Science

The Science Department at Bethlehem Catholic High School seeks to develop the knowledge, skills and attitudes which will enable each student to live as a responsible Christian in a constantly changing world. Since the study of science involves the understanding and interpretation of basic ethical and moral values, science teachers have the responsibility to direct the development of each student physically, spiritually and socially.

The science curriculum is designed to satisfy the individual academic needs of students. In following the appropriate sequence of courses, each student will develop an interest in, as well as an appreciation and respect for science and its applications.

IMPORTANT ADVISORY

All students are required to study three years of sciences. For students interested in a scientific, medical, or engineering career, we advise study in all the basic sciences: biology, chemistry and physics. It is imperative for a science major to schedule as many upper level courses as possible so that in senior year Anatomy/Physiology or AP Chemistry would be appropriate. Science majors are also strongly advised to schedule as many mathematics courses as possible to complement a good preparation for college.

BIOLOGY Credit 1.00 Level 2

This introductory course for students presents a descriptive approach to a modern Biology. The traditional aspects of biology are presented along with their laboratory investigations. The following topics are covered: Organization/Characteristics of living things, the Chemical Basis of Life (biochemistry of organic molecules), Cell Structure and Functions, Photosynthesis and Cellular Respiration, Cell Reproduction , Genetics, Bacteria & Viruses, Plant Diversity, Comparative Analysis of Organ Systems in Animalia, and Ecology. Ethical Issues in Science are brought in at various topics throughout the course. Assessments are in the form of: Projects, Laboratory Work, Quizzes, Tests, and Homework.

HONORS BIOLOGY Credit 1.00 Level 3

This course seamlessly blends inquiry, research, and classroom discussion about topics including but not limited to the following: the characteristics of life, the chemical bases of life, organelle and cell membrane structure and function, a brief look at microorganisms and how they influence human beings, genetics, DNA replication, transcription, translation, and protein synthesis, nutrition, human anatomy and physiology, a further discussion into human organ systems and healthy living, human embryological development, evolution and natural selection, ecology, and animal behavior and learning. Students entering this class should consider that this is a writing intensive class, including frequent research paper writing, lab reporting, and general written responses to instructional prompts. Students should expect to read both textbook and supplemental texts each night, create a personalized portfolio of their developing coursework, and to be comfortable participating in an accelerated learning environment.

****Placement is based upon English Placement Test*****

CHEMISTRY Credit 1.00 Level 2

Chemistry focuses on the properties and reactions of matter with emphasis on real-world applications. Topics of concentration include scientific measurements, symbolic representation, properties and structure of matter, chemical reactions, and relationships

between energy and matter. These concepts are developed through inquiry-based labs, demonstrations, problem solving, and other interactive activities. Mathematical skills through algebra are used in problem-solving.

HONORS CHEMISTRY Credit 1.00 Level 3

This course emphasizes a study of basic scientific principles through experimentation. The understanding of scientific principles is fortified through discussion and problem solving. A solid mathematical background is essential to success.
The course is designed for students who will be majoring in any science-related field in college, such as: medicine, nursing, chemistry, physics, engineering, or biology.
Prerequisite: *85% average in Honors Biology and Honors Mathematics course or 90% average in College Prep Biology and Mathematics course.*

ENVIRONMENTAL SCIENCE Credit 1.00 Level 2

The theme of this environmental science course is "balance vs. imbalance; a balanced system survives, an imbalanced system is doomed to collapse". The human situation in relation to the environment should be seen in this light.

The course can be generally broken down into the following topics:

1. natural ecosystems and how they function
2. population balances
3. soil and water ecosystems and managements
4. pollution issues
5. chemical pest control vs. natural methods of biological control
6. conservation of natural ecosystems and species
    a. recycling
    b. solar and nuclear technology

Prerequisite: *Biology, Chemistry and Algebra 2 (which may be taken concurrently)*

HONORS ENVIRONMENTAL SCIENCE Credit 1.00 Level 3

The theme of this environmental science course is sustainability, human populations existing indefinitely with a high standard of living and health. To attain this goal focus will be on the concepts of preservation, conservation, reduction of wastes, and renewable resources. These concepts are reinforced with short and semester long lab activities, more critical thinking and analysis, individual research projects, and discussion of current local environmental issues.
Prerequisite: *Grade of 85% or better in Biology and Chemistry, Algebra 2 (may be taken concurrently), and teacher of course approval.*

PHYSICS 1 Credit 1.00 Level 2

Algebra-Based Course Overview:
Physics 1 is an algebra-based, introductory college-preparatory physics course that explores topics such as Newtonian mechanics (including rotational motion); work, energy, and power; mechanical waves and sound; and introductory, simple circuits. Through inquiry based learning, students will develop scientific critical thinking and reasoning skills. Significant instructional time is devoted to hands-on laboratory work with an emphasis on inquiry-based investigations. Investigations will require students to ask questions, make

observations and predictions, design experiments, analyze data, and construct arguments in a collaborative setting, where they direct and monitor their progress.
Prerequisite: *Students should have completed geometry and be concurrently taking Algebra 2 or an equivalent course. Although the Physics 1 course includes basic use of Trigonometric functions, this understanding can be gained either in the concurrent math course or in the Physics 1 course itself.* ***85% average in Chemistry and Mathematics course or 80% average in Honors Chemistry and Honors Mathematics course.*** *Teacher of course approval.*

HONORS PHYSICS 1 Credit 1.00 Level 3

The basic goals of this course are to impart an understanding of the basic concepts of physics and to enable students to use these concepts to solve a variety of problems. The emphasis is on theoretical development and problem solving with a blend of mathematics and experimental investigation which stresses physics principles and makes us of laboratory techniques and equipment. This course is recommended for students interested in majoring in engineering, pre-medicine and allied health, earth sciences.
Prerequisite: *90% average in Chemistry and Mathematics course or 85% average in Honors Chemistry and Honors Mathematics course. The Mathematics courses required are Algebra 1 and 2 and Trigonometry which may be taken concurrently. Teacher of course approval.*

PHYSICS 2 Credit 1.00 Level 2

Algebra-Based Course Overview:
Physics 2 is an algebra-based, introductory college-preparatory physics course that explores topics such as fluid statics and dynamics; thermodynamics with kinetic theory; PV diagrams and probability; electrostatics; electrical circuits with capacitors; magnetic fields; electromagnetism; physical and geometric optics; quantum, atomic, and nuclear physics. Through inquiry-based learning, students will develop scientific critical thinking and reasoning skills.
Significant instructional time is devoted to hands-on laboratory work with an emphasis on inquiry-based investigations. Investigations will require students to ask questions, make observations and predictions, design experiments, analyze data, and construct arguments in a collaborative setting, where they direct and monitor their progress.
Prerequisite: *Students should have completed Physics 1 or a comparable introductory course. Students should have taken or be concurrently taking Pre-Calculus (Introduction to Calculus) or an equivalent course. Teacher of course approval*.

ANATOMY & PHYSIOLOGY Credit 1.00 Level 2

This course is a laboratory based biological science emphasizing the fundamental and principle concepts the Anatomy& Physiology of the Human Body. Biology 2 will begin with basic terminology and cell structure; then extends to a survey of the organ systems. These examinations of the body systems illustrate the complementary sciences of structure and function at all levels of organization. As the content investigates the body systems, critical thinking skills will be developed through evaluations of homeostatic imbalances and disease diagnoses. The course will involve a thorough dissection of the *Felis Domesticus (domestic cat)* as the systems are learned as well as develop strong Laboratory skills working independently. This course is recommended for the average student going into the Health Sciences or someone who wants to gain knowledge of the Human Body.
Prerequisite: *80% or better in Honors/College Prep Biology 1 and Honors/College Prep Chemistry and teacher of course approval.*

HONORS BIOCHEMISTRY/ANATOMY & PHYSIOLOGY
Credit 1.00 Level 3

This course is designed for the above average student majoring in Biology or some science related degree at the college level. It is a fast-paced course emphasizing the biochemistry of cell physiology and anatomy & physiology of all types of organisms including bacteria, plants, and animals. Critical thinking skills are emphasized along with strong Laboratory skills. Primary emphasis in this course should be on developing an understanding of concepts rather than on memorizing terms and technical details. Essential to this conceptual understanding are a grasp of science as a process rather than as an accumulation of facts; personal experience in scientific inquiry; recognition of unifying themes that integrate the major topics of biology; and application of biological knowledge and critical thinking to environmental and social concerns. Several dissections are performed throughout the year. The course will emphasize SAT II subject area multiple choice test questions and problem solving skills. This is a demanding course in the biological sciences.
Prerequisite: *A final average of 85% in both Honors Biology 1 and Honors Chemistry, and teacher of course approval.*

ADVANCED PLACEMENT CHEMISTRY Credit 1.00 Level 4

This course serves the interest of the student who wishes to pursue college-level studies while still in high school. It is open to both juniors and seniors. The course is designed to be the equivalent of the General Chemistry course usually taken during the first year in college. It differs qualitatively from the usual first secondary school course with respect to the kind of textbook used, the topics covered, the emphasis on chemical equations and the mathematical formulation of principles, and the kind of lab work done by the students. Quantitative differences appear in the number of topics treated, the time spent on the course by the student, and the nature and variety of experiments done in the lab, and the maturity and study demanded of the students. Advanced Placement Test is a requirement.
Prerequisite: *Honors Chemistry, Algebra 2, Trigonometry, and teacher of course approval.*

ADVANCED PLACEMENT BIOLOGY CREDIT 1.00 LEVEL 4

The AP Biology course is a rigorous, college-level course that provides students the opportunity to experience the problem-solving nature of a laboratory-intensive science class while studying the core concepts of modern Biology. Students will gain a greater appreciation for the process of scientific research and should be able to apply their knowledge of biological concepts and their critical thinking skills to current environmental and social issues. The course is structured around the following four big ideas: the process of evolution drives the diversity and unity of life; Biological systems utilize free energy and molecular building blocks to grow, reproduce, and to maintain dynamic homeostasis; Living systems store, retrieve, transmit, and respond to information essential to life processes; Biological systems interact, and these systems and their interactions possess complex properties.
Prerequisite: *Successful completion of Honors Biology and Honors Chemistry. Teacher of course approval.*