

SCIENCE

The Science department aims to develop scientifically literate students through the use of discussions, experiments, demonstrations, resource people, and visitations to scientific institutions. Students must acquire the necessary values, attitudes, and skills that will enable them to be objective in their approach to the many problems they will encounter in a rapidly changing, scientifically oriented society. To best meet these goals and prepare students to succeed on the Connecticut Academic Performance Test (CAPT), the department recommends that all students enroll in Science in Grades 9, 10, and 11. The recommended sequence is Earth Science in grade 9, Biology in grade 10, and Chemistry, Physics, and/or a Science elective in grades 11 and/or 12. Students with sufficient credits to be classified as a tenth grader will be placed in Biology. Success in science on the Connecticut Academic Performance Test (or on the District Performance Standard) is a graduation requirement. The Science component of the CAPT encompasses concepts, applications, and experimentation from three major areas: Earth Science, Life Science and Physical Science. The test, taken in tenth grade, assesses Science education from kindergarten through tenth grade. Graduation requirements include three credits in Science (one in introductory Biology; one in Earth Science, Chemistry, or Physics; and one Science elective).

SCIENCE COURSE DESCRIPTIONS

EARTH SCIENCE - GENERAL (7211)

Full Year

Credit 1.00

Weight 1.02

Prerequisites: This course is open to students in Grade 9 or 10.

Description: In this course, students will use scientific inquiry, literacy, and numeracy while investigating and discussing topics in the earth sciences. Geology, meteorology, atomic structure, and introduction to polymers, energy, and environmental topics will be covered. Attention will also be given to preparation for the CAPT, including implementation of the state embedded labs and STS activities.

EARTH SCIENCE - COLLEGE (7311)

Full Year

Credit 1.00

Weight 1.04

Prerequisites: This course is open to students in Grade 9 or 10.

Description: In this course, students will use scientific inquiry, literacy, and numeracy while investigating and discussing topics in the earth sciences. Geology, meteorology, atomic structure, and introduction to polymers, energy, and environmental topics will be covered. Attention will also be given to preparation for the CAPT, including implementation of the state embedded labs and STS activities.

EARTH SCIENCE - HONORS (7411)

Full Year

Credit 1.00

Weight 1.06

Prerequisites: This course is open to students in Grade 9 who have earned a recommended grade of 85 or higher in Level I Science in Grade 8.

Description: In this course, students will use scientific inquiry, literacy, and numeracy while investigating and discussing topics in the earth sciences. Geology, meteorology, atomic structure, and introduction to polymers, energy, and environmental topics will be covered. Attention will also be given to preparation for the CAPT, including implementation of the state embedded labs and STS activities.

BIOLOGY - GENERAL (7221)

Full Year

Credit 1.00

Weight 1.02

Prerequisites: This course is open to students in Grades 10, 11, and 12.

Description: This course is designed to familiarize students with scientific processes and skills and biological concepts needed for a scientifically literate society. The topics for discussion and laboratory investigation include scientific method and processes, cell structure and function, cell reproduction, genetics, evolution, the six kingdoms of life, and ecology. This course meets the biology requirement for graduation. Attention will also be given to final preparation for the CAPT, including implementation of the state embedded labs and STS activities.

BIOLOGY - COLLEGE (7321)

Full Year

Credit 1.00

Weight 1.04

Prerequisites: This course is open to students in Grades 10, 11, and 12.

Description: This course is designed to meet the needs of students planning on attending college and includes the depth of curriculum and laboratory experience needed to prepare these students. Topics for discussion and laboratory experience include scientific method and processes, cell anatomy and physiology, genetics, evolution, microbiology, zoology, botany, and ecology. This course meets the biology requirement for graduation. Attention will also be given to final preparation for the CAPT, including implementation of the state embedded labs and STS activities.

BIOLOGY - HONORS (7421)

Full Year

Credit 1.00

Weight 1.06

Prerequisites: This course is open to students in Grades 10, 11, and 12 who have successfully completed the Earth Science Honors course or who have earned a recommended grade of 85 or better in Earth Science College.

Description: Students selecting this course should understand that the workload (classwork and homework) is substantially more demanding than the College level course. Greater emphasis is placed on student centered activities, research, and independent exploration of course topics. Students will assume a greater degree of responsibility for learning through independent work, critical thinking, and completion of out-of-class assignments. Topics for discussion and laboratory investigation include scientific method and processes, cell anatomy and physiology, genetics, evolution, microbiology, zoology, botany, and ecology. This course meets the biology requirement for graduation. Attention will also be given to final preparation for the CAPT, including implementation of the state embedded labs and STS activities.

ADVANCED PLACEMENT BIOLOGY (7521)

Full Year

Credit 1.50

Weight 1.08

Prerequisites: This course is open to students in Grades 11 and 12 who have successfully completed Biology Honors or completed Biology College with a grade of 85 or better. Since chemistry is an important component of this course, it is also highly recommended that students have also successfully completed a year of Chemistry.

Description: The A.P. Biology course is designed to model an introductory college biology course, with the curriculum content covering the same broad spectrum of information. The curriculum includes extensive lab work which supplements class discussions and lectures. Students electing A.P. Biology should have a genuine interest in biology, realize the work load is correlated to 1.5 credits of an honors level course, and recognize this course will require a consistent effort throughout the year. Topics for discussion and laboratory investigation will include cell anatomy and physiology, genetics, growth and development, microbiology, zoology, botany, and ecology. Students will be required to take (and pay for) the Advanced Placement Examination in the spring.

CHEMISTRY - GENERAL (7231)

Full Year

Credit 1.00

Weight 1.02

Prerequisites: This course is open to students in Grades 10, 11, and 12 or with special permission of Science department head.

Description: This course introduces students to chemical laws and processes, simple problem solving, equation writing, and the chemistry of everyday life. Topics will include: fundamentals of matter and energy; atomic theory; chemical bonding; formulas; gas laws; equations; solutions; and chemistry as it applies to the home, the environment, and industry. Laboratory experiences enhance the classroom discussions.

CHEMISTRY - COLLEGE (7331)

Full Year

Credit 1.00

Weight 1.04

Prerequisites: This course is open to students in Grades 10, 11, and 12 or with special permission of Science department head. Prior successful completion of Algebra I College is required.

Description: This course introduces students to chemical laws, logical and sequential thinking, problem solving, and some practical applications of chemistry. Topics will include: measurement; matter and energy; atomic structure; chemical bonding; formula and equation writing and mathematical relationships; gas laws; solutions; and acids and bases. Laboratory experiences enhance classroom discussions.

CHEMISTRY - HONORS (7431)

Full Year

Credit 1.00

Weight 1.06

Prerequisites: This course is open to students in Grades 10, 11, and 12. A grade of 85 or higher in Algebra I College is recommended.

Description: This honors course is designed for students who plan to further their education in the sciences. The study of the properties of elements and compounds is approached at a more advanced and detailed level than in the College level course. Theory and mathematical application are emphasized in areas of acids and bases, gas behavior, and solutions. Laboratory experiences enhance the classroom discussions.

ADVANCED PLACEMENT CHEMISTRY (7531)

Full Year

Credit 1.50

Weight 1.08

Prerequisites: This course is open to students in Grades 11 and 12 who have successfully completed the Chemistry College or the Chemistry Honors course and Algebra 2. A grade of 85 or higher in Chemistry College or Chemistry Honors is recommended. It is preferred that students have successfully completed the Chemistry Honors course.

Description: The Advanced Placement Chemistry course is designed for students intending to major in the sciences in college. The depth and breadth of this course is similar to that of freshman college chemistry with emphasis on advanced problem solving and critical thinking. Topics for discussion include atomic theory, chemical bonding, gas laws, states of matter, reaction types, acid-base theory, stoichiometry, kinetics, thermodynamics, solutions, oxidation-reduction reactions, and equilibrium. Students will be required to take (and pay for) the Advanced Placement Examination in the spring.

PRINCIPLES OF SCIENCE (7131)

Full Year

Credit 1.00

Weight 1.00

Prerequisites: This course is open to students in Grades 11 and 12 or with special permission of Science department head.

Description: This course presents a basic understanding of physical science concepts and processes in a structured, small class setting. Topics for discussion and laboratory investigation will include properties of matter, atoms, chemical changes, force and motion, simple machines and mechanical advantage, energy and heat, waves and sound, and light and the effects of lenses and mirrors. Emphasis will be placed on a descriptive approach to scientific principles encountered in everyday life. This course meets the physical science or the elective science requirement for graduation.

PHYSICAL SCIENCE - GENERAL (7241)

Full Year

Credit 1.00

Weight 1.02

Prerequisites: This course is open to students in Grades 10, 11, and 12 or with special permission of Science department head. Prior successful completion of Algebra 1A or Applied Math-Algebra Topics and Applied Math-Geometry Topics is required.

Description: Topics for discussion and laboratory investigation will include velocity and acceleration, force, work, simple machines, power, forms of energy, states of matter, waves, sound, light, electrical energy, atomic structure, periodic table, and selected topics in Earth Science. Applications in everyday life will be stressed. This course meets the physical science or the elective science requirement for graduation.

PHYSICS - COLLEGE (7341)

Full Year

Credit 1.00

Weight 1.04

Prerequisites: This course is open to students in Grades 10, 11, and 12 or with special permission of Science department head. Prior successful completion of Algebra I College and Geometry College is required.

Description: Topics for discussion and laboratory investigation will include velocity and acceleration, forces, two-dimensional motion, momentum, energy, heat, waves, sound, properties of light, electrostatics, and electromagnetism.

PHYSICS - HONORS (7441)

Full Year

Credit 1.00

Weight 1.06

Prerequisites: This course is open to students in Grades 10, 11, and 12. A grade of 85 or higher in Algebra I College and Geometry College is recommended.

Description: This honors course is designed for students who plan to further their education in the sciences. Topics for discussion and laboratory investigation will include velocity and acceleration, forces, two-dimensional motion, momentum, energy, heat, waves, sound, properties of light, electrostatics, and electromagnetism. Some selected contemporary topics related to recent advances in physics may also be discussed.

PHYSICS - ECE (7441E)**University of Connecticut Early College Experience credit***

Full Year

Credit 1.00

Weight 1.08

Prerequisites: This course is open to students in Grades 10, 11, and 12. A grade of 85 or higher in Algebra I College and Geometry College is recommended.

Description: This honors course is designed for students who plan to further their education in the sciences. Topics for discussion and laboratory investigation will include velocity and acceleration, forces, two-dimensional motion, momentum, energy, heat, waves, sound, properties of light, electrostatics, and electromagnetism. Some selected contemporary topics related to recent advances in physics may also be discussed.

*The ECE Physics course is comparable to the 121Q Physics course offered at the University of Connecticut. Students earning a grade of C or better in ECE Physics will earn 4 college credits from the University of Connecticut. There is a \$100 non-refundable registration fee for students who elect the ECE Physics course. In addition, ECE Physics students are required by the University of Connecticut to complete the final examination.

ALLIED HEALTH I (7336)

One semester

Credit 0.50

Weight 1.04

(Includes shadowing experience time)

Prerequisites: This course is open to students in Grade 11. Prior successful completion of Algebra I and Biology General, College, or Honors is required. An application and interview is required for acceptance into this program. Applications can be picked up in the School Counseling Office.

Description: Allied Health I is designed for students are considering a career in one of the Allied Health fields. As such, it is an introduction to the various career options and basic requirements common to the health care industry. Through field experiences at Manchester Community College, students will be introduced to the following: Surgical Technology, Occupational Therapy, Physical Therapy, Respiratory Care, Sports & Exercise Studies, and Therapeutic Recreation & Gerontology. In addition, students will participate in shadowing experiences at Rockville General Hospital in the following areas: Surgical Technology, Medical Imaging, Nutrition, Rehabilitation (Physical and Occupational Therapy), Cardiopulmonary, Biomedical Engineering, and the BirthPlace. Guest speakers and class work will also highlight various opportunities in the medical field. This course will be applied toward the elective Science requirement for graduation.

ALLIED HEALTH II (7337)

Full Year

Credit 1.00

Weight 1.04

Prerequisites: This course is open to students in Grade 12. Prior successful completion of Allied Health I is required.

Description: Allied Health II is a component of the College Career Pathways program cooperatively developed by the Rockville High School Science Department, Rockville General Hospital, Manchester Community College, and Vernon Regional Adult Education. Topics will include: cells and tissues, body systems (integumentary, skeletal, muscular, nervous, lymphatic, circulatory, respiratory, endocrine), and special senses. Dissections are a substantial lab component to this course. This laboratory oriented program utilizes a systems approach to study human anatomy and physiology. The clinical component requires students to select two Allied Health specialties from their junior year experience and arrange a shadowing experience at Rockville General Hospital and/or surrounding medical facilities for each of their selections. Students will be assisted by the Career Center Facilitator. College credit at Manchester Community College is available upon successful completion of this course with a 75 or better average. This course meets the elective Science requirement for graduation.

ANATOMY AND PHYSIOLOGY (7335)

Full Year

Credit 1.00

Weight 1.04

Prerequisites: This course is open to students in Grades 11 and 12 who have successfully completed Biology Honors or Biology College.

Description: This course is designed for college bound students who plan to further their studies in the biological sciences. Topics will include: cells and tissues, body systems (integumentary, skeletal, muscular, nervous, lymphatic, circulatory, respiratory, endocrine), and special senses. Dissections are a substantial lab component to this course. Highly motivated students with good study habits will find this course challenging. This course meets the Science elective requirement for graduation.

MARINE SCIENCE (7338)

One Semester

Credit 0.50

Weight 1.04

Prerequisites: This course is open to students in Grades 11 and 12. Prior successful completion of Biology General, College, or Honors is required.

Description: This course is designed for students who wish to further their understanding of oceanography and marine biology. Topics include the physical properties of seawater, ocean currents, density problems, tides, marine organisms and the ecosystems of coral reefs, the intertidal zone, and the deep sea. Special emphasis is placed on man's influence within these marine habitats and possible solutions to current global problems. Two major reports are required. Students should be prepared for regular homework assignments, lab reports, and tests that are all on a college preparatory level. This course does not meet the physical or the biological science requirement for graduation, but will be applied toward the Science elective requirement for graduation.

ENVIRONMENTAL SCIENCE (7339)

One Semester

Credit 0.50

Weight 1.04

Prerequisites: This course is open to students in Grades 11 and 12. Prior successful completion of Biology General, College, or Honors is required.

Description: This course is designed for students who wish to further their understanding of environmental topics. Topics will include ecology, environmental pollution, energy sources, natural cycles, and loss of biodiversity. Global change topics (ozone depletion, greenhouse effect, deforestation, etc.) and problems specific to Vernon will be discussed. Some knowledge of computers and scientific testing procedures is helpful but not necessary. One major report will be required. Students should be prepared for regular homework assignments, lab reports, and tests that are all on a college preparatory level. This course does not meet the physical or biological science requirement for graduation, but will be applied toward the Science elective requirement for graduation.

ENVIRONMENTAL SCIENCE - ECE (7339E)**University of Connecticut Early College Experience credit***

One Semester

Credit 0.50

Weight 1.08

Prerequisites: This course is open to students in Grades 11 and 12. Prior successful completion of Biology College or Biology Honors is required. A grade of 85 or higher in Biology College or Biology Honors is recommended.

Description: This course will follow the syllabus of the University of Connecticut NMRE 1000 Environmental Science course. Presently it is an introduction to Earth's biotic and abiotic systems and how humans influence and depend on them. With sustainability as a central theme, specific course topics include: ecology, natural resources management, energy, pollution, human population dynamics, and climate change. Students will be required to complete a current topic abstract, complete a research project, and do a community service project that focuses on ecology.

*The ECE Environmental Science course is comparable to the NMRE 1000 course offered at the University of Connecticut. Students who successfully meet the expectations of the Early College Experience requirement will earn 3 college credits from the University of Connecticut. There is a \$75 non-refundable registration fee for students who elect this ECE course.

ASTRONOMY (7342)

One semester

Credit 0.50

Weight 1.04

Prerequisites: This course is open to students in Grade 11 and Grade 12 who have successfully completed an Earth Science course.

Description: This course is designed for students who want to further their understanding of the universe. Topics will include the history of astronomical studies, the Earth's relationship to the solar system, stars, galaxies, and the use of current and past observation technologies. Knowledge of computer and scientific testing procedures is necessary. Students must be prepared for regular homework assignments, lab reports, and tests on a college preparatory level. This course does not meet the Physical or Biological Science requirements for graduation but will be applied toward the Science elective requirement for graduation.

METEOROLOGY (7343)

One semester

Credit 0.50

Weight 1.04

Prerequisites: This course is open to students in Grade 11 and Grade 12 who have successfully completed an Earth Science course.

Description: This course studies the structure of the Earth's atmosphere and the causes of weather. Students will learn how to effectively use weather instruments to gather data. Topics of study will include weather patterns, thunderstorms, tornadoes, and hurricanes. Additionally, students will be required to forecast the weather and present it to an audience. Students should be prepared for regular homework assignments, lab reports, and tests that are all on a college preparatory level. This course does not meet the Physical or Biological Science requirement for graduation but will be applied toward the Science elective requirement for graduation.