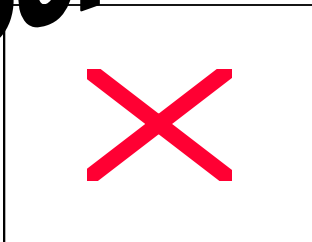


Science



STANDARD FIRST-YEAR SCIENCE COURSES

EARTH SCIENCE I (421020)

Grades: 9-12

Prerequisite: None

Credit: 1

Earth Science is a laboratory-oriented course that provides students with an opportunity to explore the various physical phenomena that affect the earth. This course, which encompasses research design concepts, helps students become more aware of their surroundings through the study of astronomy, space science, meteorology, oceanography, physical geology, and environmental resources.

Schools offering course: All

BIOLOGY I (431020)

Grades: 9-12

Prerequisite: None

Credit: 1

Biology I is a laboratory-based course that includes the study of ecology, taxonomy, cellular chemistry, genetics, microbiology, and physiology. These areas are developed within a framework of principle biological theories with an emphasis on critical thinking and science process skills. *Note: This course may utilize animal dissection techniques as an instructional strategy. Students who conscientiously object to these exercises will participate in Division-approved activities that provide comparable learning experiences.*

Schools offering course: All

CHEMISTRY I (441020)

Grades: 10-12

Prerequisite: Successful completion of one year of laboratory science and Algebra I with a grade of “C” or better

Co-requisite: Enrollment in Geometry or Integrated Algebra/Geometry III

Credit: 1

Chemistry I emphasizes the qualitative and quantitative study of substances and the changes that occur in them. Students will investigate using various lab techniques and apply mathematical skills with the use of chemical quantities in problem solving. A survey of concepts includes atomic structure, chemical bonding, formulas and equations, stoichiometry, and other calculations based on molar relationships, phases of matter and the kinetic theory, acid-base theory, and simple organic chemistry. This course is intended for college preparatory and general education purposes.

Schools offering course: All

ACTIVE PHYSICS (451010)

Grades: 11-12 ONLY

Prerequisite: Successful completion of two laboratory sciences and passing but limited proficiency in Algebra I or Integrated Algebra/Geometry II

Credit: 1

Active Physics is a course that adopts a thematic approach to physics through hands-on exploration of topics of intrinsic interest, including sports, medicine, transportation, communication, and home. This project-based course emphasizes the importance of physics concepts and places less importance on mathematics rigor, although mathematics is used to gain understanding of concepts. *Active Physics is limited to juniors and seniors who have achieved proficiency in basic science coursework and require a third science to fulfill state science graduation requirements. Students who will be enrolled in Algebra II should NOT be in this course. The course is not an appropriate course for students who intend to pursue advanced study in science and for meeting the requirements for the advanced diploma.*

Schools offering course: 1, 3, 5, 6, 7, 8, 9

SOL-BASED PHYSICS (451020)

Grades: 10-12

Prerequisite: Successful completion of Algebra I and Geometry with a “C” or better

Co-requisite: Enrollment in Algebra II or higher

Credit: 1

SOL-Based Physics is a standard first year course that covers all topics as required by the Virginia Standards of Learning (SOL) for physics. Students will utilize mathematical calculations while applying scientific methodology to investigate Newtonian mechanics; fluids (hydrostatics and hydrodynamics); wave phenomena; electricity and magnetism; thermodynamics; and selected topics in modern physics. This course is fast paced, and students are expected to have strong study and mathematical skills. Students will be instructed on how to design, conduct, analyze, and interpret data and present results collected from investigation. Written, detailed laboratory reports are required.

Schools offering course: All

ADVANCED PLACEMENT COURSES

ADVANCED EARTH SCIENCE I (421000)

Grades: 9-12

Prerequisite: Completion of Grade 8 Science with a “B” or better and teacher recommendation

Credit: 1

Advanced Earth Science I is lab-oriented, with a curriculum designed to give students a foundation in earth science concepts as well as the opportunity to utilize principles of experimental design in laboratory inquiry and on a required student project. Advanced Earth Science I includes the study of geology, oceanography, meteorology, astronomy, and space science but with extensions to each curriculum objective. **This course is open to interested students and may be required of students in specialty programs throughout the county.**

Schools offering course: 3, 6, 8, 9, 10

PRE-AP BIOLOGY (431000)

Grades: 9-12

Prerequisite: Completion of grade 8 science with a “B” or better and teacher recommendation

Credit: 1

Pre-AP Biology is lab-oriented, with a curriculum designed to give students a foundation in biological concepts as well as the opportunity to utilize principles of experimental design in laboratory inquiry and on a required student project. Advanced Biology I includes the same major areas of study as in Biology I but with extensions to each curriculum objective and associated specialty program. **This course is open to interested students and may be required of students in specialty programs throughout the county.** *Note: This course may utilize animal dissection techniques as an instructional strategy. Students who conscientiously object to these exercises will participate in Division-approved activities that provide comparable learning experiences.*

Schools offering course: 3, 6, 7, 8, 9, 10

ADVANCED PLACEMENT BIOLOGY (437020)

Grades: 11-12

Prerequisite: Completion of at least two laboratory sciences to include Biology I and Chemistry I with a grade of “B” or better in both courses and successful completion of Algebra and Geometry

Co-requisite: Advanced Biology Laboratory (431010) except at school 7 and Algebra II

Credit: 1

Advanced Placement Biology is designed to be the equivalent of a first year introduction college biology course. AP Biology is designed for students who have successfully completed foundation courses in biology and chemistry. This course aims to provide students with the conceptual framework, factual knowledge, and analytical skills necessary to deal critically with the rapidly changing science of biology. Primary emphasis of the course is on developing an understanding of concepts rather than on memorizing terms and technical details. With a satisfactory score, students may be eligible to receive some credit for college-level biology.

Schools offering course: 3, 4, 6, 7, 9, 10, 99

ADVANCED BIOLOGY LABORATORY (437520)

Grades: 11-12

Prerequisite: Satisfactory completion of two laboratory courses from earth science, biology, chemistry, and/or physics

Co-requisite: Enrollment in Advanced Placement Biology or AICE Biology

Credit: 1

This course complements the AICE and AP Biology programs and is a co-requisite for AICE Biology and AP Biology. Advanced Biology Laboratory supports the core lab hour requirements and activities for these courses by providing students opportunities to focus on the specialized laboratory investigations that are integral parts of these courses. Students also gain practical experience in accessing and utilizing scientific literature, employing advanced laboratory techniques, and increasing their ability to design and conduct in-depth independent research projects.

Schools offering course: 3, 4, 6, 8, 9, 10

PRE-AP CHEMISTRY (441001)

Grades: 10-12

Prerequisite: Completion of one laboratory science with a grade of “B+” or “A” for the year and Algebra I with a grade of “B+” or “A” for the year and teacher recommendation

Credit: 1

Pre-AP Chemistry provides the highly motivated, college-bound student with a rigorous first-year chemistry course. Students who elect to take this course must have a true desire to take AP Chemistry as a second-year course. Completion of this course will make the transition to AP Chemistry less difficult and improve test

scores on the AP examination. The content of this course will include the following: matter and energy, atomic structure, bonding, periodic table, mathematics of chemistry, kinetics and equilibrium, acids and bases, redox and electrochemistry, organic chemistry, applications of chemical properties, nuclear chemistry, and laboratory activities as well as enriched objectives. Students will complete laboratory activities that emphasize the quantitative applications learned in class.

Schools offering course: 3, 7, 8, 9, 10

ADVANCED PLACEMENT CHEMISTRY (447020)

Grades: 11-12

Prerequisite: Successful completion of Chemistry I with a grade of ‘B+’ or better, at least Algebra II with a grade of ‘B’ or better, and teacher recommendation

Co-requisite: Advanced Chemistry Lab (447010) except at school 7

Credit: 1

Advanced Placement Chemistry is intended to provide a second level of chemistry comparable to the general chemistry course usually taken during the first year of college. Topics include atomic structure and theory, chemical bonding, states of matter, chemical reactions, stoichiometry, equilibrium, kinetics, thermodynamics, and descriptive chemistry. Students enrolled in this course are encouraged to pursue an advanced mathematics sequence. Students will take the Advanced Placement Chemistry examination in May. This course is in compliance with the advanced placement course description of the College Board.

Schools offering course: 3, 4, 6, 7, 8, 9, 10

ADVANCED CHEMISTRY LABORATORY (447520)

Grades: 11-12

Prerequisite: Satisfactory completion of two laboratory courses from earth science, biology, chemistry, and/or physics

Co-requisite: Advanced Placement Chemistry (447020) or AICE Chemistry (447040)

Credit: 1

This course complements the AICE and AP Chemistry programs and is a co-requisite for AICE Chemistry and AP Chemistry. Advanced Chemistry Laboratory supports the core lab hour requirements and activities for these courses by providing students opportunities to focus on the specialized laboratory investigations that are integral parts of these courses. Students also gain practical experience in accessing and utilizing scientific literature, employing advanced laboratory techniques, and increasing their ability to design and conduct in-depth independent research projects.

Schools offering course: 3, 4, 6, 8, 9, 10

ADVANCED PLACEMENT ENVIRONMENTAL SCIENCE (427020)

Grades: 11-12

Prerequisite: Successful completion of Biology I, Chemistry I, and Algebra II with a grade of “B” or better

Credit: 1

Advanced Placement Environmental Science utilizes students’ mathematics and scientific skills in a systems approach to the environment. Major systems include aquatic and terrestrial ecosystems, the atmosphere, and resource allocation/distribution. In addition to laboratory work, some fieldwork is required. This course is in compliance with the Advanced Placement Environmental Science course description as set by the College Board. *Since Earth Science I is not a mandated prerequisite for this course, students who have not taken Earth Science I will be*

required to take the Earth Science Standards of Learning assessment at the end of this course.

Schools offering course: 3, 4, 7, 10

ADVANCED PLACEMENT PHYSICS B (457020)

Grades: 11-12

Prerequisite: Successful completion of Algebra II and Chemistry (with a grade of “B” or better), successful completion of Trigonometry (or concurrent enrollment in Trigonometry with a teacher recommendation). Additional requirement for School 3 only: Advanced SOL-Based Physics (formerly Physics I) with a grade of “B” or better

Co-requisite: Advanced Physics Laboratory (457010)

Credit: 1

AP Physics is an algebra-based course that is representative of topics covered in similar college physics courses, as determined by periodic surveys. The course covers five general areas: mechanics, kinetic theory and thermodynamics, electricity and magnetism, waves and optics, and modern physics. With a satisfactory score, students may be eligible to receive some credit for college-level physics.

Schools offering course: 3, 6

ADVANCED PHYSICS LABORATORY (457520)

Grades: 11-12

Prerequisite: Satisfactory completion of two laboratory courses from earth science, biology, chemistry, and/or physics

Co-requisite: Advanced Placement Physics (457020) or AICE Physics (457040)

Credit: 1

This course complements the AICE and AP Physics programs and is a co-requisite for AICE Physics and AP Physics. Advanced Physics Laboratory supports the core lab hour requirements and activities for these courses by providing students opportunities to focus on the specialized laboratory investigations that are integral parts of these courses. Students also gain practical experience in accessing and utilizing scientific literature, employing advanced laboratory techniques, and increasing their ability to design and conduct in-depth independent research projects.

Schools offering course: 3, 4, 6, 9

ADVANCED PLACEMENT PHYSICS C (457000)

Grades: 11-12

Prerequisite: Completion of Algebra II/Trigonometry with a grade of “A” or Functions/Analytic Geometry with a grade of “B” or better. Concurrent enrollment in Calculus is preferred but not required

Credit: 1

AP Physics C ordinarily forms the first part of a college sequence that serves as the foundation in physics for students interested in the physical sciences or engineering. The focus of this course is principally mechanics. Strong emphasis is placed on solving a variety of challenging problems, requiring some calculus that is presented to students during instruction.

Schools offering course: 7, 9

CAMBRIDGE PROGRAMME COURSES

IGCSE BIOLOGY (431040)

Grades: 9-10

Prerequisite: Completion of Grade 8 Science with a grade of “B” or better and teacher recommendation

Credit: 1

This laboratory-based course includes a curriculum designed to give students a foundation in biological concepts as well as the opportunity to utilize principles of experimental design in laboratory inquiry and on a required independent student project. IGCSE Biology includes, but is not limited to, characteristics and classification of living organisms; organization and maintenance of organisms; reproduction, inheritance, and the continuity of life; and the relationships of organisms to one another and to their environment. *Note: This course may utilize animal dissection techniques as an instructional strategy. Students who conscientiously object to these exercises will participate in Division-approved activities that provide comparable learning experiences.*

Schools offering course: 1, 4

AICE BIOLOGY (AS Level) (437040)

Grades: 11-12

Prerequisite: Completion of IGCSE Biology or Biology I with a grade of “B” or better; completion of IGCSE Chemistry or Chemistry I with a grade of “B” or better; and completion of Algebra II or IGCSE Geometry, and a teacher recommendation

Co-requisite: Advanced Biology Laboratory (437010) at school 4 only and Algebra II or Algebra II/Trigonometry

Credit: 1

AICE Biology is an accelerated and rigorous course that follows an international, advanced level curriculum. This course is lab-oriented, with a curriculum designed to give students a foundation in biological concepts as well as the opportunity to utilize principles of experimental design in laboratory inquiry and on a required independent student project. The course covers major biological topics. Students will be prepared to sit for a practical test and external examinations leading to Advanced International Certificate of Education Diploma and an Advanced Placement qualification.

Schools offering course: 1, 4

AICE BIOLOGY (A Level) (437045)

Grades: 11-12

Prerequisite: Completion of AICE Biology (AS Level)

Credit: 1

This course is a second year of the AICE Level Biology curriculum that incorporates lab experience as an integral component of its study. The curriculum involves a detailed examination of major biological themes, along with one of four optional units: mammalian physiology; microbiology and biotechnology; growth, development, and reproduction; and applications of genetics in a more comprehensive manner. Students will sit for external exams that contribute to the Advanced International Certificate of Education Diploma and present a possibility for students to receive college credit for an introductory biology course.

School offering course: 1

IGCSE CHEMISTRY (441040)

Grades: 10-11

Prerequisite: Completion of IGCSE Biology or Biology I with a grade of “B” or better and teacher recommendation; completion of IGCSE Algebra I or Algebra II with a grade of “B” or better and teacher recommendation; successful completion of English 9

Credit: 1

This course is lab-oriented, with a curriculum designed to give students a foundation in chemistry concepts as well as the

opportunity to utilize principles of experimental design in laboratory inquiry and on a required independent student project. The course will include the major principles of chemistry: structure of matter, chemical and physical properties, periodic trends, molar and stoichiometric relationships, chemical reactions and equilibria, chemical kinetics, electrochemistry, thermodynamics, acid-base theory, and organic and environmental chemistry. Assessment will include an external examination and coursework evaluations by the teacher.

Schools offering course: 1, 4

AICE CHEMISTRY (447040)

Grades: 11-12

Prerequisite: Completion of IGCSE Chemistry or Chemistry I and Algebra II or IGCSE Algebra II/Trigonometry with a “B” or better and teacher recommendation

Co-requisite: Advanced Chemistry Laboratory (447010) at school 4 only

Credit: 1

AICE Chemistry is an accelerated and rigorous course that encompasses the AP Chemistry curriculum and enriched AICE topics. This course is lab-oriented, with a curriculum designed to give students a foundation in chemistry concepts as well as the opportunity to utilize principles of experimental design in laboratory inquiry and on a required independent student project. The expanded curriculum enables students to pursue advanced studies of analytic separation techniques, biochemistry, and spectroscopy. Students will be prepared to sit for external examinations in theory and practical assessments leading to an Advanced International Certificate of Education Diploma and an Advanced Placement qualification.

Schools offering course: 1, 4

IGCSE PHYSICS (451040)

Grades : 10-11

Prerequisite: A grade of “B” or better in English 9, Algebra I, IGCSE Geometry or Geometry I, and IGCSE Algebra II/Trigonometry (concurrent enrollment in IGCSE Algebra II/Trigonometry is allowed with a previous IGCSE teacher recommendation)

Credit: 1

This course offers a combination of theoretical and practical studies such as mechanics that analyze motions and forces; study of energy with applications to work and power; thermodynamics; properties of waves (light and sound); electricity and magnetism; and atomic physics leading to an understanding of the basic principles of physics. Investigations will be student designed and tested emphasizing principles of experimental design, inquiry-based discovery, and scientific problem solving. Independent research is a required part of the program. IGCSE Algebra II/Trigonometry must have been successfully completed or the student must take IGCSE Algebra II/Trigonometry concurrently. Assessment measures will include external student examination and course evaluations by the teacher.

Schools offering course: 1, 4

AICE PHYSICS (457040)

Grades: 11-12

Prerequisite: A grade of “B” or better in IGCSE Physics or Physics I, IGCSE Algebra II/Trigonometry, IGCSE Chemistry or Chemistry I or concurrently enrolled in Functions Analytic with a teacher recommendation

Co-requisite: Advanced Physics Laboratory (457010) at school 4 only

Credit: 1

AICE Physics is an accelerated and rigorous course that encompasses the AP Physics curriculum and enriched AICE program topics. This course focuses on the advanced study of topics in general physics, Newtonian mechanics, matter, oscillations and waves, electricity and magnetism, and modern physics. The inquiry-based approach emphasizing principles of experimental design, scientific problem solving, and research skills requires students to use principles and concepts that are taught and to apply them in a logical, reasoned, and deductive manner to their work. Independent research is a required part of the program. Students will be prepared to sit for external examinations in theory and practical applications leading to an Advanced International Certificate of Education Diploma and an Advanced Placement qualification.

Schools offering course: 1, 4

AICE ENVIRONMENTAL MANAGEMENT (438040)

Grades: 11-12

Prerequisite: Successful completion of IGCSE Biology or Biology I AND IGCSE Chemistry or Chemistry I AND IGCSE Algebra II or Algebra II with a ‘B’ or better and teacher recommendation

Credit: 1

This accelerated Cambridge course has a strong human dimension and is concerned with both local and global issues. The curriculum encompasses the four traditional subdivisions of the global environment, including the lithosphere, hydrosphere, biosphere, and atmosphere. The course develops in students a strong understanding of the Earth’s natural systems and the effects of human activity on these systems. Students are challenged to think about important environmental issues and to look to themselves for possible solutions. An important component of the practical assessment is an Individual Research Report based on issues for the course of studies. Students will be prepared to sit for an external examination leading to the AICE Diploma and an Advanced Placement qualification. *Since Earth Science is not a mandated prerequisite for this course, students who have not taken Earth Science I will be required to take the Earth Science Standards of Learning Assessment at the end of this course.*

Schools offering course: 1, 4

INTERNATIONAL BACCALAUREATE SCIENCE COURSES
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IB MYP EARTH SCIENCE (421051)

Grades: 9-12

Prerequisite: Enrollment in the IB Program and completion of Grade 8 Science with a grade of “B” or better

Credit: 1

IB MYP Earth Science is designed for IB students who wish to concentrate on rigorous earth science principles and processes that will lead to more qualitative sciences. Students will investigate the natural sciences of astronomy, oceanography, meteorology, and geology. The IB internal assessment will serve as a guide as students apply the scientific method.

School offering course: 2, 5

IB ENVIRONMENTAL SYSTEMS (SL) (451151)

Grades: 11-12

Prerequisite: Completion of Pre-IB Biology and Pre-IB Chemistry with a grade of “C” or better

Credit: 1

This course enables students to develop a coherent perspective on the environment. The course uses the concepts and terminology

associated with a system approach to study. These principles are subsequently applied to the study of natural ecosystems, their component parts, and the functional relationships that maintain their dynamic integrity. Topics include global cycles and physical systems, human population, freshwater ecosystems, conservation and biodiversity, and pollution. Students are required to take the IB Environmental Systems exam. *Diploma candidates taking IB Biology may not use this course as their sixth subject.*

Schools offering course: 2, 5

IB MYP BIOLOGY I (431050)

Grades: 9-12

Prerequisite: Successful completion of Grade 8 Science and teacher recommendation

Credit: 1

IB MYP Biology is a survey of the animal, plant, and protist kingdoms, including consideration of the classification, distribution, and life processes of the major groups of each kingdom. Students will use scientific research methods to investigate scientific principles. Extensive laboratory work will be a part of the course, and students are required to submit written lab reports. Students will explore the skills used by practicing biologists and how biology can help solve environmental problems. *Note: This course may utilize animal dissection techniques as an instructional strategy. Students who conscientiously object to these exercises will participate in Division-approved activities that provide comparable learning experiences.*

Schools offering course: 2, 5

IB BIOLOGY I (HL) (438050)

Grade: 11

Prerequisite: Successful completion of IB MYP Biology I and IB MYP Chemistry I and teacher recommendation

Credit: 1

IB Biology is the first year of an overview of the major principles and processes in the areas of molecular and cellular biology, genetics, ecology, and organisms. Laboratory work is an integral part of this course and students are required to submit written laboratory reports. Key points of the course are structure and function, universality versus diversity, and equilibrium within systems. *Note: This course may utilize animal dissection techniques as an instructional strategy. Students who conscientiously object to these exercises will participate in Division-approved activities that provide comparable learning experiences.*

Schools offering course: 2, 5

IB BIOLOGY II (HL) (439050)

Grade: 12

Prerequisite: Completion of IB Biology I with a grade of “C” or better

Credit: 1

IB Biology II is an introduction to advanced anatomy and physiology and plant biology. A review of IB Biology I principles and processes in the areas of molecular and cellular biology, genetics, ecology, and organisms is included. Students are required to take the IB examination at the end of the course. Laboratory work is an integral part of this course and students are required to submit written laboratory reports. *Note: This course may utilize animal dissection techniques as an instructional strategy. Students who conscientiously object to these exercises will participate in Division-approved activities that provide comparable learning experiences.*

Schools offering course: 2, 5

IB MYP CHEMISTRY (441051)

Grades: 10-12

Prerequisite: Successful completion of one year of laboratory science and Algebra I with a grade of “C” or better

Credit: 1

This course includes the major concepts of chemistry, including atomic structure and bonding, formulas and equations, stoichiometry, oxidation-reduction, thermodynamics, chemical equilibrium, acid-base theory, and simple organic chemistry. Students will use scientific research methods to investigate scientific principles. Laboratory experiments are designed to illustrate major concepts and to reinforce the IB Group 4 rubric. Students will be required to submit written laboratory reports.

Schools offering course: 2, 5

IB CHEMISTRY I (HL) (448050)

Grade: 11

Prerequisite: Successful completion of IB MYP Chemistry I and teacher recommendation

Credit: 1

IB Chemistry I is the first year of a survey course of the major principles of chemistry including the structure of matter, kinetic theory of gases, chemical equilibrium, chemical kinetics, thermodynamics, acid-base theory, and organic chemistry. Emphasis is on problem solving, proficiency in mathematical usage, and improvement and expansion of laboratory techniques as related to contemporary chemistry to include experimental design. Students will be required to submit written laboratory reports.

Schools offering course: 2, 5

IB CHEMISTRY II (HL) (449050)

Grade: 12

Prerequisite: Successful completion of IB Chemistry I with a grade of “C” or better

Credit: 1

IB Chemistry is the second year of a survey course of the major principles of chemistry. Emphasis is on research techniques, advanced laboratory techniques, advanced problem solving and synthesis of prior knowledge to investigate IB option topics. With a satisfactory IB exam score, students may receive credit for introductory college chemistry. Students will be required to submit written laboratory reports.

Schools offering course: 2, 5

IB PHYSICS (SL) (458050)

Grades: 11-12

Prerequisite: Successful completion of IB MYP Physics with a grade of “C” or better and IB MYP Algebra II/Trigonometry with a grade of “B” or better

Credit: 1

IB Physics I is an extremely fast-paced, rigorous course following the IB Standard Level curriculum. Building on their background from IB MYP Physics, students will study mechanics, heat, electromagnetism, light, sound, and modern physics in greater depth. Students will design and implement their own laboratory investigations and will be graded using IB assessment criteria. They will participate in the interdisciplinary “Group 4 Project” and will sit for the Standard Level examination at the end of the course.

Schools offering course: 2, 5

Schools offering course: 1, 2, 3, 4, 6, 7, 8, 9

EARTH SCIENCE II: OCEANOGRAPHY (425020)

Grades: 11-12

Prerequisite: A grade of “C” or better in Earth Science AND Biology I or Chemistry I with a grade of “C” or better *Note: Course work in Chemistry is recommended.*

Credit: 1

Oceanography is a second level Earth Science course designed to be a more in-depth treatment of the oceanography concepts presented in first year Earth Science. It is a broad survey course dealing mainly with physical oceanography and covering such topics as the geology and geography of ocean basins; physical properties of sea water; marine chemistry; salinity and density; circulation of the oceans, waves and tides; and oceanographic instruments, tools, and methods. Emphasis is also placed on marine biology, ocean policy, and ocean ecology.

Schools offering course: All

EARTH SCIENCE II: ASTRONOMY (426020)

Grades: 11-12

Prerequisite: A grade of “C” or better in Earth Science, a grade of “C” or better in Algebra I, AND a grade of “C” or better in either Biology I or Chemistry I

Credit: 1

Astronomy is a second level Earth Science course designed to be a more in-depth, mathematical treatment of the astronomical concepts presented in introductory Earth Science. Topics such as the universe, universal laws, galaxies, stellar evolution, the solar system and its motion, and the exploration of space will be discussed.

Schools offering course: 2, 3, 4, 5, 7, 8, 9, 99

EARTH SCIENCE II: PHYSICAL GEOLOGY (424020)

Grades: 11-12

Prerequisite: A grade of “C” or better in Earth Science, a grade of “C” or better in either Biology I or Chemistry I; AND enrollment in either Algebra I or Integrated Algebra/Geometry II

Credit: 1

Physical Geology is a second level Earth Science course designed to be a more in-depth treatment of the geology concepts presented in introductory Earth Science. Topics of study include but are not limited to plate tectonics theory; interrelationships between humans and the geological environment that affect ground water resources; runoff and erosion; waste disposal; energy resources and food production; time/space relationships in the earth record; and geomorphology.

Schools offering course: 4, 7, 9, 10

BIOLOGY II: SURVEY OF ADVANCED TOPICS IN BIOLOGY (432000)

Grades: 11-12

Prerequisite: Successful completion of Biology I and Chemistry I with a “C” or better

Credit: 1

Biology II: Survey of Advanced Topics in Biology is an academically rigorous, in-depth, second year study of selected areas of biology that allows highly motivated students to delve more deeply into life systems and processes. Extensive laboratory work is part of this course. Emphasis is placed on research skills and techniques. *Note: This course utilizes animal dissection techniques as a major instructional strategy. Students who conscientiously object to these exercises will participate in Division-approved activities that provide comparable learning experiences.*

BIOLOGY II: INTRODUCTION TO DNA SCIENCE AND BIOTECHNOLOGY (435030)

Grades: 11-12

Prerequisite: Completion of Biology I and Chemistry I with a “C” or better in both courses; completion of Algebra I and Geometry with a “C” or better in both courses and teacher recommendation

Co-requisite: Enrollment in Algebra II or higher

Credit: 1

This is a second-year study of biological and chemical principles related to molecular biology and biotechnology. The course is designed for students with interests in the health sciences, animal science, and plant biology. A variety of topics, issues, and techniques will be addressed, including cellular structure and function; enzyme activity; classical and molecular genetics; DNA science (gene regulation, mutation, transfer; karyotyping; and DNA sequencing and decoding), genetic engineering applications; and various biotechniques. Ethical, social, and legal implications associated with biotechnology will be explored through case studies, student research, discussion, debate, and examination of current events. Laboratory experiences will include chromatography, electrophoresis, immunology, enzyme studies, DNA extraction, PCR simulation, and plant cloning.

School offering course: 3

BIOLOGY II: ECOLOGY (434033)

Grades: 11-12

Prerequisite: Successful completion of Concentrated Earth Science and Advanced Biology, and concurrent enrollment or completion of Chemistry I.

Credit: 1

Ecology is an academically rigorous, in-depth, second year study of biological and ecological principles governing higher levels of organization (populations, communities, ecosystems). Concepts that will be covered include adaptation and natural selection; the physical environment and climate; population ecology, growth models, and life history patterns; communities, competition, parasitism, mutualism, and human interactions; ecosystem productivity, energy flow, nutrient cycling, and biogeochemical cycles; and biogeography, biodiversity, and global environmental change. The science of ecology is dedicated to an understanding of the relationships between organisms and their environment and is often at the center of public policy disputes related to the environment; therefore, students will learn how ecological research is becoming increasingly important and prominent throughout the world.

School offering course: 10

LAB ASSISTANT/SCIENCE SEMINAR (461000)

SCIENCE TEACHER’S AIDE (0143)

Grades: 10-12

Prerequisite: Successful completion of subject in which assisting and *prior* approval of supervising teacher

Credit: 1/2 for 461000; none for 0143

Lab Assistant/Science Seminar offers the student the opportunity to learn more science while assisting a science teacher. The instructional objectives vary according to the course in which the student is assisting and according to the program, interests, and ability of the student. This course may be taken more than once for credit with prior approval of the science department chairperson. *To earn credit for Lab Assistant, instructional objectives and evaluative criteria must be delineated as per Regulation 681-3, Section III.C.*

Schools offering course: 461000: 1, 2, 4, 5, 6, 7, 8, 9, 10

SCIENCE ELECTIVES FOR THE BIOTECH PROGRAM AND/OR THE CENS PROGRAM
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INTRODUCTION TO MICROBIOLOGY AND BACTERIOLOGY (461034)**Grades: 10-12****Prerequisite: Successful completion of introductory Biology with a grade of “C” or better and successful completion of, or concurrent enrollment in Chemistry****Credit: 1/2**

This half credit science elective course will give students the opportunity to learn about the immunological and biological properties of bacteria, viruses, and fungi. In this course students will be exposed to the tools required for a research career and study current issues in microbiology and immunology. Students will become acquainted with the dynamics of the host/parasite relationship, including host defense systems, and the relationship of microorganisms to disease.

School offering course: 3**INTRODUCTION TO FORENSIC SCIENCE (461035)****Grades: 10-12****Prerequisite: Successful completion of introductory Biology with a grade of “C” or better and successful completion of, or concurrent enrollment in Chemistry****Credit: 1/2**

This half credit science elective course will give students the opportunity to examine how technology has revolutionized forensic science and how it is used to solve crimes; the principles that are applied in the collection, preservation, and analysis of evidence; what characterizes individual evidence and class evidence; how microscopic evidence is used in the study of crime; and what the role of experimentation is in teaching, explaining, and illustrating forensic concepts.

School offering course: 3**SENIOR INDEPENDENT RESEARCH (461033)****Grade: 12****Pre-requisite: Enrollment in the BIOTECH or CENS program and successful completion of three laboratory sciences****Credit: 1**

This research course is designed to provide BIOTECH or CENS students with an opportunity to apply what they have learned from course work; design their own active inquiry experience; research and prepare a technical paper or electronic presentation; present orally the results of their research; hear talks and share ideas with fellow students and scientists from industry and academia; and gain experience in self-expression during an oral examination. The project will include qualitative or quantitative research and analysis and will reflect a year-long study of a minimum of 140 documented hours in one of several areas including business or government agency mentorship; independent scientific experimentation with quantifiable results; performance of directed, after-hours community projects; performance or assistance with independent research affiliated with a university; or performance and/or completion of a Distance Learning Project. *In order to qualify for this opportunity, BIOTECH or CENS students must submit a written project proposal to the Senior Independent Research teacher by May 20 of their junior year. Each student must arrange to have a faculty advisor or mentor from industry or academia.*