



## SCIENCE

**REQUIREMENTS:** 3 credits of Science; 1 additional credit in Math and/or Science.

**ERIE BUSINESS CENTER ARTICULATION AGREEMENT:** Students can earn 3 credits when they receive a grade of B or better in Biology A or Biology H.

**EDINBORO UNIVERSITY ARTICULATION AGREEMENT:** Upon matriculation at Edinboro University of Pennsylvania, students can earn 3 credits (Biology 101) when they earn an "A" or "B" in the following classes: Earth Space Science H, Biology H, Chemistry H, and Biology 2 AP or Chemistry 2 AP or Physics 1 H and Physics 2 H.

**GANNON UNIVERSITY ARTICULATION AGREEMENT:** Upon matriculation at Gannon University, students can earn 3 credits (BIOL 139) when they earn a B or better in the following classes: Earth Space Science H, Biology H, Chemistry H, and Biology 2 AP or Chemistry 2 AP or Physics 1 H and Physics 2 H.

### ASTRONOMY

# 5712  
Grade level: 10, 11, 12  
Credit: 0.50

This course is offered every other year – It will be offered in 2009-2010

This course is a study of the universe and its component parts such as galaxies, solar systems, nebulae, and stars, with a special emphasis on our sun. There is time spent on the development of astronomy as a science and instruments used. A special section is devoted to current discoveries and theories now developing. Films, class activities, and laboratory experiences are included. Students taking this course for Honors credit will sign a contract during the first week of the class.

Prerequisites: Earth Space Science and Departmental approval.

**BIOLOGY H**  
**BIOLOGY A**

# 2714  
# 2724  
Grade level: 10  
Credit: 1.0

This course is required for Sophomores and covers the study of cellular structure and functions, genetic principles, evolution, a survey of the six kingdoms of organisms, and ecology. There is an emphasis on laboratory, hands-on experiences. Lecture, discussion, and projects are also components of the course. In the honors level the material is covered in more detail, more independent work is expected, including written work and critical thinking.

Prerequisite for Biology H: "B+" in Earth Space Science H or "A" in Earth Science A with Department approval.

**BIOLOGY 2 AP**

# 5794  
Grade level: 12  
Credit: 1.0

This is a comprehensive course designed to be the equivalent of an introductory college level biology course. AP Biology aims to provide students with the conceptual framework, factual knowledge, and analytical skills necessary to deal critically with the rapidly evolving field of biology. The areas of study include: molecular and cellular biology, genetics, ecology, evolution, plant and animal anatomy and physiology. Primary emphasis is placed on developing an understanding of concepts; essential to this conceptual understanding are: scientific inquiry, recognition of unifying themes that integrate the major topics in biology, application of biological knowledge, and critical thinking applied to environmental and societal concerns. The Biology AP exam may be taken in May 2010. The cost of the test is approximately \$90.

Fee: \$50

Prerequisites: "B+" in Biology H and Chemistry H, or "A" in Biology A and Chemistry A or Department Approval

**CHEMISTRY H**  
**CHEMISTRY A**

# 3714  
# 3724  
Grade level: 11  
Credit: 1.0

This course satisfies the Junior science requirement. In this course students will apply the basic concepts in chemistry to everyday life. This course includes lecture, discussion, reading, problem solving, calculations, research based projects, and laboratory experiences, enabling students to learn many concepts through the discovery process and scientific method. Topics include: SI units, significant figures, graphing, dimensional analysis, matter and its properties, atomic structure and bonding, naming and writing formulas, balancing equations, moles and stoichiometry, behavior of gases, solutions, acids, bases and salts, mixtures, chemical behavior in reactions, analysis of energy sources and heat transfers and basic organic chemistry. The Honors level course will explore topics including oxidation-reduction, and acids and bases, and organic and biochemistry more in depth than the Academic level course.

Prerequisites for Chemistry H: Earth Space Science, "B" in Biology H or "A" in Biology A , and "B" in Algebra H" or "A" in Algebra A or Department approval.

Prerequisites for Chemistry A: Earth Space Science A, Biology A, Algebra A or Department approval.

## **CHEMISTRY 2 AP**

# 5764  
Grade level: 12  
Credit: 1.0

AP Chemistry is designed to be the equivalent to the general chemistry course that is usually taken during the first year of college. Students will attain a depth of understanding of fundamentals and a reasonable competence in dealing with chemical problems. The course will contribute to the development of the students' abilities to think clearly and to express their ideas orally and in writing, with clarity and logic. The student must be willing to do the work of a typical college chemistry course. The Chemistry AP exam may be taken in May 2010. The fee for this exam is approximately \$90.

Fee: \$ 50

Prerequisites: "B+" in Chemistry H and "B+" in Geometry H or Algebra 2 H

## **ENVIRONMENTAL CHALLENGES**

# 7762  
Grade level: 11, 12  
Credit: 0.50

This is a semester course focused on environmental issues and problems. The topics of focus include: environmental problems in a social context, ecological principles and their application, energy including alternative energy, resources including water, air, and land, and pollution and policy. A text will be used as well as articles addressing issues and topics. Field experiences and laboratory exercises will provide valuable exploration of these ecological and environmental topics. The interacting influences of history, religion, economics, science and technology, society and government on the environment will be studied and analyzed through lecture and discussion. Students taking this course for Honors credit will sign a contract during the first week of class.

Prerequisites: Earth Space Science and Biology. Chemistry can be taken at the same time.  
Fee: \$ 25

## **FORENSIC SCIENCE**

# 7782  
Grade level: 12  
Credit: 0.50

Forensics uses science to assess and evaluate crime scene scenarios. This class will integrate knowledge and lab skills from Earth Science, Biology and Chemistry and put them into a real world scenario. Forensic Science class will give students the opportunity to immerse themselves in this popular topic.

Prerequisites: Earth Space Science, Biology and Chemistry with Department approval.  
Fee: \$ 25

## **HUMAN BIOLOGY 1 H**

# 6792  
Grade level: 11, 12  
Credit: 0.50

This honors level course is designed for students interested in pursuing a medically-related career. The course focuses on the biochemistry of cellular processes, structures and functions of body cells and tissues, and takes a systems approach to studying the anatomy, physiology, and pathology of the cardiovascular, endocrine, and nervous systems. You will learn the structures, functions, and dysfunctions of the human body by studying structures and processes at a variety of levels including the molecular, cellular, tissue, organ and organ system level.

Fee: \$ 25

Prerequisites: Earth Space Science; "B" in Biology H or "A" in Biology A. or department approval. Chemistry may be taken at the same time.

## **HUMAN BIOLOGY 2 H**

# 7792  
Grade level: 11, 12  
Credit: 0.50

This honors level course is designed for students interested in pursuing a medically-related career. The course takes a systems approach to studying the anatomy, physiology, and pathology of skeletal, muscular, integumentary, digestive, respiratory, and reproductive systems. Students may take Human Biology 2 without taking Human Biology 1. You will learn the structures, functions, and dysfunctions of the human body by studying structures and processes at a variety of levels including the molecular, cellular, tissue, organ and organ system level.

Prerequisites: Earth Space Science; "B" in Biology H or "A" in Biology A or departmental approval. Chemistry may be taken at the same time.

Fee: \$ 25

## **INTEGRATED SCIENCE H INTEGRATED SCIENCE A**

# 1734  
# 1744  
Grade level: 9  
Credit: 1.0

This course provides students with a foundation upon which to build throughout their years at Villa. This course connects one area of science to another, it also relates science to technology, society, and other disciplines. Units of study include introductory level instruction in Chemistry, Biology, Earth Science, Physics and Astronomy. Students will be involved in laboratory activities, cooperative learning activities, and critical thinking exercises. Emphasis will be placed on students developing their ability to think, learn and solve problems.

## **OCEANOGRAPHY**

#  
Grade level: 10, 11, 12  
Credit: 0.50

This course is offered every other year it will be offered in 2010-2011.

From whence did all this water come? What is really under there? What does the ocean offer for the future? How do marine animals live and what are their special adaptations for ocean living? These and many more questions are answered in a study of the development of oceans, research done, and possibilities to consider for the twenty first century. Information is shared through films, interactive lectures, activities including Internet site explorations, and research. Students taking this course for Honors credit will sign a contract during the first week of class.

Prerequisites: Earth Space Science and Department approval

## **PHYSICS 1 H**

# 6732  
Grade level: 12  
Credit: 0.50

Physics is the science of energy and motion. Physics 1 introduces mechanics, which is the study of the motion of physical bodies. Students will use conceptual and mathematical models to describe and explain different types of motion. It is highly recommended that a student pursuing a science career take both semesters of Physics H.

Prerequisites: "B" in Algebra 2, "B" in Precalculus/Trigonometry H or "A" in Trigonometry A, and "B+" in Chemistry H, or Department approval. (Precalculus /Trigonometry may be taken concurrently.)

## **PHYSICS 2 H**

# 6742  
Grade level: 12  
Credit: 0.50

This course introduces the various divisions of physics, building on the concepts from Physics I. Topics include: mechanical energy, waves, optics, acoustics, electrostatics, electricity, magnetism, and modern physics.

Prerequisites: "B" in Physics 1 H or Department approval.

## **PHYSICS A**

# 5782  
Grade level: 11, 12  
Credit: 0.50

This is a conceptual survey course of physics. The mathematical emphasis is minimal. Topics include: motion, forces, energy, waves, acoustics, optics, and electricity. Practical applications are stressed.

Prerequisites: Algebra 1, Earth Space Science, Biology and Chemistry with Department approval.

## **SAT/ACT PREP**

# 5422  
Grade level: 10, 11, 12  
Credit: 0.5

This pass/fail course helps students prepare for standardized tests such as the SAT and the ACT. The course will be divided into three sections: verbal and writing skills, math skills and science skills. The verbal/writing section familiarizes students with the various aspects of the verbal and writing sections of the SAT and ACT tests. The topics covered are: sentence completion, reading comprehension, paragraph organization, identifying sentence errors, vocabulary and timed-writing responses. The math portion of the course includes practice with gridding student-produced responses, numbers, operations, algebra, functions, geometry, measurements, data analysis, statistics, and probability. The science portion of the course will include topics from biology, chemistry, physics, and the Earth/space sciences (geology, astronomy and meteorology). Students will practice skills such as graph reading, interpretation of scatterplots, interpretation of information presented in tables, interpretation of experimental results, and analysis and comparison of alternative viewpoints or hypotheses. This course helps prepare students by teaching them strategies for standardized test taking. Although this class cannot cover all topics as thoroughly as necessary, this class will provide specialized study skills, teacher and student feedback, and daily practice. This course will be taught in the Fall semester.

Prerequisite: Algebra 2, or Geometry with concurrent enrollment in Algebra 2

Fee: Students will purchase their own SAT and/or ACT workbooks. The cost for all workbooks is approximately \$45