

# Course Descriptions

## Science

### **INTRODUCTION TO PHYSICS & CHEMISTRY (IMPACT)**

**No. 4209**

*Full Year/Full Time  
Grade 10 Phase I*

*Credit 1.0*

Introduction to Physics and Chemistry is a study of the nature and behavior of matter and energy. This course uses laboratory exercises, demonstrations, and other classroom experiences to help students learn about the physical world. Laboratory experiments and demonstrations will supplement classroom discussion. Instructional modifications are made to help students understand scientific concepts.

**Criteria for Selection - This course is reserved for students in the IMPACT program.**

### **INTRODUCTION TO PHYSICS & CHEMISTRY**

**No. 4409**

*Full Year/Full Time  
Grade 10 Phases I, II, III  
NCAA*

*Credit 1.0*

Students in Introduction to Physics and Chemistry will use laboratory exercises, demonstrations, and other classroom experiences to learn about the non-living physical world. Students will have one semester of introductory physics and one semester of introductory chemistry with a final test at the end of each semester. Scientific models are developed and used to explore and explain physical and chemical phenomena. Students should be capable of learning by inquiry and working cooperatively in small group and large group laboratory situations. This class meets five periods per week.

**Criteria for Selection - None.**

### **ACADEMIC INTRODUCTION TO PHYSICS & CHEMISTRY**

**No. 4509**

*Full Year/Full Time  
Grade 10 Phases III, IV  
NCAA*

*Credit 1.0*

Academic Introduction to Physics and Chemistry is designed for the student with a higher mathematical ability than those who register for the Introduction to Physics and Chemistry course. In this course, students will observe, analyze, and solve physical and chemical problems in nature by using the scientific method and through the development and application of mathematical formulas. Students will have one semester of introductory physics and one semester of introductory chemistry with a final test at the end of each semester. Students should be capable of learning by inquiry and working cooperatively in small group and large group laboratory situations. In addition, students are required to complete several self-directed research activities throughout the year. This class meets five periods per week.

**Criteria for Selection -**

**Students must meet the following three criteria:**

1. **80% or above in Honors Geometry (or a higher level Math course) OR 85% or above in Academic Geometry.**
2. **80% or higher in Academic Biology OR 95% or higher in Biology.**
3. **Approval by a Science teacher.**

### **HONORS BIOLOGY**

**No. 4609**

*Full Year/Full Time  
Grade 9 Phase IV  
NCAA*

*Honors Wt.  
Credit 1.5*

This course is an in-depth approach to life science with emphasis on cellular, molecular, and environmental concepts. This phase requires a high level of reading and mathematical computation skills, and independence. Students will frequently work cooperatively to perform hands-on experiments and activities in areas such as biochemistry, genetics, evolution, microbiology, and cell functions. This class meets seven/eight periods each week. Students should expect a more rigorous work load commensurate with the level of the class.

**Criteria for Selection -**

1. **93% or higher in 8th grade Science.**
2. **7th grade IOWA test score (Math Total) at or above the 85th National Percentile Rank.**
3. **85% or above in Advanced Algebra 1 (or a higher level Math course) or 95% or above in Academic Algebra 1.**

### **BIOLOGY (IMPACT)**

**No. 4210**

*Full Year/Full Time  
Grade 9 Phase I*

*Credit 1.0*

This course includes the processes, structures, and functions of living organisms. Students will use an ecological approach to study the relationships of living things in their environment. Laboratory experiments and demonstrations will supplement classroom discussion.

**Criteria for Selection - This course is reserved for students in the IMPACT program.**

### **BIOLOGY**

**No. 4410**

*Full Year/Full Time  
Grade 9 Phases I, II*

*Credit 1.0*

This course introduces the fundamental principles necessary to promote biological literacy among students. Classroom discussions, investigations, demonstrations, laboratory activities, and the use of various media will enhance student learning. Topics include: living organisms, cell functions, heredity, evolution, and ecology with practical applications for each.

**Criteria for Selection - None.**

### **ACADEMIC BIOLOGY**

**No. 4510**

*Full Year/Full Time  
Grade 9 Phases III, IV  
NCAA*

*Credit 1.5*

This course is a traditional approach to life science with labs and demonstrations, supplementing text, lecture, and technology. It provides a dual microscopic/macroscopic approach that covers life at all levels of biological organization. This class meets seven/eight periods each week.

**Criteria for Selection in grade 9 -**

1. **85% or higher in 8th grade Science.**
2. **7th grade IOWA test score (Math Total) at or above the 65th National Percentile Rank.**
3. **75% or above in Advanced Algebra 1 (or a higher level Math course) or 85% or above in Academic Algebra 1.**

# Course Descriptions

## Science

### **BIOLOGY PRACTICUM**

*Full Year/Full Time  
Grades 11, 12*

This course is designed to prepare students to achieve at the Proficient or Advanced level on the Biology Keystone Exam. Students will utilize a variety of resources to provide supplemental instruction for items tested on the Biology Keystone Exam. Instruction will be based on topics from the core biology curriculum that are aligned with the eligible content that is assessed on the Keystone. Students will be given the opportunity to gauge their progress and predict their success on the Biology Keystone Exam by using benchmark assessments along with other measures. Students may exit the course when they achieve a minimal score of Proficient on the Exam or complete a project-based assessment approved by the Pennsylvania Department of Education.

**Criteria for Selection –**  
**Scoring at the Basic or Below Basic level on the most recent Biology Keystone Exam.**

### **HONORS CHEMISTRY**

*Full Year/Full Time  
Grades 10, 11, 12 Phases III, IV  
NCAA*

Students will be introduced to a problem-oriented approach to chemistry that will prepare them for future academic challenges. This course explores the theoretical and mathematical aspects of chemistry. Mathematics, including geometry, and algebra, will be used extensively in this course to solve problems and develop relationships between physical quantities; a proficiency on the Keystone: Algebra I exam is highly recommended. The class meets 7½ periods per week. It is geared toward the student who is math/science oriented. It is recommended that students are enrolled concurrently in Honors Algebra II or a higher level math course.

**Criteria for Selection –**  
**For grade 10 –**  
**1. 80% or higher in Honors Biology (4609) and 85% or higher in Honors Geometry (3201) or a higher level math course or 95% or higher in Academic Geometry (3102).**

**2. Approval by current Science teacher.**

**OR**

**1. 95% or higher in Academic Biology (4510) and 85% or higher in Honors Geometry (3201) or a higher level Math course, or 95% or higher in Academic Geometry (3102).**

**2. Approval by current Science teacher.**

**For grades 11 and 12 –**

**1. 85% or higher in Honors Biology (4609) or 95% or higher in Academic Biology (4510) and 85% or higher in Academic Introduction to Physics, and Chemistry (Formerly Academic Physical Science (4509)).**

**2. 80% or higher in Honors Geometry (3201) or a higher level Math course, or 95% or higher in Academic Geometry (3102)**

**3. Approval by current Science teacher.**

### **APPLIED SCIENCE 1**

*Full Year/Full Time  
Grades 11, 12 Phase I*

This course is a part of a two-year course sequence in which the student will study the four major branches of science. Basic concepts

**No. 4001**

**Credit .5**

of general science as it applies to every day living are offered. This course will focus the use of the scientific method to investigate elements of biology, the human body, elements of physics, motion and Newton's laws, and space science. This course is designed with the intent to have the student learn about a topic in science and then apply it to an every day situation. The topics for Applied Science 1 will always be different from the topics in Applied Science 2 so that the student can earn two credits of science if desired (or need for graduation) at the Senior High.

**Criteria for Selection – Approval by School Counselor or previous Science Teacher is required.**

### **APPLIED SCIENCE 2**

*Full Year/Full Time  
Grades 11, 12 Phase I*

This course is part of a two-year course sequence in which the student will study the four major branches of science. Basic concepts of general science as it applies to every day living are offered. This course will focus on the use of the scientific method to investigate elements of chemistry, physical and chemical changes, changes in the state of matter, elements of physics, waves, sound, light, optics and electricity. This course is designed with the intent to have the student learn about a topic in science and then apply it to an every day situation. The topics for Applied Science 1 will always be different from the topics in Applied Science 2 so that the student can earn two credits of science if desired (or needed for graduation) at the Senior High.

**Criteria for Selection – Approval by School Counselor or previous Science Teacher is required.**

### **ENVIRONMENTAL SCIENCE**

*Full Year/Full Time  
Grades 11, 12 Phases II, III  
NCAA*

The goal of this course is to provide students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world. Students will be required to gather and analyze information from many different disciplines. This course is a scientific study of the natural world and how it is influenced by people. Major topics include: ecology, human population, Earth's resources, pollution, energy, biodiversity and global change. Scientific inquiry is integrated throughout the course.

**Criteria for Selection –**  
**Successful completion of a Physical Science course (4409 or 4509) and a Biology course (4410 or 4510).**

### **HONORS ENVIRONMENTAL SCIENCE**

*Full Year/Full Time  
Grades 11, 12 Phases III, IV  
NCAA*

This course is a study of interrelationships that equips students with the necessary information to understand the complexity of environmental concerns, problems, and alternative courses of action. Interactions between human populations and their environment, as well as basic ecological principles, environmental policy, ethics, resource use, and conservation, are addressed. We will study environmental problems both natural and human-made; to evaluate the relative risks associated with these problems, and examine alternative solutions for resolving and/or preventing those problems. This course concludes with sustainability on the personal, local, and global levels. Lab activities and case studies will play a major role in the course. Principles of scientific inquiry are integrated throughout the course. Students should have developed skills in reading, writing, biology, chemistry, and math to support their work.

**No. 4411**

**Credit 1.0**

**No. 4414**

**Credit 1.0**

**No. 4451**

**Credit 1.0**

**No. 4115**

**Honors Wt.  
Credit 1.0**

# Course Descriptions

## Science

### Criteria for Selection -

1. Successful completion of a Physical Science course (4409 or 4509) and a Biology course (4410 or 4510) with an 80% average or above.
2. It is recommended, but not necessary, that the student be enrolled in, or have completed a Chemistry course.

### **EARTH SCIENCE AND ASTRONOMY**

**No. 4461**

*Full Year/Full Time  
Grades 11, 12 Phases II, III  
NCAA*

**Credit 1.0**

This course emphasizes historical contributions in the development of scientific thought about the earth and space. In this course we will explore our universe starting on earth with the celestial sphere, seasons, models of the universe, and the governing laws; then space explorations and colonization; an overview of the solar system; and finally on to the stars, including their features and evolution. Laboratory experiments, worksheets, field work, projects, Starry Night Computer Simulation, videos, and class discussion will enhance the student's understanding and appreciation of our precious planet and our amazing universe!

### Criteria for Selection -

1. Successful completion of some level of Algebra 1 (3301, 3101).

### **HONORS EARTH SCIENCE AND ASTRONOMY**

**No. 4462**

*Full Year/Full Time  
Grades 11, 12 Phases III, IV  
NCAA*

**Honors Wt.  
Credit 1.0**

Astronomy is the science that deals with the study of the heavens and the realms extending from the Earth's atmosphere to the distant reaches of the universe. In this course, students have the opportunity to apply laws and principles learned in the core sciences to understand how Earth's systems and the cosmos operate. Among the fascinating aspects of our universe that will be studied are stars and constellations; the solar system; space exploration; and colonization. This course is designed to provide students with a broad enough background in astronomy that they will be able to follow current developments years after. The analysis and calculations of some topics is more in-depth than in the regular Earth Science and Astronomy course (4461). Strong Algebra skills are recommended. Laboratory experiments, worksheets, field work, projects, Starry Night Computer Simulation, videos, and class discussion will enhance the student's understanding and appreciation of our precious planet and our amazing universe!

### Criteria for Selection -

1. Successful completion of some level of Algebra 1 (3301, 3101).
2. Although not required, current enrollment in or completion of any level of Chemistry or Physics is suggested.
3. This course CANNOT be taken in conjunction with Earth Science and Astronomy (4461).

### **ACADEMIC CHEMISTRY**

**No. 4911**

*Full Year/Full Time  
Grades 11, 12, Phase III  
NCAA*

**Credit 1.5**

Academic Chemistry is a college preparatory course that explores the fundamental principles of chemistry through classroom lecture, laboratory experimentation, and discussion. Solving various mathematical problems related to chemical concepts is an integral part of the course. Academic Chemistry meets seven/eight periods per week.

### Criteria for Selection -

1. 80% or higher in Academic Algebra 1 (3101), 90% or higher in Essentials of Algebra I Part 2 (3301) or 75% or higher in a higher level math course.
2. 80% or higher in Academic Introduction to Physics and Chemistry or 90% or higher in Introduction to Physics and Chemistry.
3. Approval by current Science teacher.
4. Approval by current Mathematics teacher.

### **HONORS ORGANIC CHEMISTRY**

**No. 4811**

*Full Year/Full Time  
Grades 11, 12, Phases III, IV  
NCAA*

**Honors Wt.  
Credit 1.0**

This is a demanding lecture-oriented course that deals with the chemistry of carbon compounds, their structure, nomenclature, reaction mechanisms, and syntheses. It is roughly equivalent to one and a half semesters of college-level organic chemistry. Students who intend to pursue a career in chemistry, medicine, pharmacy, biology, nursing, or veterinary medicine will find this course extremely beneficial.

### Criteria for Selection -

1. 80% or higher in Honors Chemistry (4610) or 90% or higher in Academic Chemistry (4911).
2. Successful completion of Academic Algebra 2 (3103) or Honors Algebra 2 (3202) or higher level Mathematics course.
3. Approval by teacher.

### **AP CHEMISTRY**

**No. 4012**

*Full Year /Full Time  
Grades 11, 12 Phase IV  
NCAA*

**AP Wt.  
Credit 1.5**

This course is designed to meet the demands of the AP Chemistry syllabus as published by the College Board. The topics covered in detail include, but are not limited to, atomic theory and structure, chemical bonding and geometry, classes of chemical reactions, stoichiometry, equilibrium (acid/base, solubility, and complexation), kinetics, thermodynamics, states of matter (solids, liquids, and gases), and buffers. The large number of objectives for the course and the highly analytical nature make it demanding. The course is the equivalent of two semesters of chemistry at the college-level. With success in the class, the student has the opportunity to earn college credit by taking the AP Chemistry exam at the end of the year. As with any AP class, the experience of having a college-level science class in high school will be invaluable, developing time-management and organization skills. AP Chemistry can be taken as either a junior or senior, but taking it as a junior will prepare the student for other advanced science courses as a senior.

### Criteria for Selection -

1. 80% or higher in Honors Chemistry (4610) or 90% or higher in Academic Chemistry (4911).
2. Successful completion of or Academic Algebra 2 (3103) or Honors Algebra 2 (3202) or higher level Math course.
3. Approval by teacher.

# Course Descriptions

## Science

### HONORS METEOROLOGY

*Full Year/Full Time*  
*Grades 11, 12 Phases III, IV*  
*NCAA*

Students who take this course investigate the structure of severe storm systems including super cell thunderstorms, hurricanes, and blizzards. They also explore and discuss ways to handle the dangers associated with them. Additionally, they become proficient in knowledge regarding weather basics including the layers of the atmosphere, energy exchanges, formation of clouds, types of precipitation, weather instruments, atmospheric optics, and forecasting techniques. Current topics such as climate change, global warming, the thinning of the ozone layer, and alternative energy sources will also be studied. This course is conceptually based, and uses only minimal mathematical skills.

**Criteria for Selection –**

**Current enrollment in, or completion of, Academic Physics (4412), or Honors Physics (4512), or AP Physics C (4092), or AP Physics 1 (4062), or AP Physics 1 & 2 (4082).**

### ACADEMIC PHYSICS

*Full Year/Full Time*  
*Grades 11, 12, Phase III*  
*NCAA*

This course is intended for college-bound students who are interested in a non-science career. Students will study the following topics: classical mechanics, waves, sound, optics, electrostatics, and magnetism. Although this class stresses concepts over computations, a basic knowledge of algebra, geometry, and trigonometry is required.

**Criteria for Selection –**

1. **Successful completion of Academic Chemistry (4911) or Honors Chemistry (4610) or teacher approval.**
2. **Successful completion of some level of Algebra 1 (3301, 3101) or higher level Math course or teacher approval.**

### HONORS PHYSICS

*Full Year/Full Time*  
*Grades 11, 12 Phases III, IV*  
*NCAA*

This course stresses the mathematical and conceptual development of the following topics: mechanics, electricity, waves, sound, and optics. Mathematical problem-solving, including algebraic manipulation, systems of equations, trigonometric functions, logarithms, and graphical analysis are used extensively. Laboratory exercises are included to enhance the development of concepts and data analysis techniques. Honors physics is designed for the college-bound student and for the student preparing for the Advanced Placement 1&2 and C level courses. This course meets 7½ periods each week.

**Criteria for Selection –**

1. **Successful completion of Honors Chemistry (4610) or 90% or higher in Academic Chemistry.**
2. **Successful completion of Academic Algebra 2 (3103) or Honors Algebra 2 (3202) or higher level Math course.**

### No. 4111

*Honors Wt.*  
*Credit 1.0*

### AP PHYSICS 1&2

*Full Year/Full Time*  
*Grades 11, 12 Phase IV*  
*NCAA*

This course is designed to meet the demands of both the AP Physics 1 & 2 syllabi as published by the College Board. The topics covered include Classical Mechanics, Thermodynamics, Fluid Dynamics, Electricity and Magnetism, Light and Sound, and Topics in Modern Physics. The large number of objectives for the course and the highly analytical nature of the problem-solving make it very demanding. This course is equivalent to a two-semester terminal physics course at the college-level. Please note that there are two separate AP exams associated with this course: one for AP Physics 1 and a second for AP Physics 2. A student can earn college credit by taking the AP Physics exams at the end of the year. This of course depends upon how well the student does on the exam and the college and major in which the student enrolls. Please contact the specific college or university for more information.

Mathematics, including trigonometry, geometry, and algebra will be used extensively in this course to solve problems and develop relationships between physical quantities. Although it is beneficial to have had Honors Physics or Academic of Physics prior to AP Physics 1 & 2, it is not required. This course meets 7½ periods each week and is not available for students who have already completed AP Physics 1.

**Criteria for Selection –**

1. **80% or higher in Honors Algebra 2 (3202); or higher level Math course; or 95% or higher in Academic Algebra 2 (3103).**
2. **80% or higher in Honors Chemistry (4610) or 90% or higher in Academic Chemistry (4911).**
3. **Approval by prior year's Science Teacher.**

### AP PHYSICS 1

*Full Year/Full Time*  
*Grades 11, 12 Phase IV*  
*NCAA*

This course is designed to meet the demands of the AP Physics 1 syllabus as published by the College Board. The topics covered include Classical Mechanics, Waves and Sound, and an introduction to Electric Circuits. This course is equivalent to a one-semester terminal physics course at the college-level. The course is valuable to the student in two ways. The experience of having taken a college-level science class in high school will be a tremendous help when the student is in college. Secondly, the student can earn college credit by taking the AP Physics 1 exam at the end of the year. This of course depends upon how well the student does on the exam and the college and major in which the student enrolls. Please contact the specific college or university for more information. Mathematics, including trigonometry, geometry, and algebra will be used extensively in this course to solve problems and develop relationships between physical quantities. Although it is beneficial to have had Honors Physics or Academic of Physics prior to AP Physics 1, it is not required. This course meets five periods each week.

**Criteria for Selection –**

1. **80% or higher in Honors Algebra 2 (3202); or higher level Math course; or 90% or higher in Academic Algebra 2 (3103).**
2. **80% or higher in Honors Chemistry (4610) or 90% or higher in Academic Chemistry (4911).**
3. **Approval by prior year's Science Teacher.**

### No. 4082

*AP Wt.*  
*Credit 1.5*

### No. 4062

*AP Wt.*  
*Credit 1.0*

# Course Descriptions

## Science

### AP Physics 2

*Full Year/ Full Time*  
*Grade 12 Phase IV*  
*NCAA*

This course is designed to meet the demands of the AP Physics 2 syllabus as published by the College Board. The first unit of Physics 2 builds on the last unit of Physics 1 exploring electrostatic phenomena in more detail, then using this information to analyze electric circuits in greater depth. It is very important that students have a firm grasp of the basic concepts of physics, as only some of the material is reviewed. Topics for this course include Electric Field and Circuit Analysis, Magnetism, Fluid Dynamics and Thermodynamics, Geometric & Physical Optics, Modern Topics, and Atomic & Nuclear Physics. The student may earn college credit by taking the AP Physics 2 exam at the end of the year.

**Criteria for Selection -**

1. **80% or higher in Honors Physics (4512) or AP Physics 1 (4062).**
2. **Approval by prior year's Science Teacher.**

### AP Physics C

*Full Year/Full Time*  
*Grade 12, Phase IV*  
*NCAA*

This course is designed to meet the objectives of the AP Physics C syllabus as published by the College Board. Students will be prepared to take both the Mechanics and Electricity/Magnetism AP Physics C exams. Mechanics is that part of physics dealing with motion and energy and the way objects behave when acted on by forces. The electricity and magnetism section of the course starts with electrostatics and the use of Gauss's Law to determine electric fields, moves through electrodynamics, and finishes with a complete description of electromagnetic induction (including LRC circuits). Completing both sections of the course can be quite demanding. High-level mathematics, including calculus, is used to model relationships among physical quantities and to solve problems.

This course will provide an outstanding preparation base for rigorous college science majors such as engineering, computer science, astrophysics, and pure sciences such as physics or chemistry. Please note that each college or university has its own policy about granting credit based on AP exam scores. Each student should investigate the requirements of the college program in which he or she is interested. Regardless of whether or not the student takes the AP exams (most do), the experience of taking this academically demanding, yet highly interesting class, is valuable as a stepping stone to higher levels of accomplishment at the university level.

**Criteria for Selection -**

1. **80% or higher in AP Chemistry (4012) or Honors Chemistry (4610).**
2. **80% or higher in Honors Physics (4412) or AP Physics 1&2 (4082) or AP Physics 1 (4062).**
3. **Co-requisite: AP Calculus (3012 or 3022) or Honors Calculus (3422).**
4. **Approval by prior year's Science Teacher.**

### No. 4072

*AP Wt.*  
*Credit 1.0*

### ACADEMIC ANATOMY & PHYSIOLOGY

*Full Year/Full Time*  
*Grades 11, 12 Phase III*  
*NCAA*

### No. 4711

*Credit 1.0*

Academic Anatomy & Physiology is intended for students who are interested in the structure, function, and disorders pertaining to the human body. This course will place emphasis on the body systems, their interactions, and genetics as well as disorders affecting those systems. A considerable amount of time will be devoted to lab work (modeling, simulations, and dissection), lectures, cooperative group learning, hands-on activities, and demonstrations. This course is recommended for any student interested in furthering the understanding of the human body.

**Criteria for Selection -**

1. **Successful completion of some level of Biology (4410, 4510, or 4609).**
2. **This course CANNOT be taken concurrently with (or after) Honors Anatomy and Physiology (4721).**

### HONORS ANATOMY & PHYSIOLOGY

*Full Year/Full Time*  
*Grades 11, 12 Phase III, IV*  
*NCAA*

### No. 4721

*Honors Wt.*  
*Credit 1.0*

This course is intended for college-bound students who are interested in the structure and function of the human body. Considerable time is devoted to lecture, clinical, practical, and laboratory applications. Students will explore areas such as an Introduction to the Human Organism, the Skeletal System, Articulations, the Muscular System, the Nervous System, and the Cardiovascular System. Dissection, anatomy lab, and cadaver lab field trips are also provided in the course. Honors Anatomy and Physiology is recommended for any college-bound student, especially those interested in a medical or science related field.

**Criteria for Selection -**

1. **Successful completion of Honors Biology (4609) or 80% or higher in Academic Biology (4510), or 90% or higher in Academic Anatomy & Physiology (4711).**
2. **Successful completion of Academic Chemistry (4911) with an 80% or higher, or Honors Chemistry (4610) with a 75% or higher.**
3. **This course cannot be taken concurrently with Academic Anatomy & Physiology (4711).**

### AP BIOLOGY

*Full Year/Full Time*  
*Grades 11, 12 Phase IV*  
*NCAA*

### No. 4011

*AP Wt.*  
*Credit 1.5*

The AP Biology course is designed to be the equivalent of a college introductory biology course usually taken by biology majors during their first year of college. Textbooks and laboratory sessions are designed to cover the range and depths of college-level biology and will provide students with the conceptual framework, factual knowledge, and analytical skills necessary to deal critically with the rapidly changing science of biology.

**Criteria for Selection -**

1. **Successful completion of Honors Biology (4609) or 80% or higher in Academic Biology (4510).**
2. **Successful completion of Honors Chemistry (4610) with a 75% or higher, or successful completion of Honors Anatomy and Physiology (4721) with an 80% or higher.**