Science

Kindergarten

Kindergarten students will use inquiry to focus on questions about the world around them, including questions related to earth, physical, and life science. By the end of Kindergarten, students will be able to:

- Describe different types of motion and the effects of gravity on objects.
- Identify parts of things such as tools or toys.
- Describe, compare, and sort items according to physical attributes such as number, shape, texture, size, weight, color, and motion.
- Use their senses of sight, smell, taste, touch, and sound to sort physical objects into groups.
- Use their senses to make observations about the physical world around them.
- Demonstrate awareness of similarities and differences of physical attributes of the world around them, including awareness of similarities and differences between living and nonliving things, between animals and plants, and between parents and offspring.

First Grade

First grade students will use inquiry to focus on questions about the world around them. By the end of first grade, students will be able to:

- Observe, measure, and communicate weather data.
- Observe and record changes in water as it relates to weather.
- Describe the effects of magnets on other magnets and objects.
- Create drawings that correctly depict a specific thing being described.
- Make observations, ask questions about, and investigate patters.
- Recognize sources of light and explain how shadows form.
- Investigate the characteristics and basic needs of plants and animals.

Second Grade

Second grade students will use inquiry to focus on questions about the world around them and seek answers by making observations and exploring. They will use whole numbers as well as basic fractions to identify and made estimations of length, weight, and time intervals to analyze scientific data and solve numerical problems related to a science activity. By the end of second grade, students will be able to:

- Recognize attributes of the sun, moon, and the stars.
- Identify and describe sources of energy.
- Explain how pushes and pulls cause changes in speed and direction of an object.
- Locate source of heat and light energy.
- Form ideas about natural and manipulated changes such as changes in the Earth's surface and changes in the attributes of materials.
- Describe the sequence of the life cycle of common animals in their area.
- Observe and record changes in their surroundings and infer the causes of those changes.

Third Grade

Third grade students will use inquiry to focus on questions about the world around them and conduct observations, keep records of observations, follow proper procedures to indicate changes to observations and use the information they obtain to answer their own questions. Their communication skills allow them to record findings and analyze data. They understand that the form or shape of an object is frequently related to use, operation or function. They add and subtract whole numbers. They observe, construct, and measure objects using ordinary hand tools. They represent objects in the real world with geometric figures, number sequences, graphs, diagrams, maps, and stories. By the end of third grade, students will be able to:

- Explain how heat is produced and the effects of heating and cooling.
- Describe the effect of magnets on common objects and in other objects.
- Describe the ways in which the parts of an object influence or interact with one another.
- Explain the process of formation of fossils and information they provide as evidence of organisms that lived long ago.
- Identify the characteristics of the different regions in Georgia and the features of the organisms that live in those regions.
- Recognize the effects of pollution and humans on the environment.
- Differentiate between rocks and minerals

Fourth Grade

Fourth grade students will gather and interpret data that will allow them to make meaningful models to gain understanding of the natural world. They differentiate between observations and ideas and speculate about observations they make. They add, subtract, multiply and divide whole numbers and use records, tables, or graphs to identify patterns of change. Fourth graders write instructions and make sketches that allow others to carry out a scientific procedure. They determine whether or not a comparison is fair if conditions are different for each thing being compared. By the end of fourth grade, students will be able to:

- Compare and contrast attributes of stars, star patterns, and planets.
- Model the position and motion of the Earth, moon, and sun and used these models to explain the sequence of the phases of the moon, and the occurrence seasonal changes.
- Describe how mirrors, lenses, and prisms affect the way in which light travels.
- Identify simple machines and explain their uses.
- Explain and demonstrate how sound is produced.
- Describe the roles of organisms and the flow of energy within an ecosystem.
- Identify factors that affect the survival or extinction of organisms.
- Differentiate between the states of water and how they relate to the water cycle and weather.
- Analyze weather charts/maps and collect weather data to predict weather events and infer patterns and seasonal changes.
- Explain and demonstrate the relationship between the application of a force and the resulting change in position and motion on an object.

Fifth Grade

Fifth grade students will investigate evidence related to scientific concepts. They will conduct experiments and do research with the focus of gaining knowledge about the natural world. They keep

records of investigations and observations and understand why they should not alter those records. They use numerical data to describe and compare objects. Fifth graders use technology to gather and record information. They use reference books, back issues of magazines or newspapers, and computer databases to locate scientific information. They are able to conduct experiments and report their findings in the form of written reports, charts, and various other presentations including multi-media projects. By the end of fifth grade, students will be able to:

- Identify and find examples of constructive and destructive forces while relating the role of technology to monitor and control these forces.
- Explain the difference between physical and chemical change.
- Describe the relationship between electricity and magnetism.
- Classify organisms into groups and relate how they determined the groups.
- Compare and contrast characteristics of learned behaviors and of inherited traits.
- Describe the differences between plant and animal cells and compare single-celled and multi-celled organisms.
- Relate how microorganisms are harmful or beneficial.
- Demonstrate that the mass of an object is equal to the sum of its parts.
- Determine the necessary components for completing an electric circuit.
- Describe the characteristics of common materials that are either insulators or conductors of electricity.
- Investigate and explain the causes of static electricity.

Sixth Grade

Sixth grade students study Earth science concepts through an inquiry based approach. The focus of the Earth science standards is to provide an overview of common strands in Earth science including, but not limited to, meteorology, geology, astronomy, oceanography, resources, and human impact on the earth. Sixth grade students use records they keep and analyze the data they collect. They use different models to represent systems such as the solar system and the sun/moon/earth system, write instructions, describe observations, and show information in graphical form. When analyzing the data they collect, sixth graders recognize relationships in simple charts and graphs and find more than one way to interpret their findings. The students replicate investigations and compare results to find similarities and differences. By the end of sixth grade, students will be able to:

- Explore the progression of basic historical scientific models on the formation and structure of the solar system and the universe.
- Explain the effects of the relative positions of the earth, moon and sun.
- Explain the causes of waves, currents, and tides.
- Describe the composition, location, and subsurface topography of the world's oceans.
- Describe how the distribution of land and oceans affects climate and weather patterns.
- Study the formation and composition of Earth.
- Explain the effects of physical processes (plate tectonics, erosion, deposition, volcanic eruption, gravity) on geological features including oceans (composition, currents, and tides).
- Describe how fossils show evidence of the changing surface and climate of the Earth.
- Classify rocks by their process of formation
- Describe various natural resources and sources of energy, their uses and conservation.

Seventh Grade

Seventh grade students will study life science through an inquiry based approach. The purpose of this course is to give all students an overview of common strands in life science including, but not limited to, diversity of living organisms, structure and function of cells, heredity, ecosystems, and biological evolution. Seventh grade students keep records of their observations and use those records to analyze the data they collect. They write instructions, describe observations, and show information in graphical form. When analyzing the data they collect, seventh graders can recognize relationships in simple charts and graphs and find more than one way to interpret their findings. The students replicate investigations and compare results to find similarities and differences. By the end of seventh grade, students will be able to:

- Observe and use observations to explain diversity of living organisms and how the organisms are classified.
- Describe the structure and function of cells, tissues, organs, and organ systems.
- Explain the relationship between cell structures to basic cell functions.
- Explain the role of genes and chromosomes in the process of inheriting a specific trait.
- Compare and contrast asexual and sexual reproduction.
- Describe how selective breeding can be used to produce plants or animals with desired traits.
- Use what they know about ecosystems to explain the cycling of matter and flow of energy between organisms and their environments.
- Examine the dependence of organisms on one another and on their environments.
- Use the concepts of natural selection and fossil evidence in explanations.
- Examine the evolution of living organisms through inherited characteristics that promote survival of organisms and the survival of successive generations of their offspring.

Eighth Grade

Eighth grade students will study physical science concepts through an inquiry based approach. The purpose of this course is to give all students an overview of common strands in physical science including, but not limited to, the nature of matter, laws of energy, matter, motion and forces, and energy transformation. The students at this grade work to acquire a conceptually understanding of core concepts of physical science like conservation of matter, conservation of energy, motion and forces, and energy transformations. ***This course is NOT intended in any way to take the place of the high school physical science course.***

Eighth grade students record their observations clearly and accurately. They keep records and analyze the data they collect. They use what they observe to explain the difference between physical and chemical changes. Eighth graders write instructions, describe observations, and show information in graphical form. When analyzing the data they collect, eighth graders can recognize relationships in simple charts and graphs and find more than one way to interpret their findings. The students replicate investigations and compare results to find similarities and differences. By the end of eighth grade, students will be able to:

- Collect, use and analyze scientific data related to physical science phenomena.
- Demonstrate a basic conceptual understanding of the conservation of matter and conservation of energy laws.
- Explain and trace energy transformations in terms of the law of conservation of energy.
- Use observations to explain the difference between physical and chemical changes.
- Investigate and describe relationships between force, mass, and the motion of objects.

- Examine and explain the scientific view of the nature of matter, i.e. matter is made of particles, particles interact to form atoms, and atoms interact to form molecules.
- Describe the movement of particles in solids, liquids, gases, and plasmas.
- Describe how heat can be transferred through matter and space.
- Demonstrate the effect of simple machines on work.
- Identify the characteristics of electromagnetic and mechanical waves and diagram their parts.
- Describe how the behavior of light waves is manipulated causing reflection, refraction diffraction, and absorption.
- Describe how the behavior of waves is affected by the medium in which they travel.
- Relate the properties of sound to everyday experiences.
- Explain the parameters that modify the strength of the gravitational force between objects.
- Demonstrate the advantages and disadvantages of series and parallel circuits and how they transfer energy.
- Investigate and explain the relationship between electric currents and magnetic forces.

Biology I (High School 9-12)

The Biology curriculum is designed to continue student investigations of the life sciences that began in grades K-8 and to provide students the necessary skills to be proficient in biology. This curriculum includes more abstract concepts such as the interdependence of organisms, the relationship of matter, energy, and organization in living systems, the behavior of organisms, and biological evolution. Students will investigate biological concepts through experience in laboratories and field work using the processes of inquiry. It is expected that biology students are able to identify and use standard safety practices for all classroom laboratory and field investigations.
Biology students will recognize that different explanations to a particular observation often can be given for the same evidence. They will suggest reasonable hypothesis for identified problems. Biology students will demonstrate the computation and estimation skills necessary for collecting and analyzing data and developing reasonable scientific explanations based on this data. They will be expected to communicate the results of their scientific investigations clearly in coherent written laboratory reports, and accounts.
By the end of this course, students will be able to:

- Demonstrate appropriate technique in all laboratory situations.
- Design scientific experiments that may reinforce or weaken opposing explanations of observed phenomena.
- Develop procedures for solving scientific problems.
- Develop reasonable conclusions based on data collected and evaluate whether the conclusions are reasonable by reviewing the process and checking against other available information.
- Use data as evidence to support scientific arguments and claims in written or oral presentations.
- Analyze the nature of the relationships between cell structures and its functions in living cells.
- Explain how enzymes function as catalysts.
- Identify the function of the four major macromolecules and water in life processes.
- Compare and contrast viruses with living organisms.
- Describe how biological traits are passed on to successive generations and how new traits may appear or current ones disappear.
- Compare the advantages of sexual reproduction and asexual reproduction in different situations.
- Examine the use of DNA technology in forensics, medicine, and agriculture.
- Explain the cycling of energy through the processes of photosynthesis and respiration.

- Compare how structures and function vary between the six kingdoms
- Examine the evolutionary basis of modern classification systems.
- Describe how organisms dependent on one another and the flow of energy and matter within their ecosystems.
- Relate plant and animal adaptations to their ability to survive stressful environmental conditions.
- Assess and explain human activities that influence and modify the environment such as global warming, population growth, pesticide use, and water and power consumption.
- Explain the history of life in terms of biodiversity, ancestry, and the rates of evolution.
- Explain how fossil and biochemical evidence support the theory of evolution.
- Relate natural selection to changes in organisms.
- Recognize the role of evolution on pesticide and antibiotic resistance.

Chemistry I (High School 9-12)

The chemistry curriculum is designed to continue student investigations of the physical sciences that began in grades K-8 and to provide students the necessary skills to be proficient in chemistry. This curriculum includes more abstract topics such as the explanation of the structure of matter in terms of atoms and collections of atoms, periodicity and bonding, compounds and reactions, characteristics of states of matter, acid/base chemistry, chemical dynamics and equilibrium. Students will investigate chemical concepts through experience in laboratories and field work using the processes of inquiry. It is expected that chemistry students are able to identify and use standard safety practices for all classroom laboratory and field investigations.
Chemistry students will recognize that different explanations to a particular observation often can be given for the same evidence. They will suggest reasonable hypothesis for identified problems. Chemistry students will demonstrate the computation and estimation skills necessary for collecting and analyzing data and developing reasonable scientific explanations based on this data. They will be expected to communicate the results of their scientific investigations clearly in coherent written laboratory reports, and accounts.
By the end of this course, students will be able to:
- Demonstrate appropriate technique in all laboratory situations.
- Design scientific experiments that may reinforce or weaken opposing explanations of observed phenomena.
- Develop procedures for solving scientific problems.
- Develop reasonable conclusions based on data collected and evaluate whether the conclusions are reasonable by reviewing the process and checking against other available information.
- Use data as evidence to support scientific arguments and claims in written or oral presentations.
- Describe the nature of matter and its classification.
- Explain the importance of nuclear fusion in the production of all elements.
- Use the Law of Conservation of Matter to determine chemical composition in compounds and chemical reactions.
- Apply concepts of the mole and Avogadro’s number to determine empirical and molecular formulas, and mass, moles, and molecules relationships.
- Experimentally determine indicators of a chemical reaction specifically precipitation, gas and water production, and changes in energy to the system.
- Explain the role of equilibrium in chemical reactions.
- Use the modern atomic theory to explain the characteristics of atoms.

- Compare and contrast types of chemical bonds (i.e. ionic, covalent).
- Relate light emission and the movement of electrons to element identification.
- Use the organization of the Periodic Table to predict properties of elements.
- Describe how the rate at which a chemical reaction occurs can be affected by changing concentration, temperature, or pressure and the addition of a catalyst.
- Explain the role of activation energy and degree of randomness in chemical reactions
- Compare and contrast atomic/molecular motion in solids, liquids, gases, and plasmas and analyze the flow of energy during a phase change.
- Collect data and calculate the amount of heat given off or taken in by chemical or physical processes.
- Characterize the properties that describe solutions in terms of solute/solvent interactions and the nature of acids and bases.

Earth Systems (High School 9-12)

Earth Systems Science is designed to continue student investigations that began in K-8 Earth and Space science curricula. Earth systems students will investigate the connections among Earth's systems through Earth's history. These systems – the atmosphere, hydrosphere, geosphere, and biosphere – interact through time to produce Earth's landscapes, ecology, and resources that we see today. This course develops the explanations of phenomena fundamental to the sciences of geology and physical geography, including the early history of the Earth, plate tectonics, landform evolution, the Earth's geologic record, weather and climate, and the history of life on Earth. Instruction focuses on inquiry and the development of scientific explanations based on evidence, rather than mere descriptions of phenomena. Students will engage in case studies, laboratory exercises, maps, and data analysis. Special attention is paid to topics of current interest (e.g., recent earthquakes, tsunamis, global warming, price of resources) and to potential careers in the geosciences.
Earth systems students will recognize that different explanations to a particular observation often can be given for the same evidence. They will suggest reasonable hypothesis for identified problems. Earth Systems students will demonstrate the computation and estimation skills necessary for collecting and analyzing data and developing reasonable scientific explanations based on this data. They will be expected to communicate the results of their scientific investigations clearly in coherent written laboratory reports, and accounts.
By the end of this course, students will be able to:

- Demonstrate appropriate technique in all laboratory situations.
- Design scientific experiments that may reinforce or weaken opposing explanations of observed phenomena.
- Develop procedures for solving scientific problems.
- Develop reasonable conclusions based on data collected and evaluate whether the conclusions are reasonable by reviewing the process and checking against other available information.
- Use data as evidence to support scientific arguments and claims in written or oral presentations.
- Investigate the composition and formation of Earth systems, including the Earth's relationship to the solar system.
- Describe how the decay of radioactive isotopes is used to determine the age of rocks, Earth, and solar system.
- Identify the transformations and major reservoirs that make up the rock cycle, hydrologic cycle, carbon cycle, and other important geochemical cycles.
- Relate how plate tectonics creates certain geologic features, materials, and hazards.
- Distinguish among types of plate tectonic settings produced by plates diverging, converging, and sliding past each other.

- Explore the actions of water, wind, ice, and gravity that create landforms and systems of landforms (landscapes).
- Explain how rock relationships and fossils are used to reconstruct the Earth's past.
- Describe and apply principles of relative age (superposition, original horizontality, cross-cutting relations, and original lateral continuity).
- Apply the principle of uniformitarianism to relate sedimentary rock associations and their fossils to the environments in which the rocks were deposited.
- Use geologic maps and stratigraphic relationships to interpret major events in Earth history.
- Investigate the interaction of insolation and Earth systems to produce weather and climate.
- Relate changes in global climate to variation in Earth/Sun relationships and to natural and anthropogenic modification of atmospheric composition.
- Explain how life on Earth responds to and shapes Earth systems.
- Describe how the nature and distribution of life on Earth, including humans, relates to the chemistry and availability of water.
- Explain how geological and ecological processes interact through time to cycle matter and energy, and how human activity alters the rates of these processes.
- Describe how fossils provide a record of shared ancestry, evolution, and extinction that is best explained by the mechanism of natural selection.
- Identify the evolutionary innovations that most profoundly shaped Earth systems: photosynthetic prokaryotes and the atmosphere; multicellular animals and marine environments; land plants and terrestrial environments.

Environmental Science (High School 9-12)

The Environmental Science curriculum is designed to extend student investigations that began in grades K-8. This curriculum is extensively performance, lab and field based. It integrates the study of many components of our environment, including the human impact on our planet. Instruction should focus on student data collection and analysis. Some concepts are global; in those cases, interpretation of global data sets from scientific sources is strongly recommended. It would be appropriate to utilize resources on the Internet for global data sets and interactive models. Chemistry, physical, mathematical, and technological concepts are integrated throughout the course and whenever possible, careers related to environmental science are emphasized.

Environmental science students will recognize that different explanations to a particular observation often can be given for the same evidence. They will suggest reasonable hypothesis for identified problems. Environmental science students will demonstrate the computation and estimation skills necessary for collecting and analyzing data and developing reasonable scientific explanations based on this data. They will be expected to communicate the results of their scientific investigations clearly in coherent written laboratory reports, and accounts.

Environmental science students will recognize that different explanations to a particular observation often can be given for the same evidence. They will suggest reasonable hypothesis for identified problems. Environmental science students will demonstrate the computation and estimation skills necessary for collecting and analyzing data and developing reasonable scientific explanations based on this data. They will be expected to communicate the results of their scientific investigations clearly in coherent written laboratory reports, and accounts.

By the end of this course, students will be able to:

- Demonstrate appropriate technique in all laboratory situations.

- Design scientific experiments that may reinforce or weaken opposing explanations of observed phenomena.
- Develop procedures for solving scientific problems.
- Develop reasonable conclusions based on data collected and evaluate whether the conclusions are reasonable by reviewing the process and checking against other available information.
- Use data as evidence to support scientific arguments and claims in written or oral presentations.
- Investigate the cycling of matter (hydrologic, nitrogen, phosphorus, oxygen, and carbon cycles) within an ecosystem and identify changes in these cycles caused by human interactions.
- Investigate the flow of energy within an ecosystem.
- Describe the loss of usable food energy during movement up the trophic levels in terms of entropy.
- Describe how the abiotic components (water, air, and energy) affect the biosphere.
- Describe interconnections between abiotic and biotic factors, including normal cyclic fluctuations and changes associated with climatic change (i.e. ice ages).
- Explain succession in terms of changes in communities through time to include changes in biomass, diversity, and complexity and describe how succession may be altered by traumatic events.
- Describe interactions between individuals (*i.e.* mutualism, commensalisms, parasitism, predation, and competition).
- Investigate the availability, allocation energy and other resources and describe ways for their conservation.
- Relate how technology is increasing the efficiency of utilization and accessibility of resources.
- Recognize that human beings are part of the global ecosystem and evaluate the effects of human activities and technology on ecosystems.
- Describe the effects of population growth, demographic transitions, cultural differences, emergent diseases, etc. on societal stability.

Physical Science (High School 9-12)

The Physical Science curriculum is designed to continue student investigations of the physical sciences that began in grades K-8 and provide students the necessary skills to have a richer knowledge base in physical science. This course is designed as a survey course of chemistry and physics. This curriculum includes the more abstract concepts such as the conceptualization of the structure of atoms, motion and forces, and the conservation of energy and matter, the action/reaction principle, and wave behavior. Students investigate physical science concepts through experience in laboratories and field work using the processes of inquiry.

Physical science students will recognize that different explanations to a particular observation often can be given for the same evidence. They will suggest reasonable hypothesis for identified problems. Physical science students will demonstrate the computation and estimation skills necessary for collecting and analyzing data and developing reasonable scientific explanations based on this data. They will be expected to communicate the results of their scientific investigations clearly in coherent written laboratory reports, and accounts.

By the end of this course, students will be able to:

- Demonstrate appropriate technique in all laboratory situations.
- Design scientific experiments that may reinforce or weaken opposing explanations of observed phenomena.
- Develop procedures for solving scientific problems.

- Develop reasonable conclusions based on data collected and evaluate whether the conclusions are reasonable by reviewing the process and checking against other available information.
- Use data as evidence to support scientific arguments and claims in written or oral presentations.
- Investigate our current understanding of the atom.
- Compare and contrast ionic and covalent bonds in terms of electron movement.
- Explore the nature of matter, its classifications, and the IUPAC system for naming types of matter.
- Calculate density when given a means to determine a substance's mass and volume.
- Apply the Law of Conservation of Matter by balancing the chemical equations.
- Distinguish the characteristics and components of radioactivity.
- Investigate the arrangement of the Periodic Table and use it to predict the properties of representative elements.
- Compare and contrast the phases of matter as they relate to atomic and molecular motion.
- Relate temperature, pressure, and volume of gases to the behavior of gases.
- Investigate the properties of solutions in terms of solute/solvent, conductivity, and concentration.
- Compare and contrast the components and properties of acids and bases.
- Identify energy transformations within a system.
- Investigate molecular motion as it relates to thermal energy changes in terms of conduction, convection, and radiation.
- Determine the heat gain or loss of a substance using mass, specific heat, and temperature.
- Explain the flow of energy in phase changes through the use of a phase diagram.
- Determine relationships among force, mass, and motion of an object.
- Apply Newton's three laws to everyday situations.
- Calculate amounts of work and mechanical advantage using simple machines.
- Calculate velocity and acceleration.
- Explain the difference in mass and weight.
- Investigate the properties of electromagnetic and mechanical waves.
- Investigate the phenomena of reflection, refraction, interference, and diffraction.
- Explain the Doppler Effect in terms of everyday interactions.
- Investigate static electricity.
- Explain the flow of electrons in simple series and parallel circuits.
- Describe the relation between voltage, resistance, and current.
- Investigate applications of magnetism and/or its relationship to the movement of electrical charge.

Physics I (High School 9-12)

The Physics curriculum is designed to continue student investigations of the physical sciences that began in grades K-8 and provide students the necessary skills to be proficient in physics. This curriculum includes more abstract concepts such as interactions of matter and energy, velocity, acceleration, force, energy, momentum, and charge**.** Students investigate physics concepts through experience in laboratories and field work using the processes of inquiry.
Physics students will recognize that different explanations to a particular observation often can be given for the same evidence. They will suggest reasonable hypothesis for identified problems. Physics students will demonstrate the computation and estimation skills necessary for collecting and analyzing data and developing reasonable scientific explanations based on this data. They will be expected to communicate the results of their scientific investigations clearly in coherent written laboratory reports, and accounts.
By the end of this course, students will be able to:

- Demonstrate appropriate technique in all laboratory situations.
- Design scientific experiments that may reinforce or weaken opposing explanations of observed phenomena.
- Develop procedures for solving scientific problems.
- Develop reasonable conclusions based on data collected and evaluate whether the conclusions are reasonable by reviewing the process and checking against other available information.
- Use data as evidence to support scientific arguments and claims in written or oral presentations.
- Analyze the relationships between force, mass, and the motion of objects.
- Compare and contrast scalar and vector quantities.
- Measure and calculate the magnitude of frictional, gravitational, centripetal forces.
- Apply Newton's three Laws of Motion to explain of the motion of objects.
- Determine the conditions required to maintain a body in a state of static equilibrium.
- Measure and calculate two-dimensional motion by using component vectors.
- Explain the significance of energy in understanding the structure of matter and the universe.
- Describe energy transformations in terms of the law of Conservation of energy and the Work-Energy theorem.
- Measure and calculate linear momentum and describe the conditions for its conservation.
- Compare and contrast elastic and inelastic collisions.
- Analyze and measure power.
- Explain the processes that results in the production and energy transfer of electromagnetic waves.
- Experimentally determine the behavior of waves in various media in terms of reflection, refraction, and diffraction of waves.
- Explain the relationship between the phenomena of interference and the principle of superposition.
- Demonstrate the transfer of energy through different mediums by mechanical waves.
- Determine the location and nature of images formed by the reflection or refraction of light.
- Evaluate relationships between electrical and magnetic forces.
- Determine the relationship among potential difference, current, and resistance in a direct current circuit.
- Determine equivalent resistances in series and parallel circuits.
- Describe the corrections to Newtonian physics given by quantum mechanics and relativity when matter is very small, moving fast compared to the speed of light, or very large.