

## SCIENCE

### **Biology**

**Grade 9**

This course represents an ecological approach to the study of biology, emphasizing: the nature and chemistry of life, earth as a biosphere, ecosystems, communities and populations, humans' role in the biosphere, cellular structure and function, photosynthesis, cellular respiration, cell growth and division, genetics and genetic engineering, and evolution. As students are investigating this material, they will also maintain and develop the following skills and concepts: recording investigations clearly and accurately, distinguishing between observation and inference, using scientific tools, interpreting data and organizing it into charts, tables, and graphs, using proper units, using models, and employing proper lab safety practices. *One credit*

### **Biology Honors**

**Grade 9**

*Prerequisite: Consistently strong performance in previous year's math and science courses and recommendation of the department.*

Offered to advanced ninth graders, this college preparatory course is an introduction to modern biology using a molecular and cellular approach. Topic areas include: biochemistry, cells, bioenergetics, molecular genetics, reproduction, heredity, and evolution. *One credit*

### **Chemistry**

**Grade 10**

This course is a study of matter and its changes. Topics covered include atomic theory, periodicity, stoichiometry, thermodynamics, kinetics and acid/base chemistry. The course involves problem solving and laboratory exercises. A working knowledge of algebra is essential. *One credit*

### **Chemistry Honors**

**Grade 10**

*Prerequisite: Consistently strong performance in previous year's math and science course and recommendation of the department. Concurrent enrollment in Algebra II is a requisite.*

This is a rigorous course designed for the highly motivated science student who plans to enroll in Advanced Placement Chemistry, or who will need an advanced level of understanding of chemistry for future science courses. Topics covered are stoichiometry, thermodynamics, quantum theory, nuclear chemistry, bonding principles, reactions, gases, liquids, solids, solutions, equilibrium, kinetics, and electrochemistry. The course is lab-based and a working knowledge of a graphing calculator is essential. Chemistry Honors is taught primarily to advanced tenth grade students as a preparation for college or AP Chemistry. *One credit*

### **Anatomy and Physiology**

**Grade 11**

This course is a holistic overview of human anatomy and physiology. Study of the 11 organ systems with an emphasis on structure and function at the cellular, tissue, and organ levels is the central focus. Illness and disease along with the interplay of the organ systems to maintain homeostasis is an ongoing theme as well. A main goal for the course is to equip students with the knowledge of the human body that will empower personal health. In addition to the traditional lecture, labs (including several dissections), case studies, research projects, and individual/group presentations will be utilized during the course of study. *One credit*

### **Human Anatomy and Physiology Honors**

**Grade 11**

*Prerequisite: Consistently strong performance in previous year's math and science courses and recommendation of the department.*

The curriculum of this course is extensively performance and laboratory based. Structure and function of the human body is studied. This includes a study of providing internal coordination and regulation, processing and transporting, and reproduction, growth, and development. These studies will require refreshing knowledge of basic physical, chemical, and biological principles. Careers in medicine, healthcare, research, and modern medical technology are explored. In addition to traditional lecture, there are many dissections and other labs. Several case studies of illness and injury are considered. Writing projects and a service-learning project will also be included. *One credit*

### **Evolutionary Genetics Honors**

**Grade 11**

This course explores the intersection of evolution and genetics with an approach that is lab intensive. Major topics include DNA, the gene, genotype frequencies, mutations, micro- and macro-evolution, and epigenetics. Darwin, evolutionary theory, and its genetic basis is also an area of emphasis. The class utilizes an intensive hands-on approach to learning. As students work to meet curricular goals, they will become competent using advanced laboratory equipment and specific high level laboratory techniques and protocols while benefiting from a close working relationship with researchers and laboratory facilities at the University of Georgia. Students will finish the course with strong science research skills including DNA extraction, polymerase chain reactions, gel electrophoresis and DNA sequencing techniques. They will also acquire skills using computers as research tools to conduct DNA research in the field of bioinformatics. *One Credit*

### **Advanced Placement Chemistry**

**Grade 11**

*Prerequisite: Consistently strong performance in math and science courses in high school and recommendation of the department; Pre-Calculus Honors is a requisite.*

This college-level course covers topics ranging from atomic theory through electrochemistry. AP Chemistry is a rigorous problem-solving course that requires a working knowledge of advanced mathematics. The lab component requires attendance during after-school tutorial. The College Board establishes the AP Chemistry curriculum. *One credit*

### **Physics or 12**

**Grade 11**

*Prerequisites: completion of or concurrent enrollment in Algebra II.*

Physics is the scientific study of matter, energy, motion, and force. Topics covered include forces, kinematics, dynamics, rotation, energy, and momentum within a variety of fields such as mechanics, electromagnetism, atomic and nuclear physics, thermodynamics, and sound and light. The course is lab based and will stress the proper application of algebraic techniques within conceptual situations. The primary goals of Physics are to develop problem solving skills and the ability to analyze information using our understanding of the fundamental laws of nature. *One credit*

### **Physics Honors**

**Grade 11 or 12**

*Prerequisites: completion of or concurrent enrollment in Pre-Calculus Honors, or Algebra II H*

*with permission of the instructor.*

Physics is the scientific study of matter, energy, motion, and force. Topics covered in Physics Honors include forces, kinematics, dynamics, rotation, energy, and momentum within a variety of fields such as mechanics, electromagnetism, atomic and nuclear physics, thermodynamics, and sound and light. The course is lab based and a working knowledge of algebra is essential. The motivated student will have the opportunity to take the AP Physics B Exam in the spring, as the course content will closely follow that suggested by the College Board. *One credit*

### **Advanced Placement Physics C**

**Grade 12**

*Prerequisites: concurrent enrollment in AP Calculus AB/BC or permission of the instructor.*

This is a college-level, calculus-based, introductory physics course focusing on Newtonian Mechanics, and Electricity and Magnetism, with roughly half the course dedicated to each part. Mathematical methodology and problem solving skills are emphasized in this rigorous course, in addition to the laboratory content which will comprise 20-25% of the class time. This course is appropriate for any student considering a major in the physical sciences or engineering. In May, the students will take the AP Exam for which they may receive credit or placement beyond introductory courses in college. The College Board establishes the AP Physics curriculum.

*One credit*

### **Advanced Placement Biology**

**Grade 12**

*Prerequisites: Biology Honors, Chemistry Honors, consistently strong performance in math and science courses in high school, and recommendation of the department.*

This is a college-level, introductory biology course appropriate for college science majors taught in high school. In May, the students take an internationally administered exam which covers the entire textbook. The curriculum includes the following general topics: Molecules and Cells, which includes the chemistry of life, cell anatomy and physiology, and cellular biogenetics; Heredity and Evolution, which includes the basic patterns of inheritance; chromosomal genetics, molecular genetics, DNA structure and function, gene regulation, virology, and microbiology; and Organisms and Populations, which includes a survey of major organism groups and their phylogeny, the structure of plants and animals, and basic ecology. The course is rigorous and demanding, and fully 25% of the course involves participation in college-level laboratories. The authors of the AP Biology Exam establish the AP curriculum and if students perform well on the AP Biology Exam, the colleges they attend may grant them advanced placement above the freshman level and/or give credit for the courses skipped.

*One credit.*