

SCIENCE DEPARTMENT

The Science Education Program in grades 9-12 will:

1. Help students to understand and apply basic concepts, principles and theories of biology, chemistry, physics, and earth and space sciences and their interrelationships.
2. Provide the means for students to explore natural phenomena and understand the natural environment through an inquiry-based approach.
3. Train students to select and properly use appropriate laboratory equipment, materials, and technology, including measuring and sensing devices.
4. Provide students with varied opportunities to identify and solve problems through scientific exploration, including the formulation of hypotheses, design of experiments, use of technology, analysis of data and drawing of conclusions.
5. Develop the students' understanding of the relevance of science in other academic disciplines and to various career opportunities.
6. Prepare students to apply scientific knowledge in their lives and assist them in becoming active participants in an increasingly technological world.
7. Read and respond critically for a variety of purposes.
8. Utilize listening, speaking and writing skills to communicate effectively for a variety of purposes and audiences.
9. Think critically in order to deduce, analyze, and solve abstract and real world problems across disciplines.
10. Select and employ a variety of resources-including media and technology-in order to find, organize and communicate ideas effectively.
11. Learn to work collaboratively and creatively with others to achieve common objectives.

The level of courses will differ in pace, manner of presentation and selection of materials. The options of course sequences based on student performance and career goals are:

As part of the 3-credit graduation requirement for science, the student must earn at least one credit in a life science and at least one credit in a physical science. These courses must be taken in the science department and are marked with a (P) or (L) beside the course title.

GRADE9:

591	Earth Space Science – Honors
592	Earth Space Science – Accelerated
593	Earth Space Science – Standard

GRADE 10:

520	Biology – Advanced Placement
521	Biology – Honors
522	Biology – Accelerated
535	Biology – Standard

GRADE 11/12 CORE ELECTIVES:

540	Chemistry – Advanced Placement
541	Pre-AP Chemistry – Honors
542	Chemistry – Accelerated
543	Chemistry and the Community – Standard
560	Physics – UCONN Early College Experience
561	Physics – Honors
562	Physics – Accelerated
563	Physics – Standard

GRADE 11/12 ADDITIONAL ELECTIVES:

510	Environmental Science – UCONN Early College Experience
507	SEPUP – Standard
518	Astronomy – Accelerated
524	Forensic Science – Accelerated
533	Botany – Standard
587	Zoology – Standard

*PLEASE SEE OFFERINGS UNDER STEM ACADEMY AND HEALTH ACADEMY FOR ADDITIONAL SCIENCE ELECTIVE COURSES.

GRADE 9 SCIENCE

592 EARTH SPACE SCIENCE

This course core ideas include: Earth's place in the universe (describing the universe as a whole and addressing its grand continual evolution) and Earth and human activity (addressing society's interactions with the planet).

GRADE 10 SCIENCE

520 ADVANCED PLACEMENT BIOLOGY (L)

College

1 Credit

Meets seven periods per week. This course helps the student prepare for the Advanced Placement Examination that will be given in the spring. Detailed laboratory procedures are an integral part of this course. Principles such as cellular biology, molecular biology, genetics, unicellular and multicellular organisms, comparative anatomy, and plants are covered throughout the year.

521 BIOLOGY (L)



Honors

1 Credit

522 BIOLOGY (L)

Accelerated

1 Credit

535 BIOLOGY (L)

Standard

1 Credit

This course focuses on four core ideas: 1. How individual organisms are configured and how those structures function to support life, growth, behavior and reproduction 2. Organisms' interactions with each other and their physical environment 3. The flow of genetic information between generations 4. The changes in the traits of populations of organisms over time.

GRADES 11 AND 12 - CORE ELECTIVES

540 ADVANCED PLACEMENT CHEMISTRY (P)

College

1 Credit

Grade 12

Prerequisites: Chemistry; completion or concurrent enrollment in pre-calculus recommended

Meets seven periods per week. A major objective of this course is to prepare the student for the Advanced Placement Examination that will be given in the spring. Students who plan to major in healthcare, chemical engineering, pharmacy, chemistry or physics, will be adequately prepared by this course.

There will be a brief review of first year chemistry and in-depth discussion of chemical kinetics and equilibrium, bonding, thermodynamics, electrochemistry and periodic trends.

541 PRE-AP CHEMISTRY (P)

Honors

1 Credit

Grades 11, 12

Prerequisite: Algebra 1; strong math background recommended

Meets seven periods per week. The course core idea includes: Matter and its interactions: the structure, properties and interactions of matter, how particles combine to form the variety of matter one observes and how substances combine or change (react) to make new substances.

542 CHEMISTRY (P)

Accelerated

1 Credit

Grades 11, 12

Prerequisite: Algebra 1

Meets seven periods per week. The course core idea includes: Matter and its interactions: the structure, properties and interactions of matter, how particles combine to form the variety of matter one observes and how substances combine or change (react) to make new substances.

543 CHEMISTRY AND THE COMMUNITY (P)

Standard

1 Credit

Grades 11, 12

Meets five periods per week. Chemistry and the Community (ChemCom) satisfies the laboratory science entrance requirement for some colleges. It meets the minimum requirements of individuals who plan to be LP nurses, hospital technicians, or medical secretaries. It is not recommended for students who plan careers in science or engineering. The course is designed to emphasize societal problems whose solutions require some knowledge of chemistry. As part of their search for solutions, students are expected to do laboratory work and written assignments, and participate in decision-making activities. Several topic areas of a traditional chemistry course are covered.

5411 LABORATORY ASSISTANT  **Honors** **½ Credit**
 Grades 11-12
 Prerequisite: Chemistry or taking Chemistry concurrently. Permission of Science Dept. Head required.
Meets three periods per week, during non-lab days. This course teaches students advanced techniques for working in a laboratory. Students will learn skills such as solution preparation, sample preparation, and organization of both lab equipment and supplies. Students may be involved in ongoing projects in the science department such as the use of hardware and software for microcomputer based laboratory experiments. Students may be required to assist during lab demonstrations and/or lab classes.

560 AP PHYSICS/UCONN ECE (P)   **College** **1 Credit**
 Grade 12
 Prerequisite: Algebra 1 and Geometry.
 Algebra 2 must be completed or taken concurrently. Although the UCONN Physics includes basic use of trigonometric functions, this understanding can be gained in the UCONN physics course itself. *Meets seven periods per week.* Students who plan to major in engineering, electronics, chemistry or physics will be adequately prepared by this course. Semester 1 covers Newtonian mechanics (including rotational dynamics and angular momentum); work, energy, and power; fluid mechanics, and mechanical waves and sound. Semester 2 covers Electricity and Magnetism, Optics, Atomic and Nuclear Physics, and Modern Physics. Students may enroll in the class for high school credit only, or for high school and college credit at the University of Connecticut. Students who elect to register for the class at UConn may incur a small fee payable to the university. Students who meet the university's requirements (a grade of C, 73 or higher) at the end of the course will earn college credits.

561 PHYSICS (P)   **Honors** **1 Credit**
 Grades 11, 12
 Prerequisite: Algebra 1 and Geometry. Algebra 2 must be completed or taken concurrently.
Meets seven periods per week. This course is intended for those who need a technical background in studies they pursue after graduation. The topics covered are generally the same as in the advanced placement physics course but at a less rigorous level. Students who plan to major in pre-med, nursing, biology, pre-law, etc. will be adequately prepared by this course. Students who plan to major in engineering, electronics, chemistry or physics should take advanced placement physics. Topics covered include mechanics, waves, sound, light, electricity and magnetism.

562 PHYSICS (P)   **Accelerated** **1 Credit**
 Grades 11, 12
 Prerequisite: Algebra 1
Meets five periods per week. This is an introductory course where physics is treated conceptually. This course is a path for continued studies in physical science using basic algebra for computations. Topics covered include: mechanics, waves, sound, heat, electricity and light. This course involves laboratory activities as well as teacher demonstrations to ensure student understanding. Physics concepts are introduced by exploring issues in sports, medicine, energy use and communication. This is a practical course in physics that includes many laboratory experiences to develop conceptual understanding.

563 PHYSICS (P)   **Standard** **1 Credit**
 Grades 11, 12
Meets five periods per week. This is an introductory course where physics is treated *conceptually* more than algebraically. Physics concepts are learned and taught using logic and reasoning more than equations. This course is a path for continued studies in physical science without an emphasis on computations. Topics covered include mechanics, waves, sound, electricity and light. This course involves laboratory activities as well as teacher demonstrations to ensure student understanding.

GRADES 11 AND 12 - ADDITIONAL SCIENCE ELECTIVES

510 ENVIRONMENTAL SCIENCE/UCONN ECE (L)(P)   **1 Credit**
 Grade 11, 12
Meets seven periods per week. AP Environmental Science is designed to be the equivalent of a one-semester college course in environmental studies. The course provides students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world. Analysis of natural and man-made environmental problems will be conducted both in class and in the field. The relative risks associated with these problems and alternative solutions for resolving and/or preventing them will be evaluated. Field trips may be conducted.

507 SEPUP SCIENCE (L)(P) 	Standard	1 Credit
<p>Grade 11, 12 SEPUP (Science Education for Public Understanding Program) is an issues-oriented approach to current topics in environmental science. The general focus of the course revolves around water related topics. The students develop a basic evidence supported, scientific literacy while exploring important issues related to water resources in the community. Students will also explore current issues in materials science. An intensive laboratory program provides a strong performance-based assessment program throughout the course.</p>		
518 ASTRONOMY (P)  	Accelerated	½ Credit
<p>Grade 11, 12 Prerequisite: Algebra 1 This course covers the nature, origin and evolution of the solar system including the sun, planets, asteroids, comets and meteorites. The origin of the universe, evolution of stars, galaxies, neutron stars and black holes will be discussed. Optional field trip to planetarium.</p>		
524 FORENSIC SCIENCE (L)  	Accelerated	½ Credit
<p>Grades 11, 12 Prerequisite: Algebra 1, Biology, Chemistry (or concurrently taking) This course deals with the study of physical evidence left at a crime scene. Topics will include processing the crime scene, fingerprinting, serology, hair, DNA, biotechnology, and anthropology. Lab activities are an essential part of this course.</p>		
533 BOTANY (L)  	Standard	½ Credit
<p>Grades 11, 12 This course focuses on plant classification, uses, structure, reproduction, and growth regulators. Plants are cultivated. Course requirements include projects, lab and hands-on activities.</p>		
587 ZOOLOGY (L)  	Standard	½ Credit
<p>Grades 11, 12 This course is a survey of the animal kingdom to include: animal structures and functions, adaptations to land/sea, and animal diversity. Organisms studied will include sponges, mollusks, echinoderms, arthropods, amphibians, reptiles, fish, birds, and mammals. Laboratory exercises will be included and actual or virtual dissections will be required.</p>		

PRINCIPLES OF THE BIOMEDICAL SCIENCES IS RECOMMENDED, BUT NOT REQUIRED, FOR STUDENTS WHO PLAN TO TAKE AP BIOLOGY