and angles, draw and interpret geometric figures. In addition, students will construct & measure segments and their midpoints as well as angles and their bisectors. Students will classify angles and identify angle pairs. Students will use geometry formulas to find lengths and areas and determine distances and find midpoint coordinates. Students will try to draw and identify transformations. (1 quiz and 1 test)

II. **Geometric Reasoning (sections 5 and 6)**
   Students will use the properties of equality and congruence and definitions and theorems to write algebraic and geometric two-column proofs. (1 quiz and 1 test)

III. **Parallel and Perpendicular Lines (all sections)**
   Students will identify Parallel, Perpendicular, and Skew Lines. In addition, students will identify the angle pairs formed by two lines and a transversal and find the measures of those angles. Students will use the converse theorems to prove that lines are parallel. Students will use Slopes to determine when lines are parallel or perpendicular and write the equations of perpendicular and parallel lines. (1 quiz and 1 test)

IV. **Triangle Congruence (omit section 8)**
   Students will draw and identify transformations in the coordinate plane and determine whether transformations produce congruent figures. Students will also classify triangles by the measures of their angles and the lengths of their sides and find the measures of angles in isosceles and equilateral triangles. Students will use the triangle sum theorem and exterior angle theorem to determine the measures of angles of a triangle. Student will prove that triangles are congruent using five methods: SSS, SAS, ASA, AAS, and HL and use them to prove that corresponding parts of congruent triangles are congruent. (1 quiz and 1 test)

V. **Properties and Attributes of Triangles (omit section 6)**
   Students will apply the perpendicular and angle bisector theorems to find distances. Students will construct and use the center theorems of triangles to Solve Real-World Problems and segment lengths. In addition, students will use the triangle midsegment theorem to calculate lengths. They will also use the angle-side relationships of a triangle to order side lengths and angle measures. In addition, they will prove and use the pythagorean theorem to determine the side lengths of a triangle and classify triangles. Finally, they will use the 45-45-90 Triangle Theorem and the 30-60-90 Triangle Theorem to Find the Sides of a Triangle (1 quiz and 1 test)

VI. **Polygons and Quadrilaterals (all sections)**
Identify types of polygons and construct various regular polygons. Find the interior and exterior angle measures of regular and nonregular polygons. In addition, they will also use the properties of parallelograms and special parallelograms to find measures and complete proofs. Students will also use the condition for parallelogram theorems to verify that a figure is a parallelogram. Students will identify special parallelograms use the conditions theorems to prove that a given quadrilateral is a rectangle, rhombus, or square and use the properties of kites and trapezoids to find the measures of their sides and angles. Finally, they will use the trapezoid midsegment theorem to find lengths. (1 quiz and 1 test)

VII. Similarity (omit sections 2 and 6)
Identify and determine the corresponding sides and angles of similar polygons and if they are similar. They will prove similarity within triangles and find find segment lengths using the triangle proportionality theorem, the two-transversal proportionality theorem, and the triangle angle bisector theorem. Finally, they will use Ratios to Find Lengths, Perimeters, and Areas in order to draw similar polygons and make scale drawings. (1 quiz/project and 1 test)

VIII. Right Triangles and Trigonometry (omit section 5 and 6)
Students will find the geometric mean between two numbers and use the corollaries to find the lengths of altitudes and legs. Also they will find and use trigonometric ratios by hand and by calculator to find lengths and angles, solve right triangles and real-world problems. Then students will find distances using angles of elevation and depression. students will write radicals in simplified form. (1 quiz and 1 test)

IX. Extending Transformational Geometry (Chapter 9 omitted)

X. Perimeter, Circumference, and Area (omit section 4)
Students will develop area formulas for triangles, quadrilaterals, and composite figures and calculate areas, given appropriate Measurements. In addition, they will calculate the circumference and area of a circle and the area of a regular polygon estimate the area of an irregularly shaped figure. In addition, describe the effect on area caused by a proportional change in dimension and the effect on dimension caused by a change in area. (1 quiz and 1 test)

XI. Spatial Reasoning (all sections)
Students will classify three-dimensional geometric figures and describe nets and cross sections of three-dimensional geometric figures. In addition, they will calculate volumes and surface areas of the geometric solids and describe the effects on volume and surface area caused by changes in dimension. (1 quiz and 1 test)

XII. Circles (all sections)
Students will Identify, construct, measure and find lengths of chords, arcs, secants, and tangents of a circle. Students will also use the tangency theorems to find lengths. They will find the measures of arcs and chords and calculate arc lengths sector and segment Areas. In
addition they will find the measures of arcs, inscribed angles and angles formed by secants and tangents and chords to a circle and inscribed quadrilaterals as well as finding arc measures. Students will write the equation of a circle in the coordinate plane by finding the center and radius of a circle and graph the circle. (1 quiz and 1 test)
Course Title: Geometry B

Course #: 1421-1422

Course Description: This slower paced course fulfills the graduation requirement for geometry, but due to the basic emphasis on proofs, will not prepare students for entry into most higher-level mathematics courses in high school or college.

UC/CSU Approval: “c” approved

Grade Level: 9-12

Estimated Homework Per Week: 1.5 - 3 hours per week. Approximately 10-20 problems per assignment

Prerequisite: Completion of Algebra 1A with a “C” or higher second semester

Recommended Prerequisite Skills:

- Solve simple multi-step equations
- Understanding radicals and integer exponents
- Graph Coordinate Pairs
- Find the square of a number
- Find the square root of a number
- Understand the connection between proportional relationships, lines, and linear equations.
- Solving linear equations as well as apply graphical and algebraic methods to analyze and solve systems of linear equations in two variables.
- Defining, evaluating, and comparing functions, and use them to model relationships among quantities.
- Solving real-world and mathematical problems using linear mathematical models.

Course Grade Scale:

- Tests: 40%
- Quizzes: 15%
- Homework: 20%
- Participation: 10%
- Final Exam: 15%

Major Assessments/Units/Topics:
Students are assessed with a Quiz and Test each Chapter. Assessments include application of geometric properties with figures and Algebra to solve problems.

**Units/Topics:**

I. **Foundations of Geometry (omit section 7)**
   Students will identify and name points, lines, rays, segments, and angles, draw and interpret geometric figures. In addition, students will construct & measure segments and their midpoints as well as angles and their bisectors. Students will classify angles and identify angle pairs. Students will use geometry formulas to find lengths and areas and determine distances and find midpoint coordinates. *(1 quiz and 1 test)*

II. **Geometric Reasoning (sections 5 and 6)**
   Students will use the properties of equality and congruence and definitions and theorems to write algebraic and geometric two-column proofs. *(1 quiz)*

III. **Parallel and Perpendicular Lines (all sections)**
   Students will identify Parallel, Perpendicular, and Skew Lines. In addition, students will identify the angle pairs formed by two lines and a transversal and find the measures of those angles. Students will use the converse theorems to prove that lines are parallel. Students will use slopes to determine when lines are parallel or perpendicular and write the equations of perpendicular and parallel lines. *(1 quiz and 1 test)*

IV. **Triangle Congruence (sections 1 - 4)**
   Students will draw and identify transformations in the coordinate plane and determine whether transformations produce congruent figures. Students will also classify triangles by the measures of their angles and the lengths of their sides and find the measures of angles in isosceles and equilateral triangles. Students will use the triangle sum theorem and exterior angle theorem to determine the measures of angles of a triangle. *(1 quiz and 1 test)*

V. **Properties and Attributes of Triangles (sections 1, 7, 8)**
   Students will apply the perpendicular and angle bisector theorems to find distances. In addition, they will prove and use the Pythagorean theorem to determine the side lengths of a triangle and classify triangles. Finally, they will use the 45-45-90 Triangle Theorem and the 30-60-90 Triangle Theorem to find the sides of a triangle. *(1 quiz and 1 test)*

VI. **Polygons and Quadrilaterals (all sections)**
   Identify types of polygons and construct various regular polygons. Find the interior and exterior angle measures of regular and nonregular polygons. In addition, they will also use the properties of parallelograms and special parallelograms to find measures and complete proofs. Students will also use the condition for parallelogram theorems to verify that a figure is a parallelogram. Students will identify special parallelograms use the conditions theorems to prove that a given quadrilateral is a rectangle, rhombus, or square and use the properties of
kites and trapezoids to find the measures of their sides and angles. Finally, they will use the trapezoid midsegment theorem to find lengths. (1 quiz and 1 test)

VII. Similarity (omit sections 2 and 6)
Identify and determine the corresponding sides and angles of similar polygons and if they are similar. They will prove similarity within triangles and find segment lengths using the triangle proportionality theorem, the two-transversal proportionality theorem, and the triangle angle bisector theorem. Finally, they will use Ratios to Find Lengths, Perimeters, and Areas in order to draw similar polygons and make scale drawings. (1 quiz/project and 1 test)

VIII. Right Triangles and Trigonometry (omit section 5 and 6)
Students will find the geometric mean between two numbers and use the corollaries to find the lengths of altitudes and legs. Also they will find and use trigonometric ratios by hand and by calculator to find lengths and angles, solve right triangles and real-world problems. Then students will find distances using angles of elevation and depression. students will write radicals in simplified form. (1 quiz and 1 test)

IX. Extending Transformational Geometry (Chapter 9 omitted)

X. Perimeter, Circumference, and Area (omit section 4)
Students will develop area formulas for triangles, quadrilaterals, and composite figures and calculate areas, given appropriate Measurements. In addition, they will calculate the circumference and area of a circle and the area of a regular polygon estimate the area of an irregularly shaped figure. In addition, describe the effect on area caused by a proportional change in dimension and the effect on dimension caused by a change in area. (1 quiz and 1 test)

XI. Spatial Reasoning (all sections)
Students will classify three-dimensional geometric figures and describe nets and cross sections of three-dimensional geometric figures. In addition, they will calculate volumes and surface areas of the geometric solids and describe the effects on volume and surface area caused by changes in dimension. (1 quiz and 1 test)

XII. Circles (all sections)
Students will Identify, construct, measure and find lengths of chords, arcs, secants, and tangents of a circle. Students will also use the tangency theorems to find lengths. They will find the measures of arcs and chords and calculate arc lengths sector and segment Areas. In addition they will find the measures of arcs, inscribed angles and angles formed by secants and tangents and chords to a circle and inscribed quadrilaterals as well as finding arc measures. Students will write the equation of a circle in the coordinate plane by finding the center and radius of a circle and graph the circle. (1 quiz and 1 test)
Course Title: Geometry Honors

Course #: 1417-1418

Course Description: This is an advanced college prep course in standard Euclidean geometry. Topics include points, lines, angles, triangles, right triangles, using congruent triangles, proofs, polygons, similar polygons, ratios, proportions, circles, areas and volumes of solids, and coordinate geometry. Throughout the course you will evaluate your own progress in learning, think logically and record your thinking, express complicated ideas with technical language, and problem solve in groups, all while having confidence in mathematics and relating mathematics to your present and future life.

UC/CSU Approval: “c” approved
*Local honors weight only, not UC/CSU approved as an honors course

Grade Level: 9-12

Estimated Homework Per Week: 3-6 hours, depending on level of understanding. Approximately 30-40 problems per assignment, including critical thinking and word problems.

Prerequisite: Completion of Algebra 1A with a grade of “B” or higher each semester

Recommended Prerequisite Skills: Completion of Alg 1A with a grade of “A” is recommended for success in Geometry H

- Work with integers, fractions, and decimals
- Use properties of equality from algebra
- Solve simple multi-step equations
- Solve simple proportions by cross product
- Solve simple proportions involving distributive property
- Find the square of a number
- Find the square root of a number
- Use the Pythagorean Theorem
- Graph Coordinate Pairs
- Graph linear equations
- Graph systems of linear equations
- Solve equations with factoring
- Solve quadratic equations using the Quadratic Formula
- Use the distance formula and midpoint formula
Identify angles by their measure
Identify triangles by their angle measures
Find perimeter and circumference of a figure
Find the area of a rectangle, square, parallelogram and triangle
Identify the parts of a right triangle
Identify the parts of a circle
Find area and circumference of a circle
Make sense of problems and persevere in solving them.
Reason abstractly and quantitatively.
Construct viable arguments and critique the reasoning of others.
Model with mathematics
Attend to precision.
Look for and make use of structure.
Look for and express regularity in repeated reasoning

Course Grade Scale:
- Homework: 15%
- Quizzes: 25%
- Tests: 45%
- Final: 15%

Major Assessments:

Students are assessed with a Quiz and Test each Chapter and a cumulative Final each semester. Assessments include:
- written definitions of terms, and descriptions of postulates and theorems
- application of reasoning with justifications in Geometric Proofs using geometry definitions, properties, postulates and theorems
- application of geometric properties with figures and Algebra to solve problems.

Units/Topics:

Semester 1
I. Foundations of Geometry (all sections)
   Students will identify and name points, lines, rays, segments, and angles, draw and interpret geometric figures. In addition, students will construct & measure segments and their midpoints as well as angles and their bisectors. Students will classify angles and identify angle pairs. Students will use geometry formulas to find lengths and areas and determine distances and find midpoint coordinates. Students will try to draw and identify transformations. (1 quiz and 1 test)

II. Geometric Reasoning (section 5 and 6)
Students will use the properties of equality and congruence and definitions and theorems to write algebraic and geometric two-column proofs. (1 quiz and 1 test)

III. Parallel and Perpendicular Lines (all sections)
Students will Identify Parallel, Perpendicular, and Skew Lines. In addition, students will identify the angle pairs formed by two lines and a transversal and find the measures of those angles. Students will use the converse theorems to prove that lines are parallel. Students will use Slopes to determine when lines are parallel or perpendicular and write the equations of perpendicular and parallel lines. (1 quiz and 1 test)

IV. Triangle Congruence (all sections)
Students will draw and identify transformations in the coordinate plane and determine whether transformations produce congruent figures. Students will also classify triangles by the measures of their angles and the lengths of their sides and find the measures of angles in isosceles and equilateral triangles. Students will use the triangle sum theorem and exterior angle theorem to determine the measures of angles of a triangle. Student will prove that triangles are congruent using five methods: SSS, SAS, ASA, AAS, and HL and use them to prove that corresponding parts of congruent triangles are congruent. (1 quiz and 1 test)

V. Properties and Attributes of Triangles (all sections)
Students will apply the perpendicular and angle bisector theorems to find distances. Students will construct and use the center theorems of triangles to Solve Real-World Problems and segment lengths. In addition, students will use the triangle midsegment theorem to calculate lengths. They will also use the angle-side relationships of a triangle to order side lengths and angle measures. In addition, they will prove and use the pythagorean theorem to determine the side lengths of a triangle and classify triangles. Finally, they will use the 45-45-90 Triangle Theorem and the 30-60-90 Triangle Theorem to Find the Sides of a Triangle (1 quiz and 1 test)

VI. Polygons and Quadrilaterals (all sections)
Identify types of polygons and construct various regular polygons. Find the interior and exterior Angle measures of regular and nonregular polygons. In addition, they will also use the properties of parallelograms and special parallelograms to find measures and complete proofs. Students will also use the condition for parallelogram theorems to verify that a figure is a parallelogram. Students will identify special parallelograms use the conditions theorems to prove that a given quadrilateral is a rectangle, rhombus, or square and use the properties of kites and trapezoids to find the measures of their sides and angles. Finally, they will use the trapezoid midsegment theorem to find lengths. (1 quiz and 1 test)

Semester 2

VII. Similarity (omit section 2)
Identify and determine the corresponding sides and angles of similar polygons and if they are similar. They will prove similarity within triangles and find segment lengths using the triangle proportionality theorem, the two-transversal proportionality theorem, and the triangle angle bisector theorem. Finally, they will use Ratios to Find Lengths, Perimeters, and Areas in order to draw similar polygons and make scale drawings. *(1 quiz and 1 test)*

**VIII. Right Triangles and Trigonometry (omit sections 5 and 6)**

Students will find the geometric mean between two numbers and use the corollaries to find the lengths of altitudes and legs. Also they will find and use trigonometric ratios by hand and by calculator to find lengths and angles, solve right triangles and real-world problems. Then students will find distances using angles of elevation and depression. students will write radicals in simplified form. *(1 quiz and 1 test)*

**IX. Extending Transformational Geometry (all sections)**

Students will identify and draw reflections, translations, rotations, dilations, and compositions of transformations, Students will apply theorems about isometries and identify and describe symmetry in geometric figures. Students will identify regular and semiregular tessellations and use transformations to draw tessellations. *(1 quiz and 1 test)*

**X. Perimeter, Circumference, and Area (omit section 4)**

Students will develop area formulas for triangles, quadrilaterals, and composite figures and calculate areas, given appropriate Measurements. In addition, they will calculate the circumference and area of a circle and the area of a regular polygon estimate the area of an irregularly shaped figure. In addition, describe the effect on area caused by a proportional change in dimension and the effect on dimension caused by a change in area. *(1 quiz and 1 test)*

**XI. Spatial Reasoning (all sections)**

Students will classify three-dimensional geometric figures and describe nets and cross sections of three-dimensional geometric figures. In addition, they will calculate volumes and surface areas of the geometric solids and describe the effects on volume and surface area caused by changes in dimension. *(1 quiz and 1 test)*

**XII. Circles (all sections)**

Students will Identify, construct, measure and find lengths of chords, arcs, secants, and tangents of a circle. Students will also use the tangency theorems to find lengths. They will find the measures of arcs and chords and calculate arc lengths sector and segment Areas. In addition they will find the measures of arcs, inscribed angles and angles formed by secants and tangents and chords to a circle and inscribed quadrilaterals as well as finding arc measures. Students will write the equation of a circle in the coordinate plane by finding the center and radius of a circle and graph the circle. *(1 quiz and 1 test)*

**Note: Probability Unit Deleted**
XIII.  Algebra 2 Readiness

Students will review and reinforce fundamental Algebra skills in preparation for Algebra 2 Trig Honors.
Course Title: Integrated Math 2

Course #: 1475-1476

Course Description:
The purpose of Integrated Math 2 is to develop students’ ability to think mathematically and develop their conceptual understanding of mathematics and procedural fluency in mathematics. Integrated Math 2 will extend the mathematics students learned in Integrated 1 and begin the development of concepts in Number and Quantity, Algebra, Functions, Modeling, Geometry, and Statistics and Probability needed for higher-level mathematics courses. Extensive use of models/real-world situations, manipulative, graphs, and diagrams will help students see the connections between different topics which will promote students view that mathematics is a set of related topics as opposed to a set of discrete topics. In addition, students will learn to solve problems graphically, numerically, algebraically, and verbally and make connections between these representations. Students win this course will learn to use mathematical models to understand real world events and situations, and use algebraic reasoning to manipulate these models for deeper learning.

UC/CSU Approval: "c" approved

Grade Level: 9

Estimated Homework Per Week: 2-3 hours

Prerequisite: Completion of Integrated Math 1 at previous school with a grade of "C" or higher and qualifying math scores on the HSPT exam.

Recommended Prerequisite Skills:
Students entering Integrated Math 2 should already have a good understanding of the following concepts:

- Solving linear equations as well as graphing linear equations in all forms of a linear equation.
- Using both graphical and algebraic relationships to analyze and solve systems of linear equations in two variables.
- Understanding the connection between proportional relationships, lines, and linear equations.
- Understanding triangle congruence and transformational geometry.
**Course Grade Scale:**
- Homework      25%
- Quizzes        20%
- Tests          40%
- Final          15%

**Major Assessments/Units/Topics:**

**Unit 1: (2 quizzes, 1 Test)**
- Solving Linear Inequalities and graphing solutions-
  Students will use inverse operations, order of operations, and other basic mathematical properties to solve inequalities. Students will translate verbal phrases and sentences into inequalities and solve them.
- Introduction to linear functions-
  Students will be able to use a variety of methods to graph a linear equation. Students will also learn about domain and range and how to tell the difference.
- Absolute Value Equations and inequalities-
  Students will be able to solve absolute value equations and inequalities.
- Parallel and Perpendicular Lines-
  Students will identify Parallel, Perpendicular, and Skew Lines. In addition, students will identify the angle pairs formed by two lines and a transversal and find the measures of those angles. Students will use the converse theorems to prove that lines are parallel. Students will use slopes to determine when lines are parallel or perpendicular and write the equations of perpendicular and parallel lines

**Unit 2: (2 quizzes, 1 test)**
- Triangle Congruence-
  Students will draw and identify transformations in the coordinate plane and determine whether transformations produce congruent figures. Students will also classify triangles by the measures of their angles and the lengths of their sides and find the measures of angles in isosceles and equilateral triangles. Students will use the triangle sum theorem and exterior angle theorem to determine the measures of angles of a triangle. Student will prove that triangles are congruent using five methods: SSS, SAS, ASA, AAS, and HL and use them to prove that corresponding parts of congruent triangles are congruent.
- Polynomials-
  Adding and subtracting polynomials- Students will be able to classify polynomials and write polynomial expressions in standard form. Students will be able to add and subtract polynomial expressions. Students will use their knowledge regarding polynomials to solve word problems.

**Unit 3: (2 quizzes, 1 test)**
- Perimeter, Circumference, and Area
Students will develop area formulas for triangles, quadrilaterals, and composite figures and calculate areas, given appropriate Measurements. In addition, they will calculate the circumference and area of a circle and the area of a regular polygon estimate the area of an irregularly shaped figure. In addition, describe the effect on area caused by a proportional change in dimension and the effect on dimension caused by a change in area.

- **Exponents**
  Students will be able to apply the laws of exponents to simplify expressions.

**Unit 4: (2 quizzes, 1 test)**

- **Properties and Attributes of Triangles**
  Students will use the angle-side relationships of a triangle to order side lengths and angle measures. In addition, they will prove and use the pythagorean theorem to determine the side lengths of a triangle and classify triangles. Finally, they will use the 45-45-90 Triangle Theorem and the 30-60-90 Triangle Theorem to Find the Sides of a Triangle

- **Right Triangles and Trigonometry**
  Students will find the geometric mean between two numbers and use the corollaries to find the lengths of altitudes and legs. Also they will find and use trigonometric ratios by hand and by calculator to find lengths and angles, solve right triangles and real-world problems. Then students will find distances using angles of elevation and depression. students will write radicals in simplified form.

- **Factoring polynomials**
  Students will be able to factor polynomials using multiple different methods.
  Students will also be able to solve area problems using their skills and knowledge of factoring polynomials.

**Unit 5: (3 quizzes, 3 tests)**

- **Solving and graphing quadratic equations**
  Students will be able graph quadratic equations and be able to describe the different characteristics of quadratic equations. Students will also use a number of methods to solve quadratic equations. Students will apply their knowledge of solving quadratic equations to solve word problems.

- **Spatial Reasoning**
  Students will classify three-dimensional geometric figures and describe nets and cross sections of three-dimensional geometric figures. In addition, they will calculate volumes and surface areas of the geometric solids and describe the effects on volume and surface area caused by changes in dimension.

**Unit 6: (1 Quiz, 1 Test)**

- **Circles**
  Students will Identify, construct, measure and find lengths of chords, arcs, secants, and tangents of a circle. Students will also use the tangency theorems to find
lengths. They will find the measures of arcs and chords and calculate arc lengths sector and segment Areas. In addition they will find the measures of arcs, inscribed angles and angles formed by secants and tangents and chords to a circle and inscribed quadrilaterals as well as finding arc measures. Students will write the equation of a circle in the coordinate plane by finding the center and radius of a circle and graph the circle.
Course Title: Introduction to Entrepreneurship

Course #: 1447-1448

Course Description: Introduction to Entrepreneurship is a year long course designed as a project-based college prep course where students develop their own business idea based on the current real world market. Students will generate a complete business plan that will be improved throughout the course as they put into practice their newly acquired knowledge regarding: business ownership structure, financial forecasting, importance of social responsibility, competitive advantage and market research. Throughout the course students will complete case studies to understand business theory and then put this into practice with their own individual business plan. The course will culminate with students pitching their business plans to their peers, CCHS faculty/staff, and possibly industry professionals.

UC/CSU Approval: “g” approved

Grade Level: 11-12

Estimated Homework Per Week: 2-4 Hours per Week

Prerequisite: Completion of English 10/English 10 H and Geometry B/Geometry/Geometry H

Recommended Prerequisite Skills:
- Capable of writing an extensive research paper

Course Grade Scale:
- Chapter / Unit Assessments: 33%
- Assignments: 33%
- Business Plan (Fall Semester): 33%
- Business & Marketing Plan (Spring Semester): 33%

Major Assessments/Units/Topics:

1st Semester
Unit 1: Developing an Entrepreneurial Mindset (Weeks 1-5)
After an introduction to entrepreneurship, students will examine the characteristics of an entrepreneur and research real-world entrepreneurs to identify common characteristics among successful entrepreneurs. Students will integrate a variety of processes and self-assessments in order to see possible entrepreneurial characteristics in themselves and
giving students the opportunity to recognize patterns of past and present entrepreneurs as well as identify personal characteristics that might hinder someone from becoming an entrepreneur. Students will then be introduced to the role entrepreneurship plays in the economy and briefly study the history of small business within American society.

Unit 2: Opportunity and Market Analysis (Weeks 6-10)
Students will learn about different creative thinking techniques (including, but not limited to challenging the usual, drawing idea maps, thinking backwards) to generate business ideas. After generating ideas students will learn about the difference between ideas and opportunities in order to analyze the ideas that were generated through creative thinking. Students will learn about primary and secondary market research in order to evaluate the actual opportunities of their ideas. Students will comprehend SWOT (strengths, weaknesses, opportunities, threats) analysis and utilize this to determine the feasibility of their own business opportunities.

Unit 3: Creating a Business Plan (Weeks 11-15)
Students will learn about the components of a business plan and its importance in the success of a new small business. Students will learn about an entrepreneurial journey through a series of case studies that will exemplify putting theory into practice. Students will utilize the academic knowledge regarding business plans, the first two units and their own research to generate a business plan of their own for an opportunity they generated in the previous unit.

2nd Semester
Unit 4: Competition and Delivering Value to Customers (Weeks 1-3)
Students will examine direct and indirect competitors in different industries as well as pertaining to their business plan from Unit 3. Students will examine how competition impacts pricing and strategies for differentiating from competitors to create a competitive advantage. In addition, students will learn about supply and demand principles in order to understand equilibrium and how it will impact the availability of their product or service created in their own business plan. Students will build on the concept of competitive advantage by examining how this creates value for customers and its impact on a customer base. Ultimately, students will revise their business plan with a supply and demand estimate and summary of the value being delivered to their target market.

Unit 5: Financial and Expense Management (Weeks 4-6)
In this unit students will examine the different types of expenses required to begin their business as well as variable costs. Students will create appropriate forecasts based on market research to estimate sales. After completing this students will use a break-even analysis to help maximize the profitability of the business. Students will develop appropriate pitches and offers for potential investors including an appropriate analysis of the potential return on investment.

Unit 6: Business Model (Weeks 7-9)
In this unit students will compare and contrast the different types of business models while analyzing the benefits and drawbacks, focusing on the legal structure. Students will then
examine the legal process of creating different types of businesses including understanding insurance policies and their necessity to protect different aspects of the business. While understanding the legal structure and model of their business students will also determine internal resources needed to run an efficient business. Students will practice planning and managing inventory including distribution considerations for delivering products and services to customers.

Unit 7: Operating the Business (Weeks 10-12)
Students will collaborate with their peers to differentiate the four main management functions and create a video showing examples of what these functions would look like for their business ideas. Students will explore different methods of planning, organizing, directing and controlling a business to understand business management. Students will investigate the role government plays in business to understand the necessity for a clean record keeping for both tax and regulation purposes. In addition, students will work with different types of accounting systems and determine which ones are appropriate for different types of business as well as the size of the business.

Unit 8: Growing your Business/ Business Pitch (Weeks 13-15)
In this unit students will investigate different business growth strategies which will assist them in finalizing their business plan presentations. This unit will allow students to study the practice challenges of growing a business. Specifically, students will learn about site selection and layout planning while examining the tasks and tools of production management to prepare for future growth. When the business grows the number of employees will grow, therefore students will describe the process of recruiting employees and compare various methods of employee training and development. Students will also explain various methods of motivating, evaluating, promoting and dismissing employees. Students will examine different strategies for valuing a business and then implement this into their business plan and pitch to potential investors.
Course Title: Differential Equations (Math 265) and Linear Algebra (Math 270)

Course #: 1460-1429

Course Description:
MATH 265: Differential Equations
MCC Units: 4
This course introduces the theory and applications of ordinary differential equations of first and higher (mostly second) order as well as systems of linear differential equations. It includes both quantitative and qualitative methods. The course deals with theoretical aspects of existence and uniqueness of solutions as well as techniques for finding solutions using analytical, numerical, method of power-series, and Laplace transformations

MATH 270: Linear Algebra
MCC Units: 4
This course introduces students to the concepts of linear algebra. Topics include matrix algebra, Gaussian elimination, determinants of a matrix, properties of determinants, vector spaces and their properties with an introduction to proofs, linear transformations, orthogonally, eigenvalues and eigenvectors, and computational methods.

UC/CSU Approval: MiraCosta Community College course
*Limit of 2 MiraCosta courses per semester

Grade Level: 11-12

Estimated Homework Per Week: 4 hours

Prerequisite:
MATH 265: Differential Equations
Completion of AP Calculus BC with a grade of “B” or higher and earning a 3 or higher on the AP Calc BC Exam

MATH 270: Linear Algebra
Completion of AP Calculus BC with a grade of “B” or higher, earning a 3 or higher on the AP Calc BC Exam, AND completion of Math 265 in the fall with a “C” or higher
Recommended Prerequisite Skills:
Strong algebra, trigonometry and calculus skills. Student should have familiarity with the material in the following three links:
http://tutorial.math.lamar.edu/pdf/Calculus_Cheat_Sheet_All.pdf

Major Assessments/Units/Topics:

MATH 265: Differential Equations
4 tests and a final exam. All free response.

STUDENT LEARNING OUTCOMES
For a given set of problems the student will demonstrate quantitative reasoning by developing a problem-solving strategy, performing appropriate analysis and computation, and critically assessing the meaning of the conclusion or outcome.

MATERIALS NEEDED
Required Textbook: Elementary Differential Equations by Edward Burkard

TOPICS COVERED
Chap 1 First Order Differential Equations
Chap 2: Second Order Differential Equations
Chap 3: Higher-Order Differential Equations
Chap 4: Applications of Differential Equations
Chap 5: Laplace Transformations
Chap 6: Series Solutions to Differential Equations
Chap 7: Systems of First-Order Linear Differential Equations

MATH 270: Linear Algebra
4 tests and a final exam. All free response.

STUDENT LEARNING OUTCOMES
For a given set of problems the student will demonstrate quantitative reasoning by developing a problem-solving strategy, performing appropriate analysis and computation, and critically assessing the meaning of the conclusion or outcome.

MATERIALS NEEDED
Required Textbook: Linear Algebra 7e by Ron Larson
TOPICS COVERED
Chapter 1: Systems of Linear Equations
Chapter 2: Matrices
Chapter 3: Determinants
Chapter 4: Vector Spaces
Chapter 5: Inner Product Spaces
Chapter 6: Linear Transformations
Chapter 7: Eigenvalues, Eigenvectors
Cathedral Catholic High School
Course Catalog

Course Title: Pre-Calculus

Course Description: This course is designed to prepare students to begin their college studies in introductory Calculus. Students will study and graph linear, quadratic, polynomial, exponential, logarithmic and trigonometric functions. In addition students will study matrices, vectors, sequences, series and probability and be introduced to the concept of limits.

Course #: 1441-1442

UC/CSU Approval: “C” approved

Grade Level: 10-12

Estimated Homework Per Week: 2 - 4 Hours

Prerequisite: Completion of Algebra 2 or Algebra 2/Trig (H) with a grade of “C” or higher

Recommended Prerequisite Skills: Completion of Algebra 2 or Algebra 2/Trig (H) with a grade of “B” or higher. Students should be confident with solving and graphing linear functions, factoring and solving quadratic functions. Students should feel comfortable the use of the TI-84 Graphing Calculator and have a basic understanding of exponential and logarithmic functions as well as right triangle trigonometry.

Course Grade Scale:
- Homework/Classwork Quizzes . 25%
- Tests/Quizzes 55%
- Final Exam 20%

Major Assessments/Units/Topics:

There is typically 2 quizzes and 1 test for each unit. For longer units there may be 2 tests.

1 Functions and Their Graphs

- Find and use the slope of a line to write and graph a linear equation.
- Find the x-and y-intercepts to graph the line.
- Evaluate functions and find their domains.
● Recognize a relation as a function given a set of ordered pairs, table, and graph.
● Identify the intervals in which a graph of a function is increasing and decreasing.
● Use the calculator to find the intercepts and relative maximum and minimum points of the graph.
● Identify the domain and range of a function from the given graph.
● Graph a piecewise function.
● Write an absolute value function as a piecewise function and be able to graph the function.
● Be able to draw any "basic" function graph.
● Identify and graph shifts, reflections, and nonrigid transformations of functions.
● Write transformations in function notation.
● Identify the transformations from a graph and be able to write the equation of the function from the graph.
● Find arithmetic combinations and compositions of functions.
● Find the domain of the resulting arithmetic combination or resulting compositions of functions.
● Find the inverse functions graphically and algebraically.
● Find the domain and range of the original function and its inverse.

2 Polynomial and Rational Functions

● Sketch and analyze graphs of quadratic and polynomial functions.
● Recognize general and standard form.
● Convert general form to standard form by completing the square.
● Recognize how a higher degree polynomial changes the shape of the graph.
● Find all the real zeros of the polynomial function by factoring and determine the multiplicity of each zero.
● Recognize how the graph is affected at the x-intercepts by the multiplicity.
● Find the polynomial function given the zeros.
● Apply the Leading Coefficient Test to understand the left and right behavior of the graph.
● Use long division and synthetic division to divide polynomials by other polynomials.
● Write the function in the form \( f(x) = (x-k)q(x) + r(x) \) given the \( k \)-value.
● Use synthetic division to find function values and recognize the process creates a x-y table of values.
● Use the rational zero test to list all possible rational zeros.
● Use the list of possible rational zeros and synthetic division to get a degree 3 or degree 4 polynomial down to a degree 2 quotient, so factoring or the quadratic formula can be used to find the remaining real zeros, if any.
● Use synthetic division to verify the upper and lower bounds of the real zeros of \( f(x) \).
● Recognize, while using synthetic division to find real zeros, when a number is an upper or lower bound and the importance to your work.
● Determine the domains, find the asymptotes, and sketch the graphs of rational functions.
● Recognize a rational function has a removable discontinuity.
3  Exponential and Logarithmic Functions

- Graph basic natural exponential functions and their shifts or reflections.
- Graph basic natural logarithmic functions and their shifts or reflections.
- Find the domain and range of exponential and logarithmic functions.
- Find the intercepts (x and y) of each graphed function.
- Use the compound interest formula to evaluate interest annually, monthly etc. as well as continuous compounding.
- Use the growth and decay formula to evaluate time or amount of substance after a certain period of time as elapsed.
- Evaluate logarithm-values with or without a calculator.
- Use properties of logarithms to expand and condense expressions containing logarithm(s).
- Solve exponential equations including quadratic exponential form.
- Solve logarithmic equations and check for extraneous solutions.
- Solve exponential and logarithmic functions that represent population growth, carbon-dating and other real-world applications.

4  Trigonometric Functions

- Draw an angle in standard position given the degree or radian measure.
- Sketch and find co-terminal angles.
- Find the complementary and supplementary angle to a given angle.
- Convert between radian measure and degree measure and vice versa.
- Find the arc length of a sector.
- Fill in the special angles (degrees and radians) and ordered pairs of the unit circle.
- Identify the 6 trig values of every special unit circle angle.
- In right triangle trig be able to evaluate the 6 trig values given two sides of the triangle.
- Memorize the trigonometric identities.
- Use the trig identities to solve trig equations.
- Use the trig identities to convert a trig expression to a simpler trig expression.
- Use right triangle trig to solve real world problems.
- Know the trig ratios in terms of x, y coordinate points.
- Use these trig ratios to evaluate the 6 trig functions given an ordered pair.

5  Analytic Trigonometry
• Use identities to evaluate all six trig functions given one trig function value and its quadrant.
• Simplify a given trigonometric expression by using the trig identities; factoring techniques, adding fractions and multiplying are necessary strategies to get to simplified form.
• Verify a trigonometric identity, using the same strategies mentioned above.
• Solving the following types of trigonometric equations:
  ○ a.) Equation containing a single trig function, degree one
  ○ b.) Equation containing a single trig function, degree two using factoring strategies.
  ○ c.) Equation containing two trig functions, rewriting in terms of sines and cosines or using the pythagorean identities and then using factoring strategies.
  ○ d.) Equation containing multiple angle trig function.
  ○ e) Equation containing a sum or difference angle, where identity must be used to rewrite expression before solving equation.
• Evaluating a trig function using the multiple angle identities.
• Evaluating a trig function at a non-unit circle angle by rewriting that angle as a sum or difference of unit circle angles and then using the sum or difference identities.
• Verify trig identities using the sum or difference identities.
• Evaluate trig functions involving double angles.

6  Additional Topics in Trigonometry

• Use the Law of Sines to solve the triangle.
• Be able to identify the number of solutions given an SSA triangle.
• Find the area of the Triangle given SAS and SSS.
• Solve real world problems using Law of Sines.
• Use Law of Cosines to solve SSS and SAS triangles
• Use the Law of Cosines to model and solve real-life problems.
• Be able to draw the resultant of two given vectors using the triangle and parallelogram method of addition of vectors.
• Be able to write the component form of a vector given the initial and terminal pt.
• Be able to write the component form of a vector given the direction angle and its magnitude.
• Be able to perform basic operations on vectors: addition, subtraction, and scalar multiplication.
• Find the unit vector in the same direction as a given vector.
• Write a vector as the linear combination of the standard unit vectors i and j.
7 Linear Systems and Matrices

- Use the methods of substitution, graphing, and elimination to solve systems of equations in two variables.
- Use systems of equations to model and solve real-life problems.
- Use back-substitution to solve linear systems in row-echelon form.
- Use Gaussian elimination to solve systems of linear equations.
- Solve nonsquare systems of linear equations.
- Graphically interpret three-variable linear systems.
- Use systems of linear equations to write partial fraction decompositions of rational expressions.
- Use systems of linear equations in three or more variables to model and solve real-life problems.
- Use matrices and identify their dimensions.
- Perform elementary row operations on matrices.
- Use matrices and Gaussian elimination to solve systems of linear equations.
- Use the calculator (RREF) to solve systems of linear equations.
- Decide whether two matrices are equal.
- Add and subtract matrices and multiply matrices by scalars.
- Multiply two matrices.
- Use matrix operations to model and solve real-life problems.
- Verify that two matrices are inverses of each other.
- Use a formula to find inverses of 2x2 matrices.
- Use inverse matrices to solve systems of linear equations.
- Find the determinants of 2x2 matrices by hand.
- Find the determinants of square matrices using a calculator.
- Use Cramer's Rule to solve systems of linear equations.

8 Sequences, Series, and Probability

- Use sequence notation to write the terms of sequences.
- Use factorial notation.
- Use summation notation to write sums.
- Find sums of infinite series (i.e. infinite geometric series).
- Use sequences and series to model and solve real-life problems.
- Recognize, write, and find the nth term of arithmetic and geometric sequences.
- Find nth partial sums of arithmetic and geometric sequences.
- Use arithmetic and geometric sequences to model and solve real-life problems.
- Use the Binomial Theorem to calculate binomial coefficients.
- Use binomial coefficients to write binomial expansions.
● Use Pascal’s Triangle to calculate binomial coefficients.
● Solve simple counting problems.
● Use the Fundamental Counting Principle to solve more complicated counting problems.
● Use permutations and combinations to solve counting problems.
● Find probabilities of events, of mutually exclusive events, and of independent events.
Course Title: Pre-Calculus 1 Honors

Course #: 1435-1436

Course Description: Pre-Calculus Honors is an accelerated course that reviews and solidifies Algebra 2 concepts and introduces more advanced concepts in algebra and trigonometry. Students are also introduced to topics from calculus, including finding limits and derivatives. This course is designed to prepare students to take AP Calculus AB or BC.

UC/CSU Approval: “c” approved

Grade Level: 10-12

Estimated Homework Per Week: 5 hours (About 2 hours per assignment)

Prerequisite: Completion of Algebra 2 with a “B” or higher OR completion of Algebra 2/Trig Honors with a “C” or higher

Recommended Prerequisite Skills: ALL of the skills acquired and honed in Algebra 2 will be used to a greater extent in Pre-Calculus Honors. Students would benefit from a strong background in:

- Multi-step equation solving. Including rational, polynomial, and radical.
- Graphing linear, polynomial, radical and rational functions
- Basic knowledge of right triangle trigonometry
- Factoring ability
- Exponent Properties

Course Grade Scale:
- Tests: 50%
- Quizzes: 20%
- Homework: 15%
- Final: 15%

Major Assessments/Units/Topics:
There is typically one test per unit and one quiz.

Unit 1 – Prerequisite Skills
This first unit is focused on making sure students are capable with the basics of equation
solving and expression simplification that will necessary in all of the future chapters.

Topics: Linear Functions, Exponent Properties, Factoring, Equation Solving

Unit 2 – Functions and Transformations
Unit 2 is focused on more general function properties and characteristics. Students will analyze graphs and identify as many features and behaviors of functions as they can.

Topics: Piecewise Functions, Limits graphically, limits at infinity (end behavior), continuity introduction, relative extrema, increasing/decreasing/constant, parent functions and transformations.

Unit 3 – Polynomial and Rational Functions
This unit is focused on graphing and identify key features of polynomial functions (including quadratics) in the first half. The second half focuses on rational functions and how to identify both vertical and horizontal asymptotes, holes, and slant asymptotes.

Topics: Factoring, rational root theorem, complex numbers, long division, synthetic division, asymptotes, domain, holes

Unit 5 – Exponential and Logarithmic Functions
This unit explores the inverse relationship between exponential and logarithmic functions. Student will be tasked to graph and solve equations that include both.

Topics: Exponent properties, graphing exponential functions, logarithm properties, graphing logarithmic functions, exponential modeling.

Unit 6 – Trigonometric Functions
Students will learn the relationships between the trig functions and right triangles, develop an understanding of the unit circle and the bulk of the second half of this unit will focus on graphing the trig functions.

Topics: Angles and angle measures, unit circle trig, right triangle trigonometry, graphing trig functions, inverse trig functions.

Unit 7 – Analytic Trigonometry
Building off of what was covered last unit, this unit focuses on certain trig identities and relationships. Students will use trig identities to both prove that two expressions are equivalent and to solve equations. Additionally, law of sines and cosines as a means to find missing parts of a triangle will be covered in this chapter as well.

Topics: Pythagorean trig identities, sum and difference formulas, double angle identities, trig equations, law of sines, law of cosines
Unit 8 – Polar and Parametric Functions
This unit focuses on two common ways to express the relationship of two variables depending separately with respect to a third parameter variable. Polar functions relate horizontal and vertical position to functions of an angle measure, and parametric functions most often (in this course at least) relate horizontal and vertical position to functions of time. Students will learn how to graph these functions as well as describe their behaviors.

Topics: Parametric functions, polar functions, vectors

Unit 9 – Limits and Derivatives
This unit is more or less the first section in any calculus course. Students will expand on what they learned about limits earlier in the year and apply them in several ways. Students will briefly look at sequences and series and what happens in infinite sequences and series. The second half of this unit will use limits to determine the slope of the tangent line to a function and then look at the first of the basic derivative rules.

Topics: Sequences, Series, Limits, derivatives, tangent lines
Course Title: Statistics

Course #: 1445-1446

Course Description: Statistics is designed for students who have completed a minimum of Algebra 2 and wish to continue their mathematics education but do not wish to take Pre-Calculus or AP Statistics. Statistics covers four (4) major topics throughout the school year: Producing data, organizing data, probability, and statistical inference. This course will utilize graphing calculator technology with a statistical package (such as the Ti-84). Successful completion of this course prepares students for college-level statistics.

UC/CSU Approval: “C” approved

Grade Level: 11-12

Estimated Homework Per Week: Students who wish to be successful are expected to spend approximately 30-60 minutes outside of class on homework for each class period. Roughly one section from the text will be covered per class and one chapter every 4 weeks.

Prerequisite: Completion of Algebra 2 or Algebra 2/Trig (Honors) with a grade of “C” or higher

Recommended Prerequisite Skills: Students entering Statistics should already have a good understanding of the following concepts:
  ● Basic math skills, especially solving for variables in equations
  ● Identifying slope from graphs, equations, and word problems
  ● Students should also have strong reading skills to be able to understand and interpret a variety of word problems and explanations of concepts
  ● Students should be able to critically think and relate topics covered in class to real-world application problems

Course Grade Scale:
  ● Tests and Quizzes: 55%
  ● Homework: 15%
  ● Activities: 15%
  ● Final Exam: 15%

Major Assessments/Units/Topics:

Each semester will have approximately 4 tests and 4 quizzes.
Topics to be covered include:

**SEMESTER ONE**

- **Analyzing One-Variable Data**
  - organizing/displaying data
  - using numerical summaries for quantitative data
  - describing location in a distribution
- **Analyzing Two-Variable Data**
  - analyzing/displaying two-variable data
  - measuring/interpreting correlation
  - modeling linear associations
- **Collecting Data**
  - using the four steps of the statistical problem-solving process
  - taking samples/surveys using appropriate methods
  - identifying/designing an observational study and an experiment
- **Probability**
  - understanding the concepts of randomness, probability, and simulation
  - using probability models and basic probability rules
  - recognizing conditional probability and its usefulness in identifying independent events
  - using counting principles to help solve certain probability questions

**SEMESTER TWO**

- **Random Variables**
  - analyzing random variables
  - recognizing/interpreting Binomial as well as Normal probabilities
- **Sampling Distributions**
  - understanding the idea of a sampling distribution
  - using the sampling distribution of a sample count/proportion/mean to find the probability of obtaining a particular sample statistic
- **Estimating a Parameter**
  - understanding the idea of a confidence interval
  - making a confidence interval for a proportion/mean
- **Testing a Claim**
  - understanding the idea of a significance test
  - checking the conditions for when a significance test is appropriate
  - conducting a significance test for a proportion/mean