MATHEMATICS

PRE-ALGEBRA

MATHEMATICS | SEVENTH GRADE | 1 CREDIT

Pre-Algebra equips the student for a study in Algebra by introducing the language and the tools of the subject. Students will learn about the Real Numbers system and its properties. Concepts taught in the lower grades, such as order of operations, GCF, and simplification of fractions, will be expanded to include algebraic expressions with variables. Students will solve linear equations and inequalities and learn the fundamentals of graphing linear functions in the Cartesian Coordinate System.

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *God:* students should come to appreciate the eternality and infiniteness character of our Creator. It is He who has completely ordered our universe and its workings within.
- *Beauty of numbers:* students should grow in their love of the absolute truth exhibited in the properties of numbers and readily recognize these patterns in the world around them.

-

WHAT SKILLS SHOULD STUDENTS HAVE BY THE END OF THIS COURSE?

- *Memorization:* students should be able to memorize key formulas and apply to different problem types.
- *Pattern Recognition:* the student should be able to recognize the types of algebraic equations and determine the appropriate methods and strategies in solving.
- *Critical Thinking:* the student should be able to read word problems and apply the four-step problem-solving method to determine what is being asked and to develop a sound plan for its solution.
- *Assessment:* students should be able to identify whether their proposed solution is reasonable for the given problem. They should be able to check their own steps to ensure they have followed logical steps with accuracy.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- How to simplify algebraic expressions using the Order of Operations
- Add/subtract/multiply/divide integers
- Solve simple linear equations
- Solve linear inequalities
- How to work with exponents
- Add/subtract/multiply/divide rational numbers
- How to graph a linear equation
- How to solve proportions
- How to calculate percentages

CLASS RESOURCES

- *Singapore Math, Course 2A, Cavendish, Cavendish Education, 2018*
- *Singapore Math, Course 2B, Cavendish, Cavendish Education, 2018*
- *Singapore Math, Course 3A, Cavendish, Cavendish Education, 2018*
- *Singapore Math, Course 3B, Cavendish, Cavendish Education, 2018*

METHODS

- Presentation of lessons and examples
- Class discussion
- Question/answer sessions
- Small groups/peer tutoring

MEASUREMENT & ASSESSMENT

- Daily assignments
- Quizzes
- Chapter tests
- Cumulative semester exam

QUARTERLY SCHEDULE

QUARTER 1

(Course 2A)
- Real Number System
- Operations with integers, rational numbers, and decimals
- Algebraic expressions

QUARTER 2

(Course 2A/3A)
- Exponential notation
- Prime factorization
- Exponential rules
- Scientific notation
- Solving linear equations

QUARTER 3

(Course 3A)
- Solving linear inequalities
- Lines and linear equations
- Functions and graphing

QUARTER 4

(Course 2B/3B)
- Pythagorean Theorem and Distance Formula
- Geometric Transformations
- Congruence and Similarity

FIELD TRIPS & EXPERIENCES

ALGEBRA I

MATHEMATICS | EIGHTH GRADE | 1 CREDIT

Algebra1 builds on the basic principles that were introduced in Pre-Algebra. Students will learn problem-solving techniques and strategies for various types of equations and inequalities. In addition, this course will explore basic functions and their graphs. Students will identify different functions and their graphs and will examine transformations of these functions in the coordinate plane. Real-world applications connect mathematics to our world in nature, economics, physics, and other areas. A brief introduction to sequences and data analysis is included to prepare the student for deeper analysis in future courses.

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *God:* students should come to appreciate the eternality and infiniteness character of our Creator. It is He who has completely ordered our universe and its workings within.
- *Beauty of numbers:* students should grow in their love of the absolute truth exhibited in the properties of numbers and readily recognize these patterns in the world around them.

WHAT SKILLS SHOULD STUDENTS HAVE BY THE END OF THIS COURSE?

- *Memorization:* students should be able to memorize key formulas and apply to different problem types.
- *Pattern Recognition:* the student should be able to recognize the types of algebraic equations and determine the appropriate methods and strategies in solving.
- *Critical Thinking:* the student should be able to read word problems and apply the four-step problem-solving method to determine what is being asked and to develop a sound plan for its solution.
- *Assessment:* students should be able to identify whether their proposed solution is reasonable for the given problem. They should be able to check their own steps to ensure they have followed logical steps with accuracy.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- How to solve linear equations and inequalities
- The relationship between linear equations and linear functions
- How to write equations of linear functions
- How to solve systems of linear equations by graphing, substitution, and elimination
- How to simplify algebraic expressions by applying the appropriate properties
- How to factor trinomials and simple polynomials
- How to solve simple exponential equations
- How to solve quadratic equations using various methods
- How to solve simple radical equations
- How to graph linear functions and quadratic functions

CLASS RESOURCES

- *Algebra 1,* Larson and Boswell, Big Ideas Learning, 2022

METHODS

- Presentation of lessons and examples
- Class discussion
- Question/answer sessions
- Small groups/peer tutoring

MEASUREMENT & ASSESSMENT

- Daily assignments
- Quizzes
- Chapter tests
- Cumulative semester exam

QUARTERLY SCHEDULE

QUARTER 1

Chapters 1 – 3
- Linear equations
- Absolute value equations
- Linear inequalities
- Compound inequalities and absolute value inequalities
- Functions and relations
- Graphing linear functions and transformations
- Graphing absolute value functions

QUARTER 2

Chapters 4 – 6a
- Writing linear equations
- Scatter plots and lines of fit
- Arithmetic sequences
- Piece-wise functions
- Systems of linear equations
- Systems of linear inequalities
- Properties of exponents

QUARTER 3

Chapters 6b – 8
- Exponential equations
- Geometric and recursive sequences
- Polynomials and operations
- Factoring techniques
- Graphing quadratic functions

QUARTER 4

Chapters 9 – 11
- Quadratic equations
- Nonlinear systems of equations
- Graphing square-root and cube-root functions
- Radical equations
- Inverse of a function
- Measures of center and variation

FIELD TRIPS & EXPERIENCES

GEOMETRY
MATHEMATICS | NINTH GRADE | 1 CREDIT

Geometry draws on the problem-solving techniques from Algebra 1 and Logic and applies these skills to the study of geometric figures. Students are introduced to formal and informal proofs as they further develop their reasoning and documentation techniques. This course explores relationships between points, lines, and planes and includes a comprehensive study of triangles and relationships within them. Students will investigate quadrilaterals, other polygons, circles, and three-dimensional solids. A brief introduction to right triangle trigonometry will set the stage for Pre-Calculus.

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *God:* students should come to appreciate the eternality and infiniteness character of our Creator. It is He who has completely ordered our universe and its workings within.
- *Beauty of numbers:* students should grow in their love of the absolute truth exhibited in the properties of numbers and readily recognize these patterns in the world around them.

-

WHAT SKILLS SHOULD STUDENTS HAVE BY THE END OF THIS COURSE?

- *Memorization:* students should be able to memorize key formulas and apply to different problem types.
- *Pattern Recognition:* the student should be able to recognize the types of algebraic equations and determine the appropriate methods and strategies in solving.
- *Critical Thinking:* the student should be able to read word problems and apply the four-step problem-solving method to determine what is being asked and to develop a sound plan for its solution.
- *Assessment:* students should be able to identify whether their proposed solution is reasonable for the given problem. They should be able to check their own steps to ensure they have followed logical steps with accuracy.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- How to perform basic geometric constructions
- How to write informal and formal proofs
- How to analyze parallel lines, transversals, and the angles formed by them
- How to identify different types of angles
- The different ways to prove triangle congruence
- Properties of triangles, quadrilaterals, other polygons, and circles
- How to calculate area, perimeter, surface area, and volume of various geometric figures

CLASS RESOURCES

- *Geometry*, Larson and Boswell, Big Ideas Learning, 2022

METHODS

- Presentation of lessons and examples
- Class discussion
- Question/answer sessions
- Small groups/peer tutoring

MEASUREMENT & ASSESSMENT

- Daily assignments
- Quizzes
- Chapter tests
- Cumulative semester exam

QUARTERLY SCHEDULE

QUARTER 1

Chapters 1 – 3

- Points, lines, and planes
- Midpoint and Distance formulas
- Perimeter and area in the coordinate plan
- Angle pairs
- Conditional statements
- Inductive and deductive reasoning
- Proving algebraic statements, and geometric relationships
- Parallel lines and transversals
- Perpendicular lines

QUARTER 2

Chapters 4 – 6

- Transformations (translations, reflections, rotations, and dilations)
- Congruent polygons
- Proving triangle congruence
- Equilateral and isosceles triangles
- Coordinate proofs
- Perpendicular and angle bisectors
- Bisectors, medians, and altitudes of triangles
- Inequalities in one triangle
- Inequalities in two triangles

QUARTER 3

Chapters 7 – 9

- Angles of polygons
- Quadrilaterals (parallelograms, trapezoids, and other special ones)
- Similar polygons
- Triangle similarity
- Pythagorean Theorem
- Special right triangles
- Sine, cosine, and tangent ratios
- Solving right triangles
- Law of Sines and Law of Cosines

QUARTER 4

Chapters 10 – 12

- Arc measures
- Chords
- Inscribed angles and polygons
- Angle relationships in circles
- Segment relationships in circles
- Circles in the coordinate plane
- Circumference and arc length
- Areas of circles, sectors, and polygons
- Surface area and volume

FIELD TRIPS & EXPERIENCES

ALGEBRA II

MATHEMATICS | TENTH GRADE | 1 CREDIT

Algebra II builds on the problem-solving techniques learned in Algebra 1 and the analytical skills from Geometry to deepen the study of linear and quadratic functions while facilitating a study of polynomial, rational, exponential, logarithmic, and trigonometric functions. New encounters include the complex number system, logarithmic equations, angle radian measure, sequences and series.

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *God:* students should come to appreciate the eternality and infiniteness character of our Creator. It is He who has completely ordered our universe and its workings within.
- *Beauty of numbers:* students should grow in their love of the absolute truth exhibited in the properties of numbers and readily recognize these patterns in the world around them.

-

WHAT SKILLS SHOULD STUDENTS HAVE BY THE END OF THIS COURSE?

- *Memorization:* students should be able to memorize key formulas and apply to different problem types.
- *Pattern Recognition:* the student should be able to recognize the types of algebraic equations and determine the appropriate methods and strategies in solving.
- *Critical Thinking:* the student should be able to read word problems and apply the four-step problem-solving method to determine what is being asked and to develop a sound plan for its solution.
- *Assessment:* students should be able to identify whether their proposed solution is reasonable for the given problem. They should be able to check their own steps to ensure they have followed logical steps with accuracy.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- How to solve linear, quadratic, polynomial, and rational equations
- How to analyze and graph linear, quadratic, polynomial, exponential, rational, radical, and logarithmic functions
- How to solve applications of linear and quadratic functions
- How to perform operations with complex numbers
- How to perform operations with rational expressions
- How to calculate simple probability
- How to analyze arithmetic and geometric sequences and series How to solve applications using right triangle trigonometry

CLASS RESOURCES

- *Algebra 2,* Larson and Boswell, Big Ideas Learning, 2022

METHODS

- Presentation of lessons and examples
- Class discussion
- Question/answer sessions
- Small groups/peer tutoring

MEASUREMENT & ASSESSMENT

- Daily assignments
- Quizzes
- Chapter tests
- Cumulative semester exam

QUARTERLY SCHEDULE

QUARTER 1

Chapters 1 – 3
- Parent functions and transformations
- Transformations of linear and absolute value functions
- Linear systems
- Quadratic functions
- Quadratic equations
- Complex numbers
- Nonlinear systems of equations
- Quadratic inequalities

QUARTER 2

Chapters 4 – 6a
- Graphing/analyzing polynomial functions
- Operations with polynomials
- Factoring polynomials
- Solving polynomial equations
- Rational exponents and radicals
- Graphing radical functions
- Solve radical equations and inequalities
- Compositions of functions
- Exponential growth and decay

QUARTER 3

Chapters 6b – 8
- Logarithms
- Logarithmic functions
- Solving exponential and logarithmic equations
- Rational functions
- Operations with rational expressions
- Probability
- Permutations and Combinations
- Binomial Distributions

QUARTER 4

Chapters 9 – 11
- Normal distributions
- Data analysis
- Right triangle trigonometry
- Angle and radian measure
- Graphing trigonometric functions
- Trigonometric identities
- Analyzing arithmetic sequences and series
- Analyzing geometric sequences and series
- Recursive rules with sequences

FIELD TRIPS & EXPERIENCES

PRE-CALCULUS
MATHEMATICS | 1 CREDIT

Pre-Calculus brings together Algebra and Geometry delivering a more in-depth study of algebraic functions, transcendental functions, and non-elementary functions. Topics in trigonometry are introduced as well. Students will analyze conic sections and investigate polar coordinates. The course concludes with an introduction to Calculus by evaluating limits, which sets them up for the formal definition of the derivative.

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *God:* students should come to appreciate the eternality and infiniteness character of our Creator. It is He who has completely ordered our universe and its workings within.
- *Beauty of numbers:* students should grow in their love of the absolute truth exhibited in the properties of numbers and readily recognize these patterns in the world around them.

-

WHAT SKILLS SHOULD STUDENTS HAVE BY THE END OF THIS COURSE?

- *Memorization:* students should be able to memorize key formulas and apply to different problem types.
- *Pattern Recognition:* the student should be able to recognize the types of algebraic equations and determine the appropriate methods and strategies in solving.
- *Critical Thinking:* the student should be able to read word problems and apply the four-step problem-solving method to determine what is being asked and to develop a sound plan for its solution.
- *Assessment:* students should be able to identify whether their proposed solution is reasonable for the given problem. They should be able to check their own steps to ensure they have followed logical steps with accuracy.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- How to graph linear, polynomial, rational, exponential, and logarithmic functions
- How to solve polynomial, exponential, and logarithmic equations
- How to find trigonometric functions of given angles
- How to apply trigonometric identities to prove other identities
- How to solve oblique triangles
- How to use matrices to solve linear systems
- How to analyze/graph conic sections
- How to calculate limits

CLASS RESOURCES

- *PreCalculus with Limits, 8th ed.,* Larson and Battaglia, Cengage, 2018

METHODS

- Presentation of lessons and examples
- Class discussion
- Question/answer sessions
- Small groups/peer tutoring

MEASUREMENT & ASSESSMENT

- Daily assignments
- Quizzes
- Chapter tests
- Cumulative semester exam

QUARTERLY SCHEDULE

QUARTER 1

Chapters 1 – 3
- Algebraic functions
- Polynomial and rational functions
- Solving polynomial equations
- Complex numbers
- Exponential and logarithmic functions
- Properties of logarithms
- Solving exponential and logarithmic equations

QUARTER 2

Chapters 4 – 6
- Radian and degree measure
- Unit Circle
- Right triangle trigonometry
- Trigonometric functions and their graphs
- Trigonometric identities
- Trigonometric equations
- Law of Sines, Law of Cosines
- Vectors
- The complex plane

QUARTER 3

Chapters 7 – 9a
- Systems of equations
- Matrices
- Sequences and series
- Probability
- Conic sections

QUARTER 4

Chapters 9b – 11
- Polar coordinates, equations, and graphs
- Vectors in space
- Introduction to limits
- Tangent line problem
- Area problem

FIELD TRIPS & EXPERIENCES

CALCULUS
MATHEMATICS | TWELFTH GRADE | 1 CREDIT

Calculus utilizes advanced algebra and trigonometry to investigate two major topics: the slope of a curve at any given point and the area under a curve over a given interval. The student will analyze elementary and non-elementary functions, study differentiation, techniques of integration, and briefly encounter differential equations. This course is designed to prepare the student for higher mathematics study and can serve as a preparatory course for the College Board AP Calculus AB exam.

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *God:* students should come to appreciate the eternality and infiniteness character of our Creator. It is He who has completely ordered our universe and its workings within.
- *Beauty of numbers:* students should grow in their love of the absolute truth exhibited in the properties of numbers and readily recognize these patterns in the world around them.

-

WHAT SKILLS SHOULD BY STUDENTS HAVE BY THE END OF THIS COURSE?

- *Memorization:* students should be able to memorize key formulas and apply to different problem types.
- *Pattern Recognition:* the student should be able to recognize the types of algebraic equations and determine the appropriate methods and strategies in solving.
- *Critical Thinking:* the student should be able to read word problems and apply the four-step problem-solving method to determine what is being asked and to develop a sound plan for its solution.
- *Assessment:* students should be able to identify whether their proposed solution is reasonable for the given problem. They should be able to check their own steps to ensure they have followed logical steps with accuracy.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- How limits relate to the behavior of a function
- How a derivative can be used to analyze the behavior of a function
- The multiple interpretations of the derivative
- How to use derivatives to solve related rates and other applications
- How to evaluate integrals using a variety of techniques
- How to find the area under a curve
- How to solve and interpret simple differential equations

CLASS RESOURCES

- *Calculus of a Single Variable,* 11th ed., Larson and Edwards, Cengage, 2018

METHODS

- Presentation of lessons and examples
- Class discussion
- Question/answer sessions
- Small groups/peer tutoring

MEASUREMENT & ASSESSMENT

- Daily assignments
- Quizzes
- Chapter tests
- Cumulative semester exam

QUARTERLY SCHEDULE

QUARTER 1

Chapters P – 2
- Review of algebraic and trigonometric functions and their graphs
- Limits and their properties
- The derivative and the tangent line problem
- Differentiation rules and related rates

QUARTER 2

Chapters 3 – 4
- Rolle's Theorem and Mean Value Theorem
- Extrema, concavity, asymptotes, and curve sketching
- Differentials
- Antiderivatives
- Fundamental Theorem of Calculus

QUARTER 3

Chapters 5 – 6
- Logarithmic, exponential, and other transcendental functions
- Indeterminate forms and L'Hôpital's Rule
- Hyperbolic functions
- Euler's Method
- Separation of variables
- First-order linear differential equations

QUARTER 4

Chapters 7 – 8
- Area of region between two curves
- Volume: Disk Method and Shell Method
- Integration rules and techniques
- Partial fractions
- Improper integrals

FIELD TRIPS & EXPERIENCES

ADVANCED ALGEBRA
MATHEMATICS | TWELFTH GRADE | 1 CREDIT

College Algebra builds on the problem-solving techniques learned in Algebra 1, Geometry, and Algebra 2 to continue the study of elementary and non-elementary functions. The students will learn to evaluate continuity in functions, work with partial fractions, and polar equations. This course also contains sections of SAT & ACT preparation throughout the course.

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *God:* students should come to appreciate the eternality and infiniteness character of our Creator. It is He who has completely ordered our universe and its workings within.
- *Beauty of numbers:* students should grow in their love of the absolute truth exhibited in the properties of numbers and readily recognize these patterns in the world around them.

WHAT SKILLS SHOULD BY STUDENTS HAVE BY THE END OF THIS COURSE?

- *Memorization:* students should be able to memorize key formulas and apply to different problem types.
- *Pattern Recognition:* the student should be able to recognize the types of algebraic equations and determine the appropriate methods and strategies in solving.
- *Critical Thinking:* the student should be able to read word problems and apply the four-step problem-solving method to determine what is being asked and to develop a sound plan for its solution.
- *Assessment:* students should be able to identify whether their proposed solution is reasonable for the given problem. They should be able to check their own steps to ensure they have followed logical steps with accuracy.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- Linear relations and functions
- Systems of linear equations and inequalities
- How to work with matrices
- Continuity and end behavior
- Polynomial and rational functions
- Remainder Theorem, Factor Theorem, Rational Root Theorem
- Polar coordinates and complex numbers
- Exponential and logarithmic functions
- Combinatorics and probability
- Statistics and data analysis

CLASS RESOURCES

- *Advanced Mathematical Concepts,* Glencoe/McGraw-Hill, 2004

METHODS

- Presentation of lessons and examples
- Class discussion
- Question/answer sessions
- Small groups/peer tutoring

MEASUREMENT & ASSESSMENT

- Daily assignments
- Quizzes
- Chapter tests
- Cumulative semester exam

QUARTERLY SCHEDULE

QUARTER 1

Chapters 1 – 3a
- Relations and Functions
- Graphing/writing linear equations
- Piecewise functions
- Linear inequalities
- Systems of linear equations
- Matrices and determinants
- Inverse functions

QUARTER 2

Chapters 3b – 4
- Continuity
- Critical points and extrema
- Rational functions
- Direct, inverse, and joint variation
- Polynomial functions
- Quadratic equations
- Remainder Theorem, Factor Theorem, Rational Root Theorem
- Polynomial, rational, and radical equations

QUARTER 3

Chapters 9 & 11
- Polar coordinates and graphs of polar equations
- Relationship between polar and rectangular coordinates
- Complex plane and polar form of complex numbers
- Products, quotients, powers, and roots of complex numbers
- Exponential functions
- Logarithmic functions
- Common and natural logarithms

QUARTER 4

Chapters 13 – 14
- Permutations and combinations
- Probability and odds
- Binomial Theorem
- Frequency distribution
- Measures of central tendency
- Measures of variability
- Normal distribution

FIELD TRIPS & EXPERIENCES

SCIENCE

EARTH SCIENCE

SCIENCE| SEVENTH GRADE | 1 CREDIT

The course focuses on the study of Earth. As such, it will look at Earth as a whole and its place in the solar system. The four Earth systems will also be a focus – the lithosphere, the hydrosphere, the atmosphere, and the biosphere. Each quarter will focus on the structure and workings of one of the abiotic systems and their relationship to the biosphere: Q1 – Earth as a whole, Q2 – The Lithosphere, Q3 – The Hydrosphere, and Q4 – The Atmosphere.

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *Earth:* as the main focus of the study, students should have a greater appreciation for the intricacy, wonder, and diversity of the Earth.
- *Life:* given the study of the physical world's many parts, students should realize the importance of having a natural world that provides all necessary components for life.
- *God:* while looking at the details of the physical world, students should grow fonder of the Creator that put all these wonders into place for them.
- *Scientific Process:* students should increasingly see the value in the scientific process – the continuous collection of information through observation and experimentation.
- *Stewardship:* students should have a greater understanding of the delicacies of the Earth and the role humans have in aiding or harming the Earth. They should then endeavor to be an aid whenever they can.

-

WHAT SKILLS SHOULD STUDENTS HAVE BY THE END OF THIS COURSE?

- *Scientific Observation:* students will have the opportunity to improve their observational skills and their ability to communicate those observations in a clear manner.
- *Reading Scientific Texts:* students will be exposed to scientific writing which is very different than most writings to which they have been exposed. Students should grow in the ability to pull out important concepts and supporting facts from those texts.
- *Scientific Writing:* students will need to understand established scientific ideas in order to explain them in their own terms. Also, students will be able to clearly explain ideas of their own.
- *Drawing valid conclusions:* students will be challenged to look at multiple sources of information and drawing valid and proper conclusions. This will take place in the laboratory and academic setting.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- Students should be able to understand and explain the interplay of the four Earth systems.
- Students can describe Earth's place in the solar system and explain how that position affects life on Earth.
- Students should become familiar with the Cycle of Scientific Enterprise and be able to verbalize its use in studying the Earth.
- Students should be able to demonstrate how minerals are the most basic building blocks of the lithosphere, themselves built up by different elements and compounds.
- Students will be given the opportunity to show how rocks are slowly, but constantly, changing form throughout the lithosphere.
- Students will become familiar with the theory of plate tectonics and be able to articulate how that theory undergirds our understanding of major geological activities – mountain building, volcanoes, and earthquakes.
- Students will be able to explain how the Earth's structure and all living things are reliant upon the hydrologic cycle.
- Students will be given the opportunity to learn the composition of Earth's atmosphere and discuss the merit of its conservation.
- Students should be able to fully identify all features of a weather map and use a weather map to predict upcoming weather.

CLASS RESOURCES

- Nelstead, Kevin. *Earth Science. God's World, Our Home.* Austin, TX: Novare Science & Math LLC. 2016.

METHODS

- Read aloud
- Dramatized narrative and role-play
- Narration to the teacher
- Journaling
- Worksheets and activity pages

MEASUREMENT & ASSESSMENT

- In Kindergarten the students are not formerly assessed on Bible. They are asked to recall the accounts they have learned and to recite memory work individually.

QUARTERLY SCHEDULE

QUARTER 1

- Earth as a Whole: Four Earth Systems, Earth's Place in the Solar System, The Moon, Visualizing Earth
- Earth Science: Cycle of Scientific EnterpriseStudying the Earth, Stewardship of the Earth
- Matter and Minerals: Atoms and Elements, Mineral Formation, Mineral Properties
- Portions of Chapters 1-4 in *Earth Science. God's World, Our Home.*

QUARTER 2

- Rocks and the Rock Cycle: Igneous Rocks, Sedimentary Rocks, Metamorphic Rocks, Fossil Fuels
- Plate Tectonics: The Ocean Floor and Theory of Plate Tectonics, Mountain Building, Volcanism and Volcano Types, Earthquakes, Earth's Interior
- Portions of Chapters 5-7 in *Earth Science. God's World, Our Home.*

QUARTER 3

- Weathering and Soils: Weathering, Erosion, Soil Types
- Hydrologic Cycle: Streams, Groundwater, Glaciers, Oceanography
- Portions of Chapters 8-12 in *Earth Science. God's World, Our Home.*

QUARTER 4

- The Atmosphere: Composition of the Atmosphere, Properties of the Atmosphere, Energy, Water, and Movement in the Atmosphere
- Weather: Clouds and Precipitation, Air Masses and Fronts, Weather Forecasts, Severe Weather
- Climate: Differences from Weather, Climate Change, Air Pollution
- Text: Portions of Chapters 13-15 in *Earth Science. God's World, Our Home.*

FIELD TRIPS & EXPERIENCES

- Quarter 1: Viewing of the Lunar Cycle; Observation of Mineral Samples
- Quarter 2: Rock Identification; Construction of Volcanic Models
- Quarter 3: The Diversity of Soil Type; The Wonders of Water
- Quarter 4: True Effects of Air Pressure; Deciphering Weather Maps

PHYSICAL SCIENCE

SCIENCE | EIGHTH GRADE | 1 CREDIT

This course studies physical science, the fundamentals of chemistry and physics. This course is designed to build a solid foundation for the later study of biology, chemistry, and physics. To that end, the study of science itself, measurement, and matter will occur at the beginning of the course (Q1). This will be followed by the study of substance (Q2), energy (Q3), and motion, waves, and electromagnetism (Q4).

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *Nature:* as the main focus of the study being the intricacies of physical world, students should have a greater appreciation for the details, wonder, and diversity of the physical world.
- *Life:* given the study of the physical world's many parts, students should realize the importance of having a natural world that provides all necessary components for life.
- *God:* while looking at the details of the physical world, students should grow fonder of the Creator that put all these wonders into place for them.
- *Scientific Process:* students should increasingly see the value in the scientific process – the continuous collection of information through observation and experimentation.
- *Stewardship:* students should have a greater understanding of the delicacies of the Earth and the role humans have in aiding or harming the Earth. They should then endeavor to be an aid whenever they can.

-

WHAT SKILLS SHOULD STUDENTS HAVE BY THE END OF THIS COURSE?

- *Scientific Observation:* students will have the opportunity to improve their observational skills and their ability to communicate those observations in a clear manner.
- *Reading Scientific Texts:* students will be exposed to scientific writing which is very different than most writings to which they have been exposed. Students should grow in the ability to pull out important concepts and supporting facts from those texts.
- *Scientific Writing:* students will need to understand established scientific ideas in order to explain them in their own terms. Also, students will be able to clearly explain ideas of their own.
- *Drawing valid conclusions:* students will be challenged to look at multiple sources of information and drawing valid and proper conclusions. This will take place in the laboratory and academic setting.
- *Valid Scientific Calculations:* students will know how to properly integrate science and mathematics through the use of dimensional analysis and significant figures.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- Students should become familiar with the Cycle of Scientific Enterprise and be able to verbalize its use in studying physical science.
- Students should be comfortable taking proper measurements and converting them between common units.
- Students should be able to replicate the structure of atoms and explain how they combine in compounds and molecules.
- •Students should be able to articulate how the physical and chemical properties of substances lead to chemical reactions.
- Students should be able to identify the multiple forms of energy and explain the relationships between those types of energies.
- Students should be able to defend the conservation of energy in multiple scenarios.
- Students should be able to describe the four naturally occurring forces and the fields they produce.
- Students should be able to describe motion using Newton's Laws in both qualitative and quantitative manners.
- Students should be familiar with the different types of waves and how each type interacts with the physical world.
- Students should be able to discuss the nature of electricity and its relationship with magnetism.

CLASS RESOURCES

- Mays, John D. *Novarae Physical Science. 3rd Ed.* Austin, TX: Novare Science & Math LLC. 2017.

METHODS

- Teacher-guided discussion
- Explanation of important terminology
- Observation of the living world
- Laboratory experiments (including dissections)

MEASUREMENT & ASSESSMENT

- Students can expect periodic quizzes throughout the coverage of each unit with a larger assessment at the conclusion of each unit. There is also a final in each semester, worth 20% of a semester grade. The assessments are designed to allow students to show their ability to explain the topics of importance in each unit along with synthesizing their own ideas about the material.

QUARTERLY SCHEDULE

QUARTER 1

- Science, Theories, and Truth: Cycle of Scientific Enterprise, Facts and Theories
- Measurement and Units: Valid measurements, International System of Units, Unit Conversions
- Matter and Atoms: Atomic Structure, Atomic Theory
- Portions of Chapters 1, 7, and 8 in *Novare Physical Science.*

QUARTER 2

- Substances: Molecules and Crystals, Family Tree, Elements, Compounds
- Properties of Substances: Physical Properties, Phases of Matter, Chemical Properties
- Compounds and Chemical Reactions: Chemical Equations, Compound Formation, Chemical Reactions
- Portions of Chapters 6, 9, and 11 in *Novare Physical Science.*

QUARTER 3

- Sources of Energy: What is Energy? Where is Energy? Forms of Energy.
- Conservation of Energy: Law of Conservation of Energy, Mass-Energy Equivalence, Heat and Work
- Order and Design: Laws of Nature, Intelligence
- Forces and Fields: The Four Forces, The Three Fields
- Portions of Chapters 2-5 in *Novare Physical Science.*

QUARTER 4

- Force and Motion: Velocity, Acceleration, Newton's Laws of Motion
- Waves, Sound, and Light: Types of Waves, Reflection, Refraction, Diffraction, Sound
- Electricity: Nature of Electricity, Static Electricity, Circuits
- Magnetism: Cause of Magnetism, Ampere's Law
- Text: Portions of Chapters 10, 12-14 in *Novare Physical Science.*

FIELD TRIPS & EXPERIENCES

- Quarter 1: Taking Measurements; Determining Volume; Bohr Models of Atoms
- Quarter 2: Growing Crystals; Determining Density; Observing Chemical Reactions
- Quarter 3: Kinetic Energy; Heat Transfer by Conduction; Electrostatic Forces
- Quarter 4: Find Acceleration due to Gravity; Refraction; Electric Circuits

BIOLOGY
SCIENCE | NINTH GRADE | 1 CREDIT

Biology is the study of living things. This course examines what constitutes life, the major biological processes, and the great diversity of living organisms. The study begins with those characteristics and processes common to the majority of living organisms and then narrows the focus to the way that different groups of organisms complete those processes.

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *Nature:* as the main focus of the study being the intricacies of physical world, students should have a greater appreciation for the details, wonder, and diversity of the physical world.
- *Life:* given the study of the physical world's many parts, students should realize the importance of having a natural world that provides all necessary components for life.
- *God:* while looking at the details of the physical world, students should grow fonder of the Creator that put all these wonders into place for them.
- *Scientific Process:* students should increasingly see the value in the scientific process – the continuous collection of information through observation and experimentation.
- *Stewardship:* students should have a greater understanding of the delicacies of the Earth and the role humans have in aiding or harming the Earth. They should then endeavor to be an aid whenever they can.

WHAT SKILLS SHOULD STUDENTS HAVE BY THE END OF THIS COURSE?

- *Scientific Observation:* students will have the opportunity to improve their observational skills and their ability to communicate those observations in a clear manner.
- *Reading Scientific Texts:* students will be exposed to scientific writing which is very different than most writings to which they have been exposed. Students should grow in the ability to pull out important concepts and supporting facts from those texts.
- *Scientific Writing:* students will need to understand established scientific ideas in order to explain them in their own terms. Also, students will be able to clearly explain ideas of their own.
- *Drawing valid conclusions:* students will be challenged to look at multiple sources of information and drawing valid and proper conclusions. This will take place in the laboratory and academic setting.
- *Valid Scientific Calculations:* students will know how to properly integrate science and mathematics through the use of dimensional analysis and significant figures.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- Students should be able to understand what constitutes life.
- Students should be able to recognize how different types of life interact in both positive and negative ways.
- Students should be able to differentiate between plant and animal cells and the organelles that complete the biological processes in each.
- Students should trace the flow of energy throughout the biosphere via photosynthesis, chemosynthesis, and cellular respiration.
- Students should have a basic knowledge of the hereditary nature and of genes – how they are passed from organism to organism and how they are expressed.
- Students should be able to discuss the vital role microorganisms have in our global ecosystem.
- Students should be able to differentiate types of plants based on their ability to transport materials throughout their different structures and how they reproduce.
- Students will be able to organize and classify animals based on their complexity and body structures.

CLASS RESOURCES

- Miller, Kenneth R., and Joseph S. Levine. *Biology.* Upper Saddle River, NJ: Pearson Prentice Hall, 2004.

METHODS

- Teacher-guided discussion
- Explanation of important terminology
- Observation of the living world
- Laboratory experiments (including dissections)

MEASUREMENT & ASSESSMENT

- Students can expect periodic quizzes throughout the coverage of each unit with a larger assessment at the conclusion of each unit. There is also a final in each semester, worth 20% of a semester grade. The assessments are designed to allow students to show their ability to explain the topics of importance in each unit along with synthesizing their own ideas about the material.

QUARTERLY SCHEDULE

QUARTER 1

- Nature of Life: Characteristics of Life, Chemistry of Life
- Ecology: Energy and Matter, Ecosystems, Communities, and Populations
- Portions of Chapters 1-6 in *Biology*.

QUARTER 2

- Cells and Energy: Types of Cells, Photosynthesis, Cellular Respiration, Mitosis
- Genetics: Mendel and Hereditary, Meiosis, DNA and RNA
- Portions of Chapters 7-12 in *Biology*.

QUARTER 3

- Microorganisms/Fungi: Bacteria, Viruses, Protists, Fungi
- Plants: Plant Diversity, Plant Structures, Plant Reproduction, Plant Adaptations
- Portions of Chapters 19-25 in *Biology*.

QUARTER 4

- Animals: Invertebrates vs. Invertebrates, Chordates, Mammals, Animal Behavior
- Portions of Chapters 26-34 in *Biology*.

FIELD TRIPS & EXPERIENCES

- Quarter 1: Microscopes; Observing the world around us; Observation of a Community
- Quarter 2: Plant and Animal Cells through a Microscope; Seeing and Touching DNA
- Quarter 3: The Diversity of Pond Water; Flower Dissection
- Quarter 4: Invertebrate Dissection (Worm); Vertebrate Dissection (Varied)

CHEMISTRY
SCIENCE | TENTH GRADE | 1 CREDIT

Chemistry is the study of the properties of matter and the changes that matter undergoes. Therefore, this course examines the qualitative and quantitative descriptors of matter (Q1) and the ways matter interact (Q2). It then continues into the detailed modern view of what gives matter its unique properties (Q3) and those interactions (Q4).

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *Nature:* as the main focus of the study being the intricacies of physical world, students should have a greater appreciation for the details, wonder, and diversity of the physical world.
- *Life:* given the study of the physical world's many parts, students should realize the importance of having a natural world that provides all necessary components for life.
- *God:* while looking at the details of the physical world, students should grow fonder of the Creator that put all these wonders into place for them.
- *Scientific Process:* students should increasingly see the value in the scientific process – the continuous collection of information through observation and experimentation.
- *Stewardship:* students should have a greater understanding of the delicacies of the Earth and the role humans have in aiding or harming the Earth. They should then endeavor to be an aid whenever they can.

WHAT SKILLS SHOULD STUDENTS HAVE BY THE END OF THIS COURSE?

- *Scientific Observation:* students will have the opportunity to improve their observational skills and their ability to communicate those observations in a clear manner.
- *Reading Scientific Texts:* students will be exposed to scientific writing which is very different than most writings to which they have been exposed. Students should grow in the ability to pull out important concepts and supporting facts from those texts.
- *Scientific Writing:* students will need to understand established scientific ideas in order to explain them in their own terms. Also, students will be able to clearly explain ideas of their own.
- *Drawing valid conclusions:* students will be challenged to look at multiple sources of information and drawing valid and proper conclusions. This will take place in the laboratory and academic setting.
- *Valid Scientific Calculations:* students will know how to properly integrate science and mathematics through the use of dimensional analysis and significant figures.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- Students should be able to manipulate measurements between different units of measurement through the use of valid conversions factors and significant figures.
- Students must understand the history of atoms and how atoms combine into both molecules and ionic compounds.
- Students must apply the Law of Conservation of Mass through chemical equations and the mole.
- Students will learn to differentiate between the different types of chemical reactions.
- Students should be able to thoroughly discuss the multiple types of energy and how energy is transferred between different matter.
- Students will become familiar with the modern view of atoms and the probabilistic nature of the placement of electrons within an atom.
- After learning the history of the Periodic Table of Elements, students must be able to articulate the details of the periodic trends found in the Periodic Table.
- Students will be able to differentiate between the different types of chemical bonding in a detailed manner.
- Students will be able to predict the shapes of molecules based on the covalent bonds found within the molecule.
- Students will be able to describe the characteristics of gases, including use of the Ideal-Gas Equation.

CLASS RESOURCES

- Brown, Theodore L., H. Eugene LeMay, Jr., and Brue E. Bursten, *Chemistry. The Central Science. 8th ed.* Upper Saddle River, NJ: Prentice-Hall, Inc. 2000.

METHODS

- Teacher-guided discussion
- Explanation of important terminology
- Observation of the living world
- Laboratory experiments (including dissections)

MEASUREMENT & ASSESSMENT

- Students can expect periodic quizzes throughout the coverage of each unit with a larger assessment at the conclusion of each unit. There is also a final in each semester, worth 20% of a semester grade. The assessments are designed to allow students to show their ability to explain the topics of importance in each unit along with synthesizing their own ideas about the material.

QUARTERLY SCHEDULE

QUARTER 1

- Matter and Measurement: Classification of Matter, Properties of Matter, Units of Measurement, Significant Figures
- Atom, Molecules, and Ions: Atomic Theory of Matter, Molecular Compounds, Ionic Compounds, Inorganic Nomenclature
- Portions of Chapters 1 and 2 in *Chemistry. The Central Science*

QUARTER 2

- Stoichiometry: Chemical Equations, Atomic and Formula Weights, The Mole, Limiting Reactants
- Aqueous Reactions: Precipitation Reactions, Acid-Base Reactions, Oxidation-Reduction Reactions, Concentrations of Solutions
- Thermochemistry: Types of Energy, First Law of Thermodynamics
- Portions of Chapters 3-5 in *Chemistry. The Central Science.*

QUARTER 3

- Electronic Structure of Atoms: Wave Nature of Light, Bohr's Model, Quantum Mechanics, Electron Orbitals
- Periodic Properties of Elements: History of the Periodic Table, Electron Shells, Ionization Energy, Electron Affinities, Metals/Nonmetals/Metalloids
- Portions of Chapters 6 and 7 in *Chemistry. The Central Science.*

QUARTER 4

- Chemical Bonding: Octet Rule, Ionic Bonding, Covalent Bonding, Lewis Structures
- Molecular Geometry: Molecular Shapes, VSEPR Model, Orbital Overlap
- Gases: Characteristics of Gases, The Gas Laws, Effusion and Diffusion
- Portions of Chapters 8-10 in *Chemistry. The Central Science.*

FIELD TRIPS & EXPERIENCES

- Quarter 1: Taking Measurements; Is this a Chemical Reaction?
- Quarter 2: Law of Conservation of Mass; Observing Types of Chemical Reactions
- Quarter 3: Visualization of Electron Orbitals; Predicting Chemical Reactions
- Quarter 4: Modeling Covalent Bonds and Molecules; Observing the Gas Laws

PHYSICS
SCIENCE | 1 CREDIT

Physics is the study of the fundamental laws of nature, which are the laws that underlie all physical phenomena in the universe. This course focuses on the physical phenomenon of motion. This course is designed to introduce the methods to measure and describe motion (Q1), look at the relationship between motion and force (Q2), describe the energy found within motion (Q3), and study some variations to motion in collisions and rotational motion (Q4).

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *Nature:* as the main focus of the study being the intricacies of physical world, students should have a greater appreciation for the details, wonder, and diversity of the physical world.
- *Life:* given the study of the physical world's many parts, students should realize the importance of having a natural world that provides all necessary components for life.
- *God:* while looking at the details of the physical world, students should grow fonder of the Creator that put all these wonders into place for them.
- *Scientific Process:* students should increasingly see the value in the scientific process – the continuous collection of information through observation and experimentation.
- *Stewardship:* students should have a greater understanding of the delicacies of the Earth and the role humans have in aiding or harming the Earth. They should then endeavor to be an aid whenever they can.

WHAT SKILLS SHOULD BY STUDENTS HAVE BY THE END OF THIS COURSE?

- *Scientific Observation:* students will have the opportunity to improve their observational skills and their ability to communicate those observations in a clear manner.
- *Reading Scientific Texts:* students will be exposed to scientific writing which is very different than most writings to which they have been exposed. Students should grow in the ability to pull out important concepts and supporting facts from those texts.
- *Scientific Writing:* students will need to understand established scientific ideas in order to explain them in their own terms. Also, students will be able to clearly explain ideas of their own.
- *Drawing valid conclusions:* students will be challenged to look at multiple sources of information and drawing valid and proper conclusions. This will take place in the laboratory and academic setting.
- *Valid Scientific Calculations:* students will know how to properly integrate science and mathematics through the use of dimensional analysis and significant figures.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- Students should be able to manipulate measurements between different units of measurement through the use of valid conversions factors and significant figures.
- Students should be able to articulate the differences between speed and velocity as well as discuss their relationship to acceleration.
- Students should become proficient in the mathematical and scientific uses of vectors.
- Students should be able to qualitatively and quantitatively describe two-dimensional motion.
- Students should be able to use Newton's laws of motion to thoroughly describe any type of motion.
- Students should be able to explain the ability of friction to alter and aid motion.
- Students should be able to articulate the relationship of work to both force and motion.
- Students should be able to differentiate between the types of energy and defend the conservation of those energies.
- Students should be able to mathematically defend the conservation of momentum in different types of collisions.
- Students should be able to compare and contrast rotational and linear motion

CLASS RESOURCES

- Walker, James S., *Physics. 4th Ed.* San Francisco, CA: Pearson Addison-Wesley. 2010.

METHODS

- Teacher-guided discussion
- Explanation of important terminology
- Observation of the living world
- Laboratory experiments (including dissections)

MEASUREMENT & ASSESSMENT

- Students can expect periodic quizzes throughout the coverage of each unit with a larger assessment at the conclusion of each unit. There is also a final in each semester, worth 20% of a semester grade. The assessments are designed to allow students to show their ability to explain the topics of importance in each unit along with synthesizing their own ideas about the material.

QUARTERLY SCHEDULE

QUARTER 1

- Measurement and Mathematics: Dimensional Analysis, Converting Units
- One-Dimensional Kinematics: Position/Distance/Displacement, Speed/Velocity, Acceleration
- Vectors in Physics: Scalars and Vectors, Add/Subtract Vectors, Measuring in Vectors
- Portions of Chapters 1-3 in *Physics.*

QUARTER 2

- Two-Dimensional Kinematics: Projectile Motion, Zero-Launch Angle, General Launch Angle
- Newton's Laws of Motion: Force and Mass, Newton's three laws, Weight and the Normal Force
- Portions of Chapters 4 and 5 in *Physics.*

QUARTER 3

- Applications of Newton's Laws: Frictional Forces, Connected Objects
- Work and Kinetic Energy: Work Done by Constant Force, Kinetic Energy, Work-Energy Theorem, Power
- Potential Energy and Conservation: Potential Energy, Conservation of Mechanical Energy, Work Done by Nonconservative Forces
- Portions of Chapters 6-8 in *Physics.*

QUARTER 4

- Linear Momentum and Collisions: Momentum and Newton, Conservation of Linear Momentum, Inelastic Collisions, Elastic Collisions
- Rotational Kinematics: Angular Position, Velocity, and Acceleration, Linear and Rotational Kinematics, Conservation of Energy, Torque, Angular Momentum
- Portions of Chapters 9-11 in *Physics.*

FIELD TRIPS & EXPERIENCES

- Quarter 1: Taking Measurements; Displacement and Velocity; Experimental Acceleration due to Gravity
- Quarter 2: Predicting Motion; Force and Mass
- Quarter 3: Coefficients of Frictions; Catapults (Potential ---> Kinetic)
- Quarter 4: Physics of Billiards; Water Bottle Boat

HUMAN ANATOMY & PHYSIOLOGY

SCIENCE | TWELFTH GRADE | 1 CREDIT

Anatomy & Physiology is the study of the structures and functions of the human body. To that end, this course begins with a review of important biological ideas vital to the body – chemistry of the body, cells, and tissues (Q1). From there, it moves to different collections of related organ systems: covering, support, and movement of the body (Q2), regulation and integration of the body (Q3), and maintenance of the body (Q4).

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *Life:* as the main focus of the study, students should have a greater appreciation for the intricacy, wonder, and diversity of life.
- *Human Body:* given the complexity of life, students should realize the importance of having a natural world that provides all necessary components for the human body.
- *God:* while looking at the details of life and the nature created to support it, students should grow fonder of the Creator that put all these wonders into place for them.
- *Scientific Process:* students should increasingly see the value in the scientific process – the continuous collection of information through observation and experimentation.
- *Stewardship:* students should have a greater understanding of the delicacies of life and the role humans have in aiding or harming life. They should then endeavor to be an aid whenever they can.

WHAT SKILLS SHOULD BY STUDENTS HAVE BY THE END OF THIS COURSE?

- *Scientific Observation:* Students will have the opportunity to improve their observational skills and their ability to communicate those observations in a clear manner.
- *Reading Scientific Texts:* students will be exposed to scientific writing which is very different than most writings to which they have been exposed. Students should grow in the ability to pull out important concepts and supporting facts from those texts.
- *Scientific Writing:* students will need to understand established scientific ideas in order to explain them in their own terms. Also, students will be able to clearly explain ideas of their own.
- *Proper use of a microscope:* as one of the most useful tools to a biologist, students will become comfortable and confident with a microscope.
- *Drawing valid conclusions:* students will be challenged to look at multiple sources of information and drawing valid and proper conclusions. This will take place in the laboratory and academic setting.

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- Students should be able to identify the major structures of the human body.
- Students should be able to articulate the major function of each major structure of the human body.
- Students should be able to explain how each major structure functions
- Students should be able to eloquently describe the interrelationships of the body organ systems.
- Students should be able to relate each major system to the overarching idea of homeostasis.
- Students should understand the complementary nature of structure and function.

CLASS RESOURCES

- Marieb, Elain N. and Katja Hoehn. *Anatomy & Physiology. 3rd ed.* San Francisco, CA: Pearson Benjamin Cummings, 2008.

METHODS

- Teacher-guided discussion
- Explanation of important terminology
- Observation of the living world
- Laboratory experiments (including dissections)

MEASUREMENT & ASSESSMENT

- Students can expect periodic quizzes throughout the coverage of each unit with a larger assessment at the conclusion of each unit. There is also a final in each semester, worth 20% of a semester grade. The assessments are designed to allow students to show their ability to explain the topics of importance in each unit along with synthesizing their own ideas about the material.

QUARTERLY SCHEDULE

QUARTER 1

- Organization of the Body: Overview of the Body, Chemistry of the Body, Cells, Tissues
- Portions of Chapters 1-4 in *Anatomy & Physiology.*

QUARTER 2

- Covering, Support, and Movement of the Body: Integumentary System, Skeletal System, Joints, Muscular System
- Portions of Chapters 5-10 in *Anatomy & Physiology.*

QUARTER 3

- Regulation and Integration of the Body: Nervous Tissues, Central Nervous System, Peripheral Nervous System, Autonomic Nervous System, Endocrine System
- Portions of Chapters 11-15 in *Anatomy & Physiology.*

QUARTER 4

- Maintenance of the Body: Blood, Cardiovascular System, Heart, Blood Vessels, Lymphatic System, Immune System, Respiratory System, Digestive System
- Portions of Chapters 16-25 in *Anatomy & Physiology.*

FIELD TRIPS & EXPERIENCES

- Models of different organ systems.
- Microscopic views of cells and tissues.
- Color-coordination of diagrams of organ systems.

These experiences will be mixed in throughout the entirety of the year, where deemed appropriate by the teacher.

-

PHYSICS II
SCIENCE | TWELFTH GRADE | 1 CREDIT

Physics is the study of the fundamental laws of nature, which are the laws that underlie all physical phenomena in the universe. This course focuses on the physical phenomenon of thermodynamics (Q1), electromagnetism (Q2-Q3), and light and optics (Q4). The discussion of these phenomena will build off the skills and knowledge gained from the previous physics class.

PRIMARY TEACHING GOALS

WHAT SHOULD MY STUDENTS LOVE MORE BY THE END OF THIS COURSE?

- *Nature:* as the main focus of the study being the intricacies of physical world, students should have a greater appreciation for the details, wonder, and diversity of the physical world.
- *Life:* given the study of the physical world's many parts, students should realize the importance of having a natural world that provides all necessary components for life.
- *God:* while looking at the details of the physical world, students should grow fonder of the Creator that put all these wonders into place for them.
- *Scientific Process:* students should increasingly see the value in the scientific process – the continuous collection of information through observation and experimentation.
- *Stewardship:* students should have a greater understanding of the delicacies of the Earth and the role humans have in aiding or harming the Earth. They should then endeavor to be an aid whenever they can.

WHAT SKILLS SHOULD BY STUDENTS HAVE BY THE END OF THIS COURSE?

- *Scientific Observation. Students will have the opportunity to improve their observational skills and their ability to communicate those observations in a clear manner.*
- *Reading Scientific Texts. Students will be exposed to scientific writing which is very different than most writings to which they have been exposed. Students should grow in the ability to pull out important concepts and supporting facts from those texts.*
- *Scientific Writing. Students will need to understand established scientific ideas in order to explain them in their own terms. Also, students will be able to clearly explain ideas of their own.*
- *Drawing valid conclusions. Students will be challenged to look at multiple sources of information and drawing valid and proper conclusions. This will take place in the laboratory and academic setting.*
- *Valid Scientific Calculations. Students will know how to properly integrate science and mathematics through the use of dimensional analysis and significant figures.*

WHAT KNOWLEDGE SHOULD MY STUDENTS HAVE BY THE END OF THIS COURSE?

- Students should be able to manipulate measurements between different units of measurement through the use of valid conversions factors and significant figures.
- Students should understand temperature as a measure of energy and heat as a transfer of that energy.
- Students should be comfortable diagramming the temperature and energy input during any phase change.
- Students should be able to eloquently explain and comfortably use the laws of thermodynamics.
- Students should be able to trace the flow of electricity and understand how particles are affected by an electric field.
- Students should be able to explain the mechanisms for how we re-route electricity throughout a circuit through the use of capacitors, switches, resistors, etc.
- Students should be able to articulate the details of the magnetic force and the magnetic field.
- Students should understand how electromagnetic waves are produced and how they are propagated.
- Students should be able to trace the path of light through reflection, refraction, and dispersion.
- Students should be able to explain how different optical instruments (eye, camera, microscope, etc.) manipulate light in a beneficial way.

CLASS RESOURCES

- Walker, James S., *Physics. 4th Ed.* San Francisco, CA: Pearson Addison-Wesley. 2010.

METHODS

- Teacher-guided discussion
- Explanation of important terminology
- Observation of the living world
- Laboratory experiments

MEASUREMENT & ASSESSMENT

- Students can expect periodic quizzes throughout the coverage of each unit with a larger assessment at the conclusion of each unit. There is also a final in each semester, worth 20% of a semester grade. The assessments are designed to allow students to show their ability to explain the topics of importance in each unit along with synthesizing their own ideas about the material.

QUARTERLY SCHEDULE

QUARTER 1

- Thermal Physics: Temperature and Heat, Phases and Phase Changes, Laws of Thermodynamics
- Portions of Chapters 16-18 in *Physics*.

QUARTER 2

- Electromagnetism: Electric Charges, Forces, and Fields, Electric Potential, Electric Current
- Portions of Chapters 19-21 in *Physics*.

QUARTER 3

- Electromagnetism continued: Magnetism, Magnetic Flux, Alternating Current
- Portions of Chapters 22-24 in *Physics*.

QUARTER 4

- Light and Optics: Electromagnetic Waves, Geometrical Optics, Optical Instruments
- Portions of Chapters 25-28 in *Physics*.

FIELD TRIPS & EXPERIENCES

- Quarter 1: Taking Measurements; Conduction; Temperature in Phases Changes
- Quarter 2: Electrostatic Charges; Building Circuits
- Quarter 3: Electromagnets; Building Circuits
- Quarter 4: Tracing Light; The Physics of a Microscope