Science

The objective of the Science curriculum are (1) to acquaint students with the presently accepted theories and laws of the universe and the methods used to develop and test new theories and laws; (2) to help students acquire skills in making observations, assembling and evaluating facts and reaching conclusions; (3) to help students develop an understanding and appreciation of the role of science in man's attempts to relate to himself in the universe; (4) to help students appreciate the role they can and should play in protecting and improving their environment; and (5) to help students appreciate how their lives are enhanced by future scientific endeavors. NOTE: The DHS Science Department provides alternates to dissection.

As a requirement for graduation, students must complete three credits in laboratory science courses All science course offerings are laboratory courses at Darien High School. However it is highly recommended that college bound students elect three years of Science and that Chemistry and/or Physics be included in their program.

Normally, students are urged to take the first year course in biology, chemistry, and physics before taking the second year course in any of these sciences. Students may take courses in grades other than those shown above if they have met the prerequisites. **All Science courses partially fulfill STEM requirements.**

Science: AP Biology

Open to Grades: 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 400

Type: Elective

Prerequisite: 300 Biology with a grade of B+ or higher, or 400 Biology Honors with a grade of B or higher; and 300 Chemistry with a grade of B+ or higher, or 400 Chemistry with a B or higher, or departmental approval.

Course Objectives: 1. To prepare students to take the Advanced Placement (AP) Biology exam in May. 2. To make students skillful in the scientific method of reaching conclusions. 3. To make students skillful in communicating information in a scientific manner. 4. To give students an opportunity to explore selected topics in Biology in extensive detail. 5. To make students aware of current research and knowledge, particularly in the fields of genetics and DNA technology.

Description: A fast paced dynamic, university-level course that keeps pace with modern developments in Biology. Topics of study include: molecules and cells; biochemistry, genetics and evolution; organism diversity; anatomy and physiology of plants and animals; and ecology. The required laboratory work is extensive and utilizes more advanced instrumentation and data analysis. Some outside reading is required.

Expectations: Extensive homework and laboratory work is expected. Students are expected to perform extensive readings in Biology. In addition, there is a mandatory summer reading assignment with a unit test administered in the first week of school. Students who excel in this course are expected to take the Advanced Placement Biology exam.

Course Curriculum: AP Biology

Science: AP Chemistry

Open to Grades: 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 400

Type: Elective

Prerequisite: 300 Chemistry with a grade of B or higher and departmental approval, or 400 Chemistry Honors with a grade of B- or higher.

Course Objectives: 1. To allow students to experience a first year college Chemistry course while in high school. 2. To introduce students to the most recent theories in Chemistry. 3. To introduce students to complex chemical equilibria. 4. To allow students to work more independently in the laboratory.

Description: Topics are presented in considerable depth and include: matter, measurement, nomenclature, stoichiometry, reactions in aqueous solutions, kinetic theory of gases, atomic structure, quantum mechanical model of the atom, covalent bonding, VSEPR theory, MO theory, thermochemistry, entropy, Gibbs free energy, solutions, kinetics, equilibrium, simultaneous equilibria, acids-bases, complex ions, coordination compounds, nuclear chemistry.

Expectations: Extensive homework and laboratory work is expected. Students must be able to work independently on assignments. Students achieving a B+ or better should be well prepared for the AP Chemistry exam.

Course Curriculum: AP Chemistry Curriculum

Science: AP Environmental Science

Open to Grades: 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 400

Type: Elective

Prerequisite: 300 Biology with a grade of B or higher or 400 Biology Honors with a grade of B- or higher and 300 Chemistry with a grade of B or higher or 400 Chemistry Honors with a grade of B- or higher.

Course Objectives: 1. To develop a strong knowledge base in Environmental Science essential for identifying, analyzing, and solving environmental problems. 2. To design and complete an independent, long-term environmental research project which involves the collection, analysis, and communication of data. 3. To prepare for the AP Environmental Science exam.

Description: 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 anthropogenic, to evaluate the relative risks associated with these problems, and to examine alternative routes for resolving and/or preventing them. Environmental Science is interdisciplinary, drawing from both the natural and social sciences and focusing on several unifying themes including: earth systems and resources, the living world, population, land and water use, energy resources and consumption, pollution, and global change. Quantitative analysis is a significant component of this course.

Expectations: Students are expected to learn from experimentation, field research, and current and historical literature which will enable them to draw insightful conclusions and build an extensive knowledge base independently and cooperatively. They will be required to prepare an in-depth research project conducted outside of class. Students are expected to take the AP Environmental Science exam in May. Students must be able to perform basic mathematical calculations without the aid of a calculator. Materials for a required summer assignment must be acquired from the teacher before the end of the prior school year.

Course Curriculum: AP Environmental Science

Science: AP Physics C - Electricity and Magnetism

Open to Grades: 12

Number of Semesters: 2

Number of Credits: 1

Level: 400

Type: Elective

Prerequisite: AP Physics C: Mechanics*, and AP Calculus BC or AP Calculus AB and permission of the teacher. Prerequisite courses may be taken concurrently.

Course Objectives: 1) To develop a strong understanding of the Electric and Magnetic phenomena that exists in our world. 2) To prepare students to take the AP Physics C: Electricity and Magnetism exam. 3) To develop the student's ability to read, understand, and interpret physics information verbally, mathematically, and graphically. 4) To develop the students' ability to use mathematical reasoning in a physical situation or to solve a problem. 5) To develop the students' ability to perform inquiry-based experiments and complete performance-based challenges in the laboratory setting.

Description: The AP Physics C: Electricity and Magnetism course provides a systematic introduction to the main principles of electricity and magnetism at the college-freshman level (2nd semester). This course is intended to be taken after or concurrently with AP Physics C: Mechanics, and is for those students with a strong interest in pursuing physics and engineering in college. A strong interest and/or knowledge of calculus is required. Course content includes: electro-statics, electro-dynamics, Gauss's law, capacitors, circuits with resistors (R), circuits with capacitors (C), circuits with inductors (L), RC circuits / LR circuits / LC circuits, magneto statics, magneto-dynamics, induction, Maxwell's equations.

Expectations: Students are expected to apply physics theories to solve complex algebraic and calculus-based problems. In addition, students are expected to spend a lot of time completing homework assignments and practice AP problems throughout the school year and over school vacations. This course prepares students to take the AP Physics C: Electricity and Magnetism Exam, and all students are expected to take this exam in May.

Course Curriculum: AP Physics C - Electricity and Magnetism

Science: AP Physics C: Mechanics

Open to Grades: 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 400

Type: Elective

Prerequisite: 400-level Science course with a grade of B or higher, or 300-level Science course with a grade of A- or higher, and departmental approval. Student must also be enrolled in AP Calculus (AB or BC).

Course Objectives: 1. To prepare the students to take the AP Physics C Exam - Mechanics Section. 2. To develop the student's ability to read, understand and interpret physical information – verbally, mathematically and graphically. 3. To develop the students ability to describe and explain the sequence of steps in the analysis of a particular phenomenon or problem, that is, describe the idealized model to be used in the analysis, state the principles or definition that are applicable, specify relevant limitations on applications of these principles, carry out and describe the steps of the analysis, verbally and mathematically. 4. To interpret the results or conclusions, including discussion of particular cases of special interest. 5. To develop the students' ability to use mathematical reasoning – arithmetic, algebraic, geometric, trigonometric and calculus in a physical situation or problem. 6. To develop the student's ability to perform experiments and interpret the results of observations, including making an assessment of experimental uncertainties.

Description: The AP Physics course provides a systematic introduction to the main principles of physics and the freshman university level. Knowledge of Calculus, Algebra, and Trigonometry are required. A major goal of the course is to apply these principles to the solutions of problems. Course content includes kinematics, Newton's laws of motion, work, energy, power, linear momentum, circular motion, oscillations and gravitation.

Expectations: Students are expected to spend a great deal of time working in the laboratory and do extensive homework. This course prepares students for the AP Physics Calculus based exam in mechanics; all students will be encouraged to take this exam.

Course Curriculum: AP Physics C: Mechanics

Science: Anatomy & Physiology: Heart & Sole

Open to Grades: 11, 12

Number of Semesters: 2

Number of Credits: 1.0

Level: 300

Type: Elective

Prerequisite: Biology: B or higher in 300, B- in 400 and Chemistry: B or higher in 300, B- in 400

Course Objectives: Students will be expected to: 1. Consistently use correct terminology to discuss the biochemical processes and structures-- cells, tissues and organs--of the human body. 2. Identify and explain the structure and functions of each body system. 3. Explain the role of each body system in maintaining homeostasis 4. Discuss common and emerging diseases, disorders, and conditions that affect humans. 5. Describe the physiological effects of development and aging on the human body. .

Description: Students taking this course will explore the structures and biochemical processes regulating the human body and changes that occur over the human lifespan. Students will enhance their scientific literacy through linking new concepts and terminology presented during this course, with prior knowledge gained in Biology and Chemistry. There will be a heavy emphasis on structure and function of system components and associated pathology through the use of labs, dissections, and case studies. Body systems to be studied include: the cardiovascular, respiratory, immune, reproductive, and more!

Expectations: Students will be able to identify and provide detailed descriptions of the anatomy of human body systems and be able to explain the role of each system in maintaining homeostasis. In addition, students will be able to explain how congenital and acquired conditions affect human health, and discuss potential treatments for specific conditions. Students will be expected to successfully complete both standard exams --including multiple choice and essay responses, and practical (lab) exams. Students must complete supplementary system-related readings and assignments, and regularly contribute to class discussions. Students will also be required to conduct bibliographic research on various subject-related topics, including diseases, disorders, and conditions, and present their findings to the class.

Science: Applications of Physics and Chemistry 1

Open to Grades: 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 900

Type: Elective

Notes: Credit may be received from either the Science Department or the Technology Education Department. This course is designed for students looking for an alternative to a full year of Chemistry or Physics. The course can be used to meet the Science graduation requirement or the Fine/Practical Arts graduation requirement but not both.

Prerequisite: Biology and Earth Science.

Course Objectives: 1. To introduce students to basic principles of Physics and Chemistry such as physical and chemical changes, electricity and magnetism, simple machines, energy, forces and motion, and measurement. 2. To apply basic physical science concepts in the design, construction and testing of real world devices and/or products. 3. To promote and enhance general technological and scientific literacy. 4. To develop skills and qualities of effective workers such as positive interdependence, effective communication, individual accountability, self-management, leadership, creative thinking, and problem solving.

Description: Students will be exposed to physical science topics in a co-operative program between the Science and Technology Education Departments. Topics focus on science concepts that can be applied to the students' experiences in everyday life. Learning will be facilitated through independent and collaborative research and experimentation as students make connections between concrete applications and abstract concepts. A project-based, multi-sensory approach will address individual learning styles and facilitate the use of alternative assessments. Instruction will be activity centered and use a mix of whole class activities, large and small group presentations, cooperative learning, and individual projects. The science course will be taught in a laboratory setting providing access to tools and materials for individual and collaborative projects. Tools will include hand tools for wood, metal, electronic, and simple chemical projects. Computers will be used for design, problem-solving, and research.

Expectations: Students will be asked to observe, investigate and problem solve in a small group setting. It is expected that students complete reading assignments, participate in class, research some topics, and use critical thinking skills in the development of their projects. Students should be prepared to display and explain various physical science concepts using "real world" examples.

Science: Applications of Physics and Chemistry 2

Open to Grades: 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 900

Type: Elective

Notes: Credit may be received from either the Science Department or the Technology Education Department. This course is designed for students looking for an alternative to a full year of Chemistry or Physics. The course can be used to meet the Science graduation requirement or the Fine/Practical Arts graduation requirement but not both.

Prerequisite: Biology and Earth Science.

Course Objectives: 1. To introduce students to basic principles of Physics and Chemistry such as atomic structure, chemical reactions, acids and bases, waves, radioactivity, energy sources, electronics and computers. 2. To apply basic physical science concepts in the design, construction, and testing of real world devices and/or products. 3. To promote and enhance general technological and scientific literacy. 4. To develop skills and qualities of effective workers such as positive interdependence, effective communication, individual accountability, self-management, leadership, creative thinking, and problem solving.

Description: Students will be exposed to physical science topics in a cooperative program between the Science and Technology Education Departments. Topics focus on science concepts that can be applied to the students' experiences in everyday life. Learning will be facilitated through independent and collaborative research and experimentation as students make connections between concrete applications and abstract concepts. A project-based, multi-sensory approach will address individual learning styles and facilitate the use of alternative assessments. Instruction will be activity centered and use a mix of whole-class activities, large and small group presentations, cooperative learning, and individual projects. The course will be taught in a laboratory setting providing access to tools and materials for individual and collaborative projects. Tools will include hand tools for wood, metal, electronic, and simple chemical projects. Computers will be used for design, problem solving, and research.

Expectations: Students will be asked to observe, investigate and problem solve in a small group setting. It is expected that students complete reading assignments, participate in class, research some topics, and use critical thinking skills in the development of their projects. Students should be prepared to display and explain various physical science concepts using "real world" examples.

Science: Authentic Science Research

Open to Grades: 10, 11, 12

Number of Semesters: 6

Number of Credits: 3

Level: 900

Type: Elective

Notes: Students in Year 2 and Year 3 have the opportunity to earn college credit through the University at Albany's University in the High School Program.

Prerequisite: Biology and the completion of a writing sample expressing interest in the program.

Course Objectives: 1. To provide students with an understanding of research methodology. 2. To provide students the opportunity to pursue excellence in an area of their own interest. 3. To employ the scientific method of problem solving. 4. To pursue the solution to a problem or question through creative, critical, scientific thought. 5. To accomplish a review of literature on the topic of interest. 6. To learn how to conduct authentic science research. 7. To handle data in an analytical fashion. 8. To become involved with the scientific community. 9. To report the results of scientific investigation formally through writing and presentation. 10. To learn the value of time management in attaining goals over an extended time period. 11. To appreciate the work of scientists in the field and to gain an understanding of the contributions of scientists to our world. 12. To meet and overcome obstacles set before them.

Description: The program is a three year sequence of independent research. Sophomores begin with a review of literature, and in so doing, fine tune their area of interest. In the process, they also identify the foremost experts in their field of study. The students approach these scholars with questions about their research and propose a mentorship. During the junior year, they perform the actual data collection with the mentor. As seniors, they prepare their projects, meeting the goals of the Intel Science Talent Search to which they are encouraged to apply. During the course of the three year program, all of the student researchers will meet in seminar fashion on alternating days. Through this seminar work, they have the opportunity to learn from one another at each stage of their journey. Students apply from all academic levels and must continue the pursuit of their traditional science program.

Expectations: Students will be responsible for bi-weekly meetings with their mentor teacher to review the goals of the previous two weeks and to set the goals for the upcoming time period. In this way, their progress is closely monitored. Students will be expected to work in earnest at the pursuit of their goal, which is a report on the results of their scientific research to their community and beyond. Students will be encouraged to enter their projects in various science competitions such as the Intel Science Talent Search, JSHS, and the Connecticut STEM Fair.

Course Curriculum: Authentic Science Research

Science: Biology

Open to Grades: 9

Number of Semesters: 2

Number of Credits: 1

Level: 300

Type: Required

Notes: Satisfies 9th grade Science requirement.

Prerequisite: A grade of C or higher in 8th grade English.

Course Objectives: 1. To acquaint students with the world of organisms. 2. To help students see the critical relationship of one organism to another. 3. To provide knowledge of the structure and functions of organisms and populations. 4. To give students an understanding and appreciation of the diversity in structure and function of organisms. 5. To help students understand the structure and function of the human being.

Description: Biology is the science of organisms. Students will be exposed to the great diversity which exists among organisms, with an overview of topics ranging from one-celled organisms through the human being. Emphasis is also placed on the environment as it relates to all organisms.

Expectations: Students will be required to complete homework assignments and participate in laboratory sessions. They will be expected to cooperate as group members, use equipment properly, and submit lab reports. Students will also be responsible for submitting a research project.

Course Curriculum: Biology

Science: Biology Honors

Open to Grades: 9

Number of Semesters: 2

Number of Credits: 1

Level: 400

Type: Required

Notes: Satisfies 9th grade Science requirement.

Prerequisite: Initial placement into Honor Biology using 2 out of 3 criteria: Average combined 1st and 2nd quarter grade of A in 8th Grade Science; 8th Grade Math criteria options (Average combined 1st and 2nd quarter grade of C+ or better in Accelerated Geometry, Average combined 1st and 2nd quarter grade of B or better in Accelerated Algebra, Average combined 1st and 2nd quarter grade of B+ or better in Algebra 8, Average combined 1st and 2nd quarter grade of A in Pre Algebra 8); Score of 82 or higher on the 8th Grade DRP Assessment

Course Objectives: 1. To acquaint students with the world of organisms. 2. To help students see the critical relationship of one organism to another. 3. To provide knowledge of the structure and functions of organisms and populations. 4. To give students an understanding and appreciation of the diversity in structure and function of organisms. 5. To help students understand similarities of all organisms due to their common evolutionary history.

Description: Biology is the science of organisms. Students will be exposed to the great diversity which exists among organisms, while exploring the similarities of all living things. Emphasis on evolution as it relates to all organisms. This course differs from 300 Biology primarily in its inquiry-based approach. Over half of the class time is spent in the laboratory.

Expectations: Students are expected to learn from their own experimentation rather than from conclusions outlined in a text or by the teacher. They will be required to complete extensive homework assignments, cooperate as group members, and use equipment properly. They are expected to be self-directive, research-oriented, and willing to undertake supplementary work.

Course Curriculum: Biology Honors

Science: Botany

Open to Grades: 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 300

Type: Elective

Prerequisite: None

Course Objectives: To teach students the importance of plants with regard to the planet, other living organisms, and themselves and their own lives.

Description: The course will include units of instruction on importance of plants to the planet (autotrophs, base of food chain, photosynthesis & cell respiration); use of plants in everyday life (clothing, beauty products, landscaping, food, products made from plants, etc.); plants within ecosystems and biomes; plant structure (cells, tissues, roots, shoots, leaves); photosynthesis; plant reproduction; plant hormones and tropisms; plant nutrition; effects of radiation, pesticides, etc. on plants. Hands-on activities will include designing and carrying out inquiry labs, as well as forcing bulbs, growing plants in the greenhouse and classroom, planting the Botany flowerbed.

Expectations: Students will develop a true appreciation for the roles of plants in our global ecosystem, and learn that it is vitally important for them as informed citizens to protect and preserve these roles for our planet and its population to survive. Students will develop an appreciation for the beauty of plants in our homes, gardens, and environment, as well as for the many products made from plants. Students will learn how to design, plant, and nurture a garden, and how to make informed nutritional choices based on plants.

Course Curriculum: Botany

Science: Chemistry

Open to Grades: 10, 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 300

Type: Required

Prerequisite: 300 Algebra 1 with a grade of B- or higher.

Course Objectives: 1. To acquaint students with the laws and theories of Chemistry. 2. To facilitate the development of laboratory techniques. 3. To facilitate the development of the scientific method in reaching conclusions. 4. To stimulate students toward a continuing interest in the field of chemistry.

Description: Concepts covered in this class include: atomic theory and structure, periodicity, chemical formulas and equations, stoichiometry, chemical bonding, polymers, phases of matter, behavior of gasses, solutions, kinetics and equilibrium, acids and bases, and nuclear chemistry. Oxidation-reduction and electrochemistry are optional topics. Most concepts are reinforced with lab experiments and are related to everyday experience when possible.

Expectations: Students will be required to complete homework assignments and participate in class and laboratory activities. They are expected to use mathematical concepts and to develop skill in using laboratory equipment appropriately.

Course Curriculum: Chemistry

Science: Chemistry Honors

Open to Grades: 10, 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 400

Type: Required

Prerequisite: 300 Algebra 1 with a grade of B or higher and a previous 400-level science course with a grade of B or higher, or a previous 300-level science course with a grade of A.

Course Objectives: 1. To give students a strong, fundamental understanding of Chemistry. 2. To enhance abstract reasoning skills and strengthen problem-solving skills. 3. To introduce students to a variety of laboratory techniques. 4. To prepare students for further study of Chemistry.

Description: Topics covered in this course include: measurement, nomenclature, moles, stoichiometry, kinetic theory of gases, atomic structure, bonding, states of matter, solutions, rates of reactions, equilibrium, acids and bases, thermochemistry, and oxidation reduction.

Expectations: This course differs from Chemistry 300 in several significant ways. The course is faster paced and covers topics to a greater depth. Students are expected to do nightly homework assignments and weekly lab reports. Students will use their knowledge of mathematics in solving problems. Application of concepts is required throughout the course.

Course Curriculum: Chemistry Honors

Science: Earth Science

Open to Grades: 10, 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 300

Type: Required

Notes: Satisfies 10th grade science requirement. Those in 300 should show evidence of adequate academic achievement.

Prerequisite: Biology

Course Objectives: 1. To allow students to become skillful in the laboratory techniques used in Earth Science. 2. To make students aware of the various processes that are constantly interacting upon the earth and to explore some of the changes that these processes cause.

Description: This course encompasses several unifying themes. These themes are interwoven in the course structure to serve as a conceptual framework for the content. The major areas of study which are treated historically and logically are: the earth and its place in the universe; the constantly changing earth, its materials and processes; the earth materials from the subatomic through rocks and minerals; the changes in earth materials related to chemical processes; the rock cycle, weathering and erosion; the atmosphere, hydrosphere, lithosphere, biosphere; and the earth's crust and its organic remains; and the influence of humans on earth's environments.

Expectations: Students will be asked to observe, investigate, search existing literature, and draw conclusions. This is a practical lab course which leads to an understanding of the scientific method as well as enabling students to acquire knowledge of the earth's processes through a systematic approach. Field experiences are included in lab sessions.

Course Curriculum: Earth Science

Science: Marine Science

Open to Grades: 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 300

Type: Elective

Prerequisite: 300 Biology with a grade of C+ or higher, or permission of the teacher.

Course Objectives: 1. To become a scientific thinker. 2. To be a responsible community member and be able to make educated decisions regarding community goals and environmental impact. 3. To compare and contrast marine environments and the diversity of marine life from around the world.

Description: This course is an introduction to the world's oceans and to the inhabitants and processes contained within its vast boundaries. Topics will include oceanography, aquaculture,

diversity, ecology, living components, and man's interrelationship with the marine community. The course will place an emphasis on the ecology of our local waters. Interrelationships among animals, plants, and physical and chemical aspects of the environment will be studied, with stress on adaptations for survival unique to the marine environment. This course involves a wide variety of lab work, including animal dissections and field studies.

Expectations: Students are expected to complete laboratory investigations, homework, and research projects. Students will also be responsible for group cooperation in laboratory investigations as well as field studies. Students will demonstrate their understanding in a variety of forms including presentations, tests, lab reports, and lab practicals.

Course Curriculum: Marine Science

Science: Neuroscience and Biopsychology

Open to Grades: 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 300

Type: Elective

Prerequisite: Biology and Chemistry. It is highly recommended that students have also taken Psychology, offered by the Social Sciences department.

Course Objectives: 1. To introduce students to the study of neuroscience. 2. To explore topics in Psychology at the physiological level. 3. To relate on a scientific level directly to the lives of students. 4. To integrate, apply, and build upon concepts learned in previous Biology and Chemistry courses.

Description: This course will begin with an introduction to Psychology and its relationship to the field of Neuroscience. Students will examine methods of research, recent advancements, and the major theories of psychology. The next unit will enrich students prior knowledge of the nervous system and introduce a more complex picture of the nervous system, including brain anatomy, cellular functioning, and synaptic transmission. Next, students' chemistry knowledge will be enriched by expanding their knowledge of the chemistry particularly associated with thoughts and behavior, as well as pharmacology and how drugs affect the biology and chemistry of a person. Once this foundation has been made, students will continue to look at an array of topics including: learning and memory, emotion and stress, reproductive behavior, ingestive behavior, and neurological disorders.

Expectations: Students will be expected to take both standard scientific exams including multiple choice and essay responses, and practical exams. Students will also be required to summarize their readings in essay form and contribute to class discussions. Students who take this course in conjunction with the Psychology course offered through the Social Sciences Department may opt to take the AP Psychology exam. The majority of the requirements for this exam are covered if both courses are taken, and this course was designed to provide the additional requirements necessary for the AP Psychology exam. Students will also be required to conduct bibliographic research on various neurological topics and present their findings to the class.

Course Curriculum: Neuroscience and Biopsychology

Science: Physics

Open to Grades: 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 300

Type: Elective

Prerequisite: Algebra 1 and Geometry with a grade of B- or higher and be taking, or have taken, Algebra 2.

Course Objectives: 1. To acquaint students with the laws and theories of physics, with the purpose of sharing with them the tools with which to study the manner in which the world behaves. 2. To transform students into problem solvers, not only mathematically, but in the laboratory as well. 3. To focus on a conceptual understanding of physics with a strong emphasis on computation. 4. To foster in students a commitment to become scientific thinkers who are able to ask thought provoking questions, and engage in the pursuit of answers to these questions.

Description: The course includes concepts of motion, dynamics, momentum, energy relationships, mechanical waves, sound, electromagnetic waves, geometric optics, electricity, and circuits.

Expectations: Students will be expected to complete frequent homework assignments as well as written lab reports. They will be asked to apply their conceptual understanding in the solution of mathematical problems and will also be asked to problem-solve through experimentation.

Course Curriculum: Physics

Science: Physics Honors

Open to Grades: 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 400

Type: Elective

Notes:

Prerequisite: 300 Chemistry with a grade of A, or 400 Chemistry Honors with a grade of B or higher, and 300 Algebra 2 with a grade of B or higher, or 400 Algebra 2 Honors with a grade of B- or higher.

Course Objectives: 1. To acquaint students with the laws and theories of physics, with the purpose of sharing with them the tools with which to study the manner in which the world behaves. 2. To transform students into problem solvers; not only mathematically, but in the laboratory as well. 3. To focus on a conceptual understanding of physics with a strong emphasis on computation and problem solving at the college level. 4. To foster in students a commitment to become scientific thinkers who are able to ask thought provoking questions, and engage in the pursuit of answers to these questions.

Description: The course includes concepts of motion, dynamics, circular motion, momentum, energy relationships, electrostatics, electricity, DC circuits, magnetism, and geometric optics.

Expectations: Although the content of Physics - Honors is similar to Physics, there are some major differences in the approach used in Physics - Honors. The course places heavy emphasis on extrapolation of laboratory discoveries in order to formulate conclusions. In addition, Physics - Honors focuses on a strong mathematical problem solving approach. Students are encouraged to formulate conclusions on their own and problem solve, with minimal teacher guidance. The typical Physics - Honors student should have demonstrated the ability to utilize higher abstract reasoning skills in previous Science courses.

Course Curriculum: Physics Honors

Science: The Science of Forensic Investigation

Open to Grades: 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 300

Type: Elective

Prerequisite: Biology

Course Objectives: 1. To develop an understanding of the nature of science and the scientific method. 2. To apply the scientific method to issues pertaining to the law. 3. To encourage utilization of higher-order critical and problem-solving skills. 4. To encourage productive interaction with peers to function as a team, while developing and extending communication skills. 5. To foster an appreciation for all disciplines in science, and their practical application in daily life. 6. To merge strong science with everyday applications. 7. To explore the many career opportunities offered by Forensic Science.

Description: This course will consist of topical units, with the unifying theme being the application of science to the law, and may include units such as: Introduction to Forensic Science, Crime Scene Investigation, Evidence, Forensic Science and the Law, Fingerprints, Blood Analysis and Spatter, Drugs and Toxicology, DNA Fingerprinting, Hair and Fibers, Skeletal Remains, Chemical Evidence, and Mock Crime Scene. Activities will include inquiry activities, labs using microscopy, chromatography, comparative analysis, electrophoresis, spot tests, blood analysis, bone examination, etc. Students will do labs, as well as analyze case studies, solve puzzles, and make observations. The course will build upon prior knowledge students have acquired in their science and social studies courses (law), and challenge what they have learned from popular forensic shows, books, magazine articles, and televised cases. The course will provide meaning by showing students how science is used to provide sufficient or insufficient evidence to make legal decisions, as well as how the scientific method can be used to solve everyday problems.

Expectations: Students will: read assignments, case studies, lab directions, and documents; perform lab techniques safely; write opinions and case conclusions; research using a multimedia approach; present projects using both audio and video effectively; design experiments; work with other students as part of a team to solve problems; use technology to research, do experiments, etc.; complete assigned homework, labs, assignments on time; suggest possible explanations for crime scenes; test hypotheses; find relevant materials in daily media; distinguish between fact and fiction in forensic science; pass quizzes, tests, and assessments; individualize course expectations to learning styles in order to be successful, after consultation with and approval from instructor.

Course Curriculum: Forensic Investigation

Science: STEM Design & Innovation

Open to Grades: 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 300

Type: Elective

Prerequisite: 2 years of Science, including Biology and Chemistry/Earth Science and 2 years of Math, including Geometry.

Course Objectives: The course will provide a wide range of student opportunities to study hands-on science and math topics through real world, authentic problem solving and projects to reinforce science and math concepts. Communication and collaboration skills will be essential as students will be expected to present and support their solutions to a variety of stakeholders. Ultimately, this course lays the groundwork for students as an alternative path to IPIE (Independent Projects in Engineering) course, where they could spend a second year diving deeper into their topics and making solutions come to life.

Description: STEM Design and Innovation is an interdisciplinary course designed utilizing a Project Based Learning (PBL) instructional approach. Utilizing a Project Based Learning (PBL) instructional approach, this course takes an active approach towards the nature of design and the NGSS science and engineering practices. STEM Design and Innovation provides students an unique opportunity to guide their own learning and thinking while focusing on designing a solution to a local issue. Within the structure of this class, students see that finding the right questions to ask is far more important than asking for the right answer. Students will gain valuable experience in setting their own goals, monitoring their progress and presenting their ideas to peers, instructors and/or experts within the field of study. Students will complete design projects that include inquiry and analysis of a design opportunity, conceptual design development, detailed design and refinement, and testing and evaluation.

Expectations: Students taking STEM Design and Innovation will focus on open-ended questions, challenges, and/or problems to help identify the content and skills necessary to design an explanation or solution. Students will learn to develop their own questions, use those questions to create investigations, utilize data to create and critique solutions and think critically about the goals of their projects. Students will utilize both the Science and Engineering practices and the United Nations Sustainable Design goals to focus their interests in an environment that fosters student inquiry and voice.

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