

Science Department

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The science department offers a comprehensive selection of courses for all students. The four major branches of science— Earth Science, Life Science, Chemistry and Physics— are all represented. The science department also offers a wide selection of advanced offerings intended for students who have completed, or are in the process of completing, an initial three unit science sequence.

GRADUATION REQUIREMENTS:

Students must earn three units of credit in science to graduate. Two of the units must be comprised of one course from the Physical Setting (Earth Science, Chemistry, or Physics) and one course from the Living Environment core curricula. The third may be from either life sciences or physical sciences, or from an approved course integrating math, science and technology. All science courses include a critical laboratory component. Students taking Living Environment, Physical Setting/Earth Science, Physical Setting/Chemistry, and Physical Setting/Physics must successfully complete the State-mandated laboratory requirement, which includes 1200 minutes of hands-on laboratory experience with satisfactory laboratory reports. Students must also pass one Regents examination in science for a Regents Diploma and two Regents examinations for an Advanced Regents Diploma.

NINTH GRADE SCIENCE PLACEMENT

Ninth grade students will take either Physical Setting/Earth Science or Living Environment. Science placement for students entering ninth grade in September of 2006 will be determined through a rubric that includes student performance data, assessment data, and qualitative analysis. Students will receive notification of placement in writing in May 2006.

PHYSICAL SETTING/EARTH SCIENCE

0001

(1 unit) This course includes a study of the forces that have molded the earth and universe, geology of the earth, chemistry and identification of minerals, interpretation of topographic maps, physics of stars and planets, and various topics in meteorology and oceanography. The final examination is the New York State Regents Examination. New York State Education Department policy mandates the completion of a minimum of 20 laboratory hours with written reports to the satisfaction of the instructor to qualify for the Regents Examination.

LIVING ENVIRONMENT

0003

(1 unit) A survey of biology that focuses on laboratory investigations of the chemistry, anatomy and physiology of cells and organisms, their relationships to each other and the factors that affect their development and evolution. The final examination is the New York State Regents Examination. New York State Education Department policy mandates the completion of a minimum of 20 laboratory hours with written reports to the satisfaction of the instructor to qualify for the Regents Examination.

CHEMISTRY IN THE COMMUNITY

0009

(1 unit) The focus of this course is on current issues now confronting our society and the world. The eight major units deal with chemistry in the home and environment, the chemistry of food and drugs and how they affect the body, the chemistry in industry and our nuclear power plants. Laboratory activities will investigate the practical consumer aspects of chemistry that students encounter daily. A local final exam is given.

PHYSICAL SETTING/CHEMISTRY

0007

(1 unit) Emphasis will be placed on experimental evidence from which some fundamental laws of chemistry will be derived. The course involves a study of chemical and physical change in matter and

the energy change that accompany these processes. The final examination is the New York State Regents Examination. New York State Education Department policy mandates the completion of a minimum of 20 laboratory hours with written reports to the satisfaction of the instructor to qualify for the Regents Examination.

Prerequisite: Successful completion of one year of Regents science. Ideally, students should be concurrently enrolled in Math 3R or higher, as there is a considerable amount of mathematical problem-solving associated with these concepts. Students who are not concurrently enrolled in Math 3R or a higher math level must obtain departmental approval before enrolling in this course.

PHYSICS & TECHNOLOGY

0080

(1 unit) This course offers several different assessment methods, including reports, presentations, and 3 dimensional projects. Students use portfolios to map progress through projects while using science, technology, math, economics, daily logs and more!

PHYSICAL SETTING/PHYSICS

0010

(1 unit) Physics is a survey of the classical and modern laws that describe the behavior of waves, particles and forces. Classical laws of mechanics, motion, heat, light and electricity are examined and modified to allow introduction of quantum physics and relativity. The final examination is the New York State Regents Examination. New York State Education Department policy mandates the completion of a minimum of 20 laboratory hours with written reports to the satisfaction of the instructor to qualify for the Regents Examination.

Prerequisite: Math 3 or Math 3R (or concurrent).

BIOETHICS FORUMS

0006

(1/2 unit) Many of the current moral issues have their foundation in technology. For that reason, it is necessary that we focus our attention on an area of study known as bioethics. Bioethics is an interdisciplinary subject that intersects the life sciences, ethics and society. This course will investigate the history of bioethics and will focus on the legal, moral and ethical dilemmas that have been created by advances in science and technology. Our society, including our legal system, has not been able to keep pace with these changes. What was once black and white has now become a large gray area in decision making. The purpose of this course is to get students to think critically and effectively. Students will be taught HOW to think rather than WHAT to think. The format of the course will be based on a case study approach to investigate current bioethical dilemmas.

Prerequisites: Successful completion of Living Environment.

ENVIRONMENTAL SCIENCE

0017

(1 unit) Environmental Science is a senior elective for students who are interested in an interdisciplinary science course. Students enrolling should have successfully completed the course and Regents Exam in two of the following: Earth Science, Biology, and Chemistry. The course is designed to introduce students to many environmental principles, problems, connections and solutions. Students will conduct scientific field studies to investigate many aspects of the local environment. Topics in ecology, geology, soil, water chemistry and air quality will be researched and discussed. Students will also explore the interdisciplinary nature of the environment and the dynamics of human population growth, environmental law, environmental ethics, international treaties, energy and economics. The goal of this course is to provide students with a fundamental framework for understanding the way the world works, and an awareness of global environmental issues which affect us all now and in the future.

Prerequisites: Successful completion of two Regents sciences.

SCIENCE RESEARCH PROJECT

0015

(1 unit) Students choose an area of interest and engage in original science research. Research skills developed during the year include laboratory investigation, use of online international data bases of scientific literature. Mentorship will be strongly encouraged between professional and student

researchers. Students will attend seminars, field trips and participate in lab work throughout the year. Meetings will be scheduled between student and instructor to monitor student progress and provide assistance when needed. Goals for the student enrolled in this course include: development of independent work habits; scientific research; communication with the scientific community; demonstration of perseverance and creativity; presentation of original research to peers; participation in various local and national science competitions. Significant time outside of class will be required to conduct research.

Prerequisite: parental permission, teacher recommendation, interview by instructor. The core unit of study may require an extended school day.

ADVANCED COURSES IN SCIENCE:

Offered to juniors and seniors who have completed a 3 year sequence or wish to double in science. These courses are not intended to be a third year in a science sequence.

Prerequisites: Department permission required.

ADVANCED PHYSICAL GEOLOGY

0018

(1 unit) [APG](http://www.bedford.k12.ny.us/flhs/science/apg/) (<http://www.bedford.k12.ny.us/flhs/science/apg/>) at Fox Lane is a full year **COLLEGE CREDIT BEARING*** laboratory science course in physical geology taught at the college level, and the extra time allows exploration of topics in greater depth than they might be in a single semester course. Topics covered include mineralogy, petrology, weathering and erosion systems, landform studies, historical geology, tectonics, and structural geology. In addition to an extensive lab program, all students must participate on a two day field trip to the Catskill Mountains to study the structure and erosion of the sedimentary rocks of that area, and to explore the geology of an undeveloped solution cave. The final project consists of original research requiring students to design, conduct, evaluate the results of, and report on an original experiment in some area related to physical geology. *College credit is provided through SUNY College at Oneonta's [ESOP](http://employees.oneonta.edu/ebertjr/ESOP.htm) program (<http://employees.oneonta.edu/ebertjr/ESOP.htm>).

AP BIOLOGY

0090

(1 unit) This is an advanced course for biology students. It is designed to stress major unifying concepts. Where chemistry and physics facilitate understanding of these concepts, those areas are readily employed. A more sophisticated understanding of respiration, photosynthesis, evolution, genetics and other functions of metabolism and self perpetuation is developed. Laboratory exercises are structured so that these understandings can be clarified. Students should be prepared to spend time outside of class on lab work. Students are encouraged to pursue laboratory work on their own in high interest areas. Each student is required to take the AP Examination.

Prerequisites: Living Environment and Physical Setting/Chemistry.

AP CHEMISTRY

0091

(1 unit) This is a college level, general chemistry course. Topics include chemical bonding, stoichiometry, states of matter, principles of thermodynamics, chemical kinetics, equilibrium, electrochemistry, qualitative and quantitative analysis, nuclear structure and radioactivity. Each student is required to take the AP Examination.

Prerequisites: Physical Setting/Chemistry and Math 3R.

CHEMISTRY 113: FORENSIC SCIENCE

0020

Syracuse University Project Advance (1 unit: 4 college credits available through Syracuse University) Chemistry 113: Forensic Science is focused upon the application of scientific methods and techniques to crime and law. Recent advances in scientific methods and principles have had an enormous impact upon law enforcement and the entire criminal justice system. This course is intended to provide an introduction to understanding the science behind crime detection. Scientific methods specifically relevant to crime detection and analysis will be presented with emphasis placed upon the techniques used in evaluating physical evidence. Topics may include blood analysis, organic

and inorganic evidence analysis, microscopic investigations, hair analysis, DNA analysis, drug chemistry and toxicology, fiber comparisons, paints, glass compositions and fragmentation, fingerprints, soil comparisons, and arson investigations, among others. Laboratory exercises will involve techniques commonly employed in forensic investigations.

Prerequisites: Successful completion of Living Environment and Physical Setting/Chemistry.

AP PHYSICS

0092

(1 unit) A college level course offering a more mature presentation of content, providing more extensive laboratory experience than in Physics R. The course is intended to be a vigorous, well disciplined undertaking, fully challenging to the most able students. Each student is required to take the AP examination.

Prerequisite: Physics R. Co-requisite: Calculus.

AP ENVIRONMENTAL SCIENCE

0093

(1 unit) The [AP Environmental Science](#) course is designed to be the equivalent of an introductory college course in Environmental Science that includes a strong laboratory and field investigation component. Emphasis is placed on the scientific principles, concepts, and methodologies necessary to understand and evaluate interrelationships in the natural world. Students will learn to identify and analyze environmental problems, both natural and manmade, from a "systems" perspective, and to evaluate the risks associated with these problems. Finally, students will explore alternatives and solutions to the identified problems. Each student is required to take the AP Examination.

Prerequisites: Successful completion of two of the following: Living Environment, Physical Setting/Earth Science, Physical Setting/Chemistry.

ESL SCIENCE

0507

ESL Science is designed to provide an introduction to concepts and ideas related to the Living Environment. Specifically, students will explore the scientific method, microscopic life, plants, animals, human body, and environmental science in an inquiry-based, hands-on manner. An emphasis will be placed on an appreciation for science concepts with additional language support. Students will have the opportunity to engage in field work, laboratory experiments, and research projects.

THE SCIENCE OF WRITING, THE WRITING OF SCIENCE

0022

(1/2 unit) Grades 9-12. "That land is a community is the basic concept of ecology, but that land is to be loved and respected is an extension of ethics." So wrote Aldo Leopold in 1948 in the forward to [Sand County Almanac](#). This course will explore the importance of the written word to the development of science as a means of understanding our world. Students will learn how to capture observations and interpretations of nature in prose by developing a field journal. They will also investigate how the effective presentation of concepts through writing has contributed to change in human values over time. We will explore the writing of Charles Darwin, Aldo Leopold, John McPhee, as well as Rachel Carson, Neil de Grasse Tyson, Dava Sobel and others

ADVANCED SCIENCE RESEARCH

0006

(1 unit) Students will continue their independent work undertaken during the first year of the 3-year Science Research program. For the 2nd year, emphasis is placed upon frequent contact with a mentor in the student's field of interest and the reading of journal articles in the topic area. Additionally, an original research project will be designed and implemented during the 2nd year of the program with guidance from the mentor and instructor. Data is collected and analyzed by end of 2nd year, culminating in a formal research report written in time for the start of the 3rd year of the program. The 3rd year is highlighted by presentation of original research to peers and participation in various local, regional and national science symposia and competitions. Due to the independent nature of this program, significant time outside of class and during the summer is *required* in order to meet with mentors and conduct research at the lab or in the field. Meetings between student and instructor will be scheduled to monitor student progress and provide assistance when needed.

Prerequisite: parental permission, successful completion of the first year of Science Research.