SCIENCE DEPARTMENT

The Science Department offers a variety of courses in the biological, earth, and physical sciences. The science program is structured to provide students of all abilities the opportunity to experience four years of science. Upon completion of the science program, students will understand interconnections among the physical, biological, and social worlds. These understandings will enable our students to achieve an increasingly comprehensive and reliable understanding of the human species and its environment. Students develop awareness of the natural world by engaging in the following practices: observing, critical thinking, inference, experimenting, and validating. Mathematical skills and knowledge are required to some degree in all science courses. Students should be careful to select science courses that align with their proficiency in mathematics.

Course Title: **Anatomy and the Arts - FAA**

Course No.: 1385.H or 1385.CP *Offered:* All year

Grade: 10,11, 12 *Level:* Open Honors *Credits:* 5

Department: Science *Affiliated Dept.:* Franklin Arts Academy *Duration:* Full year

Description: Franklin Arts Academy Anatomy and The Arts is an advanced life science course with an emphasis on Anatomy and Physiology. Students in this course will be exposed to the physiologic and morphologic underpinnings of the vertebrate body plan. Topics covered within this course include: movement and support (the muscular skeletal system), integration and coordination (the nervous system), and processing and transport (the digestive and cardiovascular systems). Upon course's completion students will have gained an understanding of the major human organ systems and their respective roles in the maintenance of systemic homeostasis, with emphasis on form and function. Projects will involve the use of multiple art forms, catering to the talents of the individual student. This course targets students that have a need to express their passion for the arts as they explore scientific inquiry and discovery. This course is open to non FAA students.

Prerequisite(s): Students must have successfully completed Biology.

Expectations Supported: 1A, 1D, 2, 3C, 3D, 4B *Expectations Assessed:* 3C, 3D

Course Title: **Applied Science in Engineering** *Course No.:* TBD *Offered:* All year

Grade: 10, 11, 12 *Level:* Open Honors *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: This course is for the student who is interested in a hands-on, project-oriented science course where they will apply their science knowledge in the construction of a variety of devices and projects utilized in an engineering design process. Students will develop their ability to solve problems and design and build solutions in technology and engineering using hands-on, lab based science and mathematical concepts. They will achieve skills in applied science and engineering design by learning how to conceptualize a problem, develop possible solutions, design and build, test and make modifications as necessary. Throughout the course, students will work under direct supervision while using hand and/or power tools, various materials and equipment, and other resources.

Prerequisite(s): Students must have successfully completed Biology.

Expectations Supported: 1A, 1D, 2, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Astronomy** *Course No.:* 1343.H or 1343.CP *Offered:* Semester

Grade: 10, 11, 12 *Level:* Open Honors *Credits:* 2.5

Department: Science *Affiliated Dept.:* n/a *Duration:* Semester

Description: Astronomy is an exploration of the history, position, composition, evolution and characteristics of planets, stars, and other objects in space through the use of current events, sky observations, lab experiments, and projects. Students will learn how to observe and investigate objects in the sky, survey our own planet, as well as explore the solar system. Students will also investigate stars, constellations, galaxies, and the origin of the universe, as well as the technologies used to explore space. Some nighttime observations will be required. Students are expected to be proficient in Algebra and Geometry as these math skills will be utilized throughout the course.

Prerequisite(s): Students must have successfully completed Algebra and Geometry. Student must also have successfully completed Chemistry, or student may be concurrently enrolled in Chemistry.

Expectations Supported: 1A, 2, 3A, 3B, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Behavioral Science** *Course No.:* 1305 *Offered:* All year

Grade: 10, 11, 12 *Level:* College Prep *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: Behavioral science examines and compares animal and human behavior. Both biological and environmental influences on behavior will be studied. Topics will include innate vs. learned behaviors, communication, predator/prey relations, social behavior, courtship and mating strategies, migration, dominance and territoriality, and rhythmic behaviors. After completing this course, students will be able to: demonstrate an understanding of both how and why an organism behaves as it does (biology vs. environment); design and carry out labs that will examine various behaviors discussed in class; analyze data in order to write formal lab reports. Students will be required to write four research papers, and complete a human behavior field experiment using a topic approved by the instructor.

Prerequisite(s): Students must have successfully completed Biology.

Expectations Supported: 1A, 1C, 3B, 3C, 4A *Expectations Assessed:* 3C, 3D

Course Title: **Biology AP** *Course No.:* 1308 *Offered:* All year

Grade: 11, 12 *Level:* Advanced Placement *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: AP Biology is equivalent to college level introductory biology in rigor, pace, and expectation of independent work outside of class. Topics covered include: biochemistry, genetics, evolution, ecology, animal behavior and the regulatory body systems: nervous, endocrine, and immune. Labs are performed approximately once a week, with the design of the investigations becoming the responsibility of the student as the year progresses. Learning how to write concisely and coherently about biology comprises a substantial part of the course. Students are expected to take the AP exam which may allow them to earn college credit. Completion of a substantial summer assignment is required.

Prerequisite(s): Students who enroll in this course must have attained a minimum grade of B+ in Honors Biology and Honors Chemistry (or be concurrently enrolled in Honors Chemistry). It is recommended that interested students currently taking Honors Biology speak to the AP Biology teacher regarding preparedness for this college level course.

Expectations Supported: 1A, 1C, 2, 3A, 3B, 3C, 3D, 4A *Expectations Assessed:* 3C, 3D

Course Title: **Biology** *Course No.:* 1303 *Offered:* All year

Grade: 9 *Level:* Honors *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: Biology Honors serves as an introduction to the concepts crucial to life on Earth. Biochemistry, Cell Biology, Molecular and Mendelian Genetics, Classification, Evolution and Diversity, and Ecology are the main topics covered in this yearlong course. Through a combination of lectures, experiments, multi-media presentations, and longitudinal projects students gain an understanding into the complexity and wonder of life. Utilization of this material will allow the student to understand, analyze, and make critical decisions about modern biological issues. Student projects will be carried out during the year affording students an opportunity to demonstrate an understanding of concepts illuminated throughout the course. Success in Honors Biology is highly dependent on strong language ability.

Prerequisite(s): A minimum grade of B+ in Grade 8 Science and English

Expectations Supported: 1A, 1B, 1C, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Biology** *Course No.:* 1302 *Offered:* All year

Grade: 9 *Level:* College Prep *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: Biology CP provides students with an introduction to the various ideas key to the understanding of modern Biology. Basic Chemistry, Cells, Genetics, Anatomy & Physiology, Evolution, and Ecology are the major concepts of this introductory course. Each concept is presented in various formats including multi-media, discussion groups, and lectures. Students demonstrate their understanding of biologic concepts through self-directed investigations, topic presentations, and laboratory experiments.

Prerequisite(s):

Expectations Supported: 1A, 1B, 1C, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Bioengineering** *Course No.:* TBD *Offered:* All year

Grade: 10, 11, 12 *Level:* Open Honors *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: Bioengineering is designed for students with at least one year of biological science who are prepared for an in-depth study of the scientific foundations and technological applications of genomic and protein biotechnology. Through labs and *Human Genome Project* databases available via the Internet, students will engage in authentic investigations in the fields of microbiology, cell biology, genetics, bioinformatics, and biotechnology. Students need a solid understanding of DNA structure and replication, protein synthesis, and gene control mechanisms. This is an excellent course for students considering careers in the biological or medical fields.

Prerequisite(s): Successful completion of Biology.

Expectations Supported: 1A, 1B, 1C, 2, 3 *Expectations Assessed:* 3

Course Title: **Chemistry AP** *Course No.:* 1323 *Offered:* All year

Grade: 11, 12 *Level:* Advanced Placement *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: Advanced Placement Chemistry is the equivalent of a general chemistry course taken during the first college year. The theoretical aspects of chemistry are explored with emphasis on mathematical modeling. The major topics include Kinetic Molecular Theory, Structure of Matter, Kinetics, and Equilibrium and Thermodynamics. Students must be self-motivated and well organized with good time management skills. The course requires students to spend at least five hours per week in independent study. Students electing this course must complete a summer requirement including basic problem solving strategies and atomic structure.

Prerequisite(s): Students must have passed Honors Chemistry with a B+ and should have completed or be concurrently enrolled in Pre-Calculus.

Expectations Supported: 1A, 1C, 2, 3A, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Chemistry** *Course No.:* 1322 *Offered:* All year

Grade: 10, 11, 12 *Level:* Honors *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: This course is for the self-motivated student interested in pursuing a career in science, engineering, and medical fields. Content is presented at an advanced level and pace. Students in Honors Chemistry will explore the chemical and physical nature of matter , atomic structure, Periodic Table, chemical bonds, chemical nomenclature, stoichiometry, kinetic molecular theory, solutions, acids and bases, nuclear reactions, equilibrium, and kinetics. The laboratory experience directly supports the concepts introduced in the classroom. The language of chemistry is incorporated in class discussion and laboratory experiences. This course takes a traditional mathematical approach to chemistry and requires well developed mathematical reasoning and skills. Students will experience even greater success in the course if they are currently enrolled in Algebra II Honors.

Prerequisite(s): Students must have (1) completed Algebra I and (2) completed or be concurrently enrolled in Geometry.

Expectations Supported: 1A, 1B, 1C, 3A, 3B, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Chemistry**

Course No.: 1321 *Offered:* All year

Grade: 10, 11, 12 *Level:* College Prep *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: Stu dents in Chemistry will explore the chemical and physical nature of matter, atomic structure, Periodic Table, chemical bonds, chemical nomenclature, stoichiometry, kinetic molecular theory, solutions, acids and bases, nuclear reactions, equilibrium, and ki netics. The laboratory experience directly supports the concepts introduced in the classroom. The language of chemistry is incorporated in class discussion and laboratory experiences. This course takes a traditional mathematical approach to chemistry and will require mathematical reasoning and skills.

Prerequisite(s): Students must have (1) completed Algebra I and (2) completed or be concurrently enrolled in Geometry.

Expectations Supported: 1A, 1C, 3A, 3B, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Chemistry - FAA**

Course No.: 1380.H or 1380.CP *Offered:* All year

Grade: 10 *Level:* Open Honors *Credits:* 5

Department: Science *Affiliated Dept.:* Franklin Arts Academy *Duration:* Full year

Description: This 10th grade chemistry-based science course emphasizes the relationship and application of chemistry principles to situations encountered in the arts. Course topics will include: fundamental properties of matter, geometric structure of atoms and molecules, historic discoveries the Periodic Table and periodicity, chemical reactions and bonds between atoms, and stoichiometry. Laboratory experiences and interdisciplinary math and art activities will emphasize concepts in chemistry learned in the classroom and allow students to creatively express themselves. Students will be assigned homework daily and will be expected to actively participate in class activities and complete out of class projects for successful completion of the course. The language of chemistry will be incorporated in class discussion and laboratory experiences and regular assessment of key terms and concepts reinforce learning. Some mathematical reasoning skills are necessary for effective learning.

Prerequisite(s): Students must have (1) successfully completed Algebra 1 and Biology and (2) successfully completed Geometry (or be concurrently enrolled in Geometry).

Expectations Supported: 1A, 1B, 1C, 1D, 2, 4A, 4B *Expectations Assessed:* 3A, 3B, 3C, 3D

Course Title: **Comparative Anatomy and Physiology**

Course No.: 1310 *Offered:* All year

Grade: 11, 12 *Level:* Honors *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: Comparative Anatomy and Physiology is the study of the structure and function of the morphology and physiology of vertebrates and their evolutionary lineage. Through the extent of this course, students will be exposed to the physiologic and morphologic underpinnings of the vertebrate body plan. Topics covered within this course include: movement and support, integration and coordination, processing and transport, and reproduction with an emphasis on a variety of vertebrate groups. Students enrolled in the course will, by its completion, have gained an understanding of the major organ systems and their respective roles in the maintenance of systemic homeostasis along with a general understanding of the evolutionary history of each of the major vertebrate groups. Extensive dissection is a key component of this course. Special focus will be placed on the skeletal system, cardiovascular system, and nervous system.

Prerequisite(s): Students must have completed Honors Biology and Honors Chemistry and should possess strong verbal and communication skills.

Expectations Supported: 1A, 1C, 2, 3B, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Conceptual Physics - FAA**

Course No.: 1381.H or 1381.CP *Offered:* All year

Grade: 11 *Level:* Open Honors *Credits:* 5

Department: Science *Affiliated Dept.:* Franklin Arts Academy *Duration:* Full year

Description: This 11th grade physics-based science course emphasizes the relationship and application of physics principles to real-life situations encountered in the arts. Course topics typically will include forces, power, kinematics, work and energy, wave theory, sound, light, electricity and basic electronics. Laboratory experiences are used to emphasize the concepts and allow students to become familiar with apparatus. The mathematical topics that apply to the sciences include linear functions, graphics, quadratics, exponentials, and trigonometry. Laboratory and investigative activities will have an arts focus and will combine the science with the mathematics. In addition to class work, the student will be required to complete projects related to their artistic studies. Upon completion of this course, students will be able to quantitatively analyze sound, optics, movement, electricity and electronics encountered in the arts.

Prerequisite(s): Students must have completed Algebra I and Geometry.

Expectations Supported: 1A, 1B, 1C, 1D, 2, 3C, 3D, 4A, 4B *Expectations Assessed:* 3C, 3D

Course Title: **Ecology**

Course No.: 1360 *Offered:* Semester 1 or 2

Grade: 10, 11, 12 *Level:* College Prep *Credits:* 2.5

Department: Science *Affiliated Dept.:* n/a *Duration:* Semester

Description: This is a course that involves the design of nature; that is, the interrelationships amongst all living and non-living components of the environment. The course will include discussions regarding the delicate balance of nature and the diverse interactions that exist among life forms, supplemented by lab work. This course will be offered every other year.

Prerequisite(s): Students must have successfully completed Biology.

Expectations Supported: 1A, 1B, 3B, 3C, 3D, 4A, 4B *Expectations Assessed:* 3C

Course Title: **Electricity and Magnetism**

Course No.: 1347 *Offered:* Semester 1 or 2

Grade: 11, 12 *Level:* College Prep *Credits:* 2.5

Department: Science *Affiliated Dept.:* n/a *Duration:* Semester

Description: This course will explore the topics of electricity, magnetism, and the relationship between the two. Topics covered will include electrostatics, electric fields, electric currents, electric power, dc circuits, magnetism, electromagnetism, motors, and generators. Through hands-on laboratory experiences students will become familiar with using basic electric meters, such as voltmeters and ammeters. Much attention will be placed on problem solving. Assessments will be based on homework, class work, lab reports, quizzes, tests, and projects.

Prerequisite(s): Students must have completed Algebra II.

Expectations Supported: 1A, 1B, 1C, 3A, 3B, 3C, 3D, 4A *Expectations Assessed:* 3C, 3D

Course Title: **Environmental Science AP**

Course No.: 1366 *Offered:* All year

Grade: 11, 12 *Level:* Advanced Placement *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: This course is offered to students in the 11th and 12th grades that meet the prerequisites and is designed to be the equivalent of a one - semester, introductory college course in environmental science. The goal of the AP Environmental Science course is to provide students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, to identify and analyze environmental problems both natural and human-made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving or preventing them. Students should have an interest in environmental science and will be required to complete a summer reading assignment, to submit at least one research project/paper per quarter, and to take the advanced placement exam in May.

Prerequisite(s): Students who enroll in this course must have attained a minimum grade of B+ in Honors Biology and Honors Chemistry.

Expectations Supported: 1A, 1B, 3B, 3C, 3D, 4A, 4B *Expectations Assessed:* 3C, 3D

Course Title: **Geology**

Course No.: 1367 *Offered:* Semester 1 or 2

Grade: 10, 11, 12 *Level:* College Preparatory *Credits:* 2.5

Department: Science *Affiliated Dept.:* n/a *Duration:* Semester

Description: This course entails the study of Earth's origin, history, structure, and systems. Using rocks, minerals, and maps as a foundation, students will learn how the earth formed, as well as the geo-physical, geo-chemical, and internal/external energy systems that continue to shape and re-shape the planet. The effects of the rock, water, carbon, and nitrogen cycles on earth systems are explored in this course. Classroom activities, laboratory experiences, independent projects, and occasional field excursions are provided to enhance each student's understanding and application of the course material. Beginning year 2013–2014, this course will be offered every other year.

Prerequisite(s): Students must have successfully completed Biology.

Expectations Supported: 1A, 2, 3A, 3B, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Green Engineering**

Course No.: TBD *Offered:* Semester 1 or 2

Grade: 10, 11, 12 *Level:* Open Honors *Credits:* 2.5

Department: Science *Affiliated Dept.:* n/a *Duration:* Semester

Description: This course provides a background on the issues of atmospheric balance, climate change, greenhouse gases, and an overview of the use of both renewable and non-renewable energy sources. The course will use hands-on lab based activities and real-life problems for which students will creatively problem-solve, design, and manufacture solutions with the ultimate goal of increasing energy efficiency.

Prerequisite(s): Students must have successfully completed Biology.

Expectations Supported: 1, 2, 3 *Expectations Assessed:* 3C, 3D

Course Title: **Human Anatomy and Physiology**

Course No.: 1306 *Offered:* All year

Grade: 10,11, 12 *Level:* College Preparatory *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: Anatomy and Physiology is the study of the structure and the function of the human body. This course will emphasize how disease affects human systems. Topics of discussion include: movement and support, integration and coordination, processing and transport and reproduction. At the conclusion of the course, students will develop an appreciation of the form and function of the human body and gain an understanding of the role each organ system plays in the homeostasis of the human organism. Dissection is a component of this course.

Prerequisite(s): Students should have completed Biology and should possess strong verbal and communication skills.

Expectations Supported: 1A, 1C, 2, 3B, 3C, 3D, 5 *Expectations Assessed:* 3C, 3D

Course Title: **Introduction to Forensic Science**

Course No.: 1350.H or 1350.CP *Offered:* Semester 1 or 2

Grade: 10, 11, 12 *Level:* Open Honors *Credits:* 2.5

Department: Science *Affiliated Dept.:* n/a *Duration:* Semester

Description: You've been engaged by "CSI" and have been fascinated by "NCIS" but how accurately do these shows portray the realities of forensic science? The field of forensic science comprises several areas of study (anatomy, chemistry, biology, physics, etc.) and this course aims to integrate these sciences in the pursuit of justice. This course will focus on the criminal investigation process that will include crime scene investigation, evidence gathering procedures and subsequent laboratory analysis of evidence. Each student should finish this class with an understanding of the history and definition of forensic science, legal framework in which forensic science is conducted, common and recently developed forensic applications, potential forms of evidence and their analysis, and presentation of facts for a court of law.

Prerequisite(s): Students must have successfully completed Biology.

Expectations Supported: 1C, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Introduction to Robotics**

Course No.: TBD | *Offered:* Semester 1 or 2

Grade: 10, 11, 12 | *Level:* Open Honors | *Credits:* 2.5

Department: Science | *Affiliated Dept.:* n/a | *Duration:* Semester

Description: This is the beginning course in robotics which utilizes VEX robotics technology. The objective of the course is to introduce students to basic programming as well as problem-solving strategies. Students work in teams to develop, build, and program robots, as well as document and evaluate their progress in order to make improvements on the design. Topics may include motor control, gear ratios, torque, friction, sensors, timing, program loops, logic gates, decision-making, propulsion systems, and binary number systems. Student designed robots will be programmed to compete when possible.

Prerequisite(s): Students must have successfully completed Biology.

Expectations Supported: 1C, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Meteorology**

Course No.: 1362 | *Offered:* Semester 2

Grade: 10, 11, 12 | *Level:* College Prep | *Credits:* 2.5

Department: Science | *Affiliated Dept.:* n/a | *Duration:* Semester

Description: Meteorology is the study and scientific exploration of Earth's atmosphere, weather, and climate and its effect on humans and the environment. Among the topics to be covered in this course are the atmosphere, evaporation, condensation, precipitation, atmospheric pressure, winds, air masses, fronts, storms, weather forecasts, climate, climate changes, and the interactions that occur between the biosphere, geosphere, and atmosphere. Students will advance their skills in science through the use of laboratory techniques, projects, field studies, and web-based research. This course will be offered every other year.

Prerequisite(s): Students must have successfully completed Biology.

Expectations Supported: 1A, 2, 3A, 3B, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Oceanography**

Course No.: 1361 | *Offered:* Semester 1

Grade: 10, 11, 12 | *Level:* College Prep | *Credits:* 2.5

Department: Science | *Affiliated Dept.:* n/a | *Duration:* Semester

Description: Oceanography is the study of the physical features and natural resources in the Earth's oceans. This course deals mainly with physical oceanography and encompasses topics such as the: geology and geography of ocean basins; physical properties of sea water; marine chemistry; salinity and density; circulation of the oceans; waves; tides; the transfer of energy; oceanographic instruments, tools, and methods; as well as the interdependent relationships between ocean and human systems. Classroom activities, independent projects, laboratory experimentation, and web-based research are used to advance student knowledge and understanding of ocean concepts, theories, and phenomena.

Prerequisite(s): Students must have successfully completed Biology.

Expectations Supported: 1A, 2, 3A, 3B, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Physics AP C Mechanics**

Course No.: 1345 *Offered:* All year

Grade: 12 *Level:* Advanced Placement *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: AP Physics C Mechanics is a calculus-based course that provides students a challenging opportunity to apply their math and science knowledge to describe and model the physical world. The course is the equivalent of a college-level physics course taken by science and engineering students. Course topics revolve around Newtonian mechanics, including kinematics, Newton's three laws of motion, work, energy, power, system of particles and others as outlined by the AP College Board ©. AP Physics C applies mathematical skills from Algebra, Geometry, Trigonometry and differential and integral Calculus in order to solve a wide-range of physics phenomena and problems. Students will apply their new knowledge of physics in many hands-on labs, projects, and activities. Students are expected to take the Advanced Placement Exam for Physics C Mechanics given in May, and they are required to complete an extensive summer assignment in order to prepare for the course.

Prerequisite(s): Students must complete the Physics Honors course with a minimum grade of B+ and must have taken or be concurrently enrolled in calculus.

Expectations Supported: 1A, 1B, 1C, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Physics**

Course No.: 1342 *Offered:* All year

Grade: 11, 12 *Level:* Honors *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: This course is for the student who intends to pursue higher education in the sciences and/or engineering. The problem-solving approach emphasizes the application of physical science principles to real-life situations and requires a significant mathematics background. Course topics include the study of mechanics (kinematics and dynamics), forces, work, energy and waves (sound and light). Laboratory experiments and activities are integrated to allow the students to experience "the way physics works" as they study the concepts. Special topics from outside sources will supplement the class material. Successful completion of this course is required for enrollment in Physics AP. After completing this course, students will be able to quantitatively define/describe the dynamics between forces, work, and energy. Students will show proficiency in solving motion problems cinematically. Students will accurately analyze motion graphically. Students will show a working knowledge of waves and how they are related to the concepts of sound and light. Students will be able to show how the concepts studied are integrated into understanding the universe. Historically, students who performed well in this course had successfully completed Geometry Honors and Algebra II Honors and were concurrently enrolled in Algebra III/Trigonometry or Pre-Calculus.

Prerequisite(s): Students must have successfully completed Geometry Honors and Algebra 2 Honors

Expectations Supported: 1A, 1B, 1C, 3A, 3B, 3C, 3D, 4A *Expectations Assessed:* 3C, 3D

Course Title: **Physics**

Course No.: 1341 *Offered:* All year

Grade: 11, 12 *Level:* College Prep *Credits:* 5

Department: Science *Affiliated Dept.:* n/a *Duration:* Full year

Description: This course is for the student who has interest in the physical sciences. A traditional presentation of the concept of motion, forces, work, power, energy, and waves (sound and light) is made with emphasis on problem-solving techniques. Although the approach is more qualitative than quantitative, a sound background in mathematics is necessary. To be successful, students should have completed Algebra II with a grade of C or better. Laboratory experiences are used to emphasize the concepts and allow students to become familiar with apparatus. After completing this course, students will be able to define/describe the dynamics of motion and demonstrate an ability to solve problems involving motion. Students will be able to show the interconnection of force, work, power, and energy. Students will be able to construct motion graphs and make conclusions from graphs of this type. Students will show a basic knowledge of waves and how sound and light behave as waves.

Prerequisite(s): Students must have successfully completed Geometry and Algebra 2.

Expectations Supported: 1A, 1B, 1C, 3A, 3B, 3C, 3D *Expectations Assessed:* 3C, 3D

Course Title: **Pollution: Sources, Treatment and Prevention**

Course No.: 1364 *Offered:* Not offered 2014-2015

Grade: 10, 11, 12 *Level:* College Prep *Credits:* 2.5

Department: Science *Affiliated Dept.:* n/a *Duration:* Semester

Description: This course addresses various forms of environmental pollution including: air, water, land, climate, etc., and will include investigations of pollution causes and treatments, as well as an emphasis on preventive measures that man can implement. The course will include a combination of classroom activities, discussion, and lab experiences. Beginning year 2013 – 2014, this course will be offered every other year.

Prerequisite(s): Students must have successfully completed Biology.

Expectations Supported: 1A, 1B, 3B, 3C, 4A, 4B *Expectations Assessed:* 3C

Course Title: **Wave Physics**

Course No.: 1348 *Offered:* Semester 1

Grade: 11, 12 *Level:* College Prep *Credits:* 2.5

Department: Science *Affiliated Dept.:* n/a *Duration:* Semester

Description: Wave Physics will cover the branch of physics which deals with light and sound. The course will start with a study of waves in springs and water, and then move onto topics such as mirrors, lenses, color, rainbows, pitch, frequency, resonance, interference and diffraction. The topics covered will be related to the study of music, art and photography. Hands-on laboratory experiences will be used to emphasize the concepts. This course is algebra-based and emphasis is placed on both conceptual understanding and the mathematical model as a means of prediction. Much attention will be placed on problem solving. Assessments will be based on homework, class work, lab reports, quizzes, tests, and projects.

Prerequisite(s): Students must have completed Algebra II.

Expectations Supported: 1A, 1B, 1C, 3A, 3B, 3C, 3D, 4A *Expectations Assessed:* 3C, 3D