SCIENCE

ACADEMIC PLACEMENT

Course prerequisites are guidelines set for the purpose of placing students in the academic course, with the appropriate level of academic rigor. Please refer to pages 6 & 7 for school guidelines on academic placement. For appropriate recommendation, it is advised that students and parents consult with their current academic teacher and their assigned school counselor.

EARTH/SPACE SCIENCE

Credit Value: 1.0

(#3000)

Periods Per Week:	**5**	**Semester:**	**Full Year**
Prerequisites:	**None**	**Open to Grade:**	**9**

The Earth/Space Science course is a one-year activity-oriented program. It is comprised of four basic units: astronomy, geology, meteorology, and oceanography. These units are related to each other by emphasizing similar themes throughout the course. These themes include the production and transfer of energy, the structure and changes of earth materials, plate tectonics and its relationship to changes in the crust of the earth, the record of the earth's past, the earth's atmosphere and oceans, and the composition and structure of space. All students will demonstrate knowledge of key concepts in Earth Science and how these concepts relate to their everyday lives.

A.P. BIOLOGY

Credit Value: 1.5

(College in High School - University of Pittsburgh)

(#3010)

Periods Per Week:	**7**	**Semester:**	**Full Year**
Prerequisites:	**A.P. Criteria**	**Open to Grade:**	**11, 12**

The AP Biology course offers students the opportunity to take the equivalent of two semesters of an introductory college-level biology course following the AP Biology syllabus as published by the College Board. Students cultivate their understanding of biology through inquiry-based investigations as they explore-many topics such as biochemistry, cellular processes, genetics, gene expression, natural selection, and ecology. A large portion of the instructional time will be spent in hands-on laboratory work with opportunities to increase critical thinking skills and enhance problem solving abilities. The large number of objectives and fast pace of the course will prepare students for any future biology courses taken at higher educational institutions.

Students who enroll in this course have the option of taking the Advanced Placement Biology examination given in May of each year or Pitt CHS credit. The CHS curriculum correlates closely to the AP curriculum. The grade for CHS credit is determined by the student's performance on two exams, a comprehensive final, and a high school classwork grade. Students must also perform one laboratory exercise on the University of Pittsburgh campus.

College/University:	University of Pittsburgh (May be accepted at other universities/colleges)
Course Equivalent/Credits:	Preparation for Biology (BIOSC 0100) / 3 credits
Cost:	$75 per credit/$225 per course (2023-24)
Registration Deadline:	See Teacher
Summer Assignment:	Yes

A.P. Test Date:	May 2025
Test Cost:	$98 (2024)
Registration Deadline:	See Teacher
Summer Assignment:	Yes

HONORS BIOLOGY

Credit Value: 1.5

(#3015)

Periods Per Week:	**7**	**Semester:**	**Full Year**
Prerequisites:	**89% or above in Science 8 and 70% or above in Algebra 1 for freshmen; 89% or above in Earth Space Science**	**Open to Grade:**	**9, 10**

Honors Biology is a course for the student who wishes to pursue a challenging and rigorous level of study in biology. This course is appropriate for students planning for a career in a science field. There is a higher degree of student responsibility to achieve the goals and demands of the course. Proficiency and depth of understanding will be emphasized. Students will be expected to work independently and cooperatively in a lab and develop essential lab skills. Lab activities will complement each component of the core curriculum. Six major units of study comprise the core contents of this course: nature of life, biochemistry, cells, genetics, evolution and ecology.

BIOLOGY

Credit Value: 1.5

(#3020)

Periods Per Week:	**7**	**Semester:**	**Full Year**
Prerequisites:	**70% or above in Earth/Space Science**	**Open to Grade:**	**10**

Biology is an introductory biology course for high school students. The curriculum focuses on six major units: introduction to biology, biochemistry, cell structure and function, genetics, evolution, and ecology. Laboratory investigations, projects, discussions, and web-based activities are strategies used to develop these concepts. This introductory course is appropriate for students intending to earn a college degree for non-science related fields or going directly into the workforce.

CONCEPTUAL BIOLOGY

Credit Value: 1.0

(#3025)

Periods Per Week:	**5**	**Semester:**	**Full Year**
Prerequisites:	**60% or above in Earth/Space Science**	**Open to Grades:**	**10**

Conceptual Biology is an introductory biology course for high school students. The curriculum focuses on six major units: introduction to biology, biochemistry, cell structure and function, genetics, evolution and ecology. Laboratory investigation, projects, discussions and web-based activities are strategies used to develop these concepts. This is a single period biology course that focuses on the core concepts listed. This course is designed for students who are planning to attend college for non-science related fields or going directly into the workforce.

COMPARATIVE LIFE SCIENCE

Credit Value: 1.0

(#3030)

Periods Per Week:	**5**	**Semester:**	**Full Year**
Prerequisites:	**60% or above in Biology or Science 9-10**	**Open to Grades:**	**11, 12**

The Comparative Life Science course is designed increase student understanding of the anatomy, physiology, ecology, and evolution of diverse organisms. Throughout this course, students will study viruses, prokaryotes, protists, fungi, invertebrates (including sponges, cnidarians, worms, mollusks, arthropods, and echinoderms), and vertebrates (including fish, amphibians, reptiles, birds, and mammals). Students will engage in a wide variety of activities of activities including preserved animal dissections, lab investigations, research projects, and textbook materials.

A.P. CHEMISTRY

Credit Value: 1.5

(College in High School - University of Pittsburgh)
(#3035)

Periods Per Week:	**7**	**Semester:**	**Full Year**
Prerequisites:	**A.P. Criteria***	**Open to Grade:**	**11, 12**

This course is designed to meet the demands of the AP Chemistry syllabus as published by the College Board. In-depth topics include, but are not limited to, atomic theory and structure, chemical bonding and geometry, chemical reactions, stoichiometry, chemical equilibrium, kinetics, thermodynamics, acid-base chemistry and electrochemistry. The large number of objectives and fast pace of this course make it demanding. This course is the equivalent of two semesters of chemistry at the college-level. Meaningful laboratory work is critical to the successful development of topics covered in this course; therefore, students will be expected to spend considerable time exploring concepts in the laboratory. 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.

The grade for CHS credit is determined largely by the student's performance on three exams, laboratory exercises and a comprehensive final, but includes a high school component, which may include homework and quizzes. **Students choosing to take this course for CHS credit must participate in laboratory exercises which are conducted on the University of Pittsburgh campus.**

Students who enroll in this course may take the Advanced Placement Chemistry examination given in May of each school year. Based on the results of this examination, students may qualify for college credit and/or advanced college standing.

College/University:	University of Pittsburgh (May be accepted at other universities/colleges)
Course Equivalent/Credits:	General Chemistry 1 (CHEM 0110) / 4 credits
Cost:	$75 per credit/$300 per course (2023-24) plus an additional $48 lab fee
Registration Deadline:	See Teacher
Summer Assignment:	Yes

A.P. Test Date:	May 2025
Test Cost:	$98 (2024)
Registration Deadline:	See Teacher
Summer Assignment:	Yes

*Students must have successfully completed Chemistry and Algebra 2 to be eligible for the AP exam.

HONORS CHEMISTRY

Credit Value: 1.5

(#3040)

Periods Per Week:	**7**	**Semester:**	**Full Year**
Prerequisites:	**Completion of /or concurrent enrollment in Geometry 89% or above in Biology or 80% or above in Honors Biology**	**Open to Grades:**	**10, 11, 12**

In Honors Chemistry students will continue with the inquiry approach as they have learned in previous science courses. Laboratory experiments are an integral part of the course and will be utilized to reinforce concepts and develop critical thinking skills. Included in the course are a detailed study of matter and its properties and changes, the atom, inorganic nomenclature, chemical equations and reactions, the concept of the mole, stoichiometry, solutions gases, the periodic table, and molecular structure. Good mathematical skills are essential. Interwoven throughout the course are the mathematical applications of chemistry with the use of calculators, computers, and laboratory interfacing equipment for the development of problem-solving skills. Students need strong algebraic skills to be successful in the course.

CHEMISTRY

Credit Value: 1.5

(#3045)

Periods Per Week:	**7**	**Semester:**	**Full Year**
Prerequisites:	**Completion of/or concurrent enrollment in Geometry; 70% or above in any Biology**	**Open to Grades:**	**10, 11, 12**

Chemistry is one of the basic science courses that is fundamental in preparing a strong background for a student going on to some form of higher education. The student will integrate conceptual understandings, algebra skills and an ongoing laboratory experience to develop the fundamentals of problem solving, laboratory work, and the practical application of Chemistry. Chemistry emphasizes process skills to address areas of study, which include measurement, atomic structure, chemical bonding, states of matter, stoichiometry, thermochemistry, and gas laws. This course is for those students seriously considering a 4-year college and expecting the rigor of a lab science.

HONORS ORGANIC CHEMISTRY

Credit Value: 1

(#3055)

Periods Per Week:	**5**	**Semester:**	**Full Year**
Prerequisite:	**80% or above in Honors Chemistry**	**Open to Grades:**	**11, 12**

Honors Organic Chemistry is an advanced science course intended for students who are interested in pursuing a career in medicine, pharmacy, or chemistry/biochemistry, or who are simply interested in further exploring another area of chemistry. In Honors Organic Chemistry, students will learn to recognize the formulas of important functional groups, classify compounds into organic families, and apply the organic system of nomenclature (IUPAC System) to name organic compounds. Additionally, students will develop an understanding of the physical and chemical properties of organic compounds and write equations and mechanisms for their preparations. Other topics covered in the course include resonance hybrids, structural isomers, cyclohexane conformations, electron pushing and chirality and stereoisomerism. The course content will be presented primarily through lectures and some lab experiments. Students will also gain experience in constructing molecular models to further enhance the course content.

CONCEPTUAL CHEMISTRY

Credit Value: 1.0

(#3050)

Periods Per Week:	**5**	**Semester:**	**Full Year**
Prerequisites:	**70% or above in Algebra 1 or Essentials of Algebra 1**	**Open to Grades:**	**11, 12**

Conceptual Chemistry focuses on the basics of chemistry and will study much of the same big ideas and key content that is covered in Chemistry but will emphasize a lower degree of mathematical involvement and mathematical rigor. Topics covered include: the metric system of measurement, using the factor-label method for converting metric units, physical and chemical properties and changes of matter, classification of matter, atomic theory and structure, organization and use of the periodic table, chemical bonding, molecular shapes, and balancing simple chemical equations. Additionally, students will engage in group work and laboratory activities to help obtain a better understanding of the principles of chemistry that are in action all around us every day.

This course is closed to students who have successfully completed previous chemistry course work.

A.P. PHYSICS C

Credit Value: 1.5

(College in High School – University of Pittsburgh)

(#3070)

Periods Per Week:	**7**	**Semester:**	**Full Year**
Prerequisites:	**A.P. Criteria & concurrent/prior enrollment in Calculus**	**Open to Grade:**	**12**

Advanced Placement Physics C – Mechanics is designed to provide a strong foundation in mechanics for students with aspirations in the sciences at the college or university level. This course includes topics in both classical mechanics, specifically: Kinematics, Newton's laws of motion; Work energy, and power, systems of particles, linear momentum; Circular kinematics and dynamics; mechanical waves, kinetic theory and Oscillations and gravitation. Additional topics related to Electromagnetism are covered as time permits but there is a focus on preparation for the AP Physic C Mechanics exam.

Students who enroll in this course have the option of taking the Advanced Placement Physics examination given in May of each year or Pitt CHS credit. Based on the results of the examination, students may qualify for college credit and/or advanced college standing. Each test is usually transferred as four college credits in a Calculus based physics course.

College/University:	University of Pittsburgh (May be accepted at other universities/colleges)
Course Equivalent/Credits:	PHYS 0174: Basic Physics for Science and Engineering / 4 credits
Cost:	$75 per credit/$300 per course (2023-24)
Registration Deadline:	See Teacher
Summer Assignment:	Yes

A.P. Test Date:	May 2025
Test Cost:	$98 (2024) each test*
Registration Deadline:	See Teacher
Summer Assignment:	Yes

(*Two separate tests – Physics C: Mechanics and Physics C: Electricity and Magnetism, extra work outside of class would be required for students wishing to attempt the Electricity and Magnetism)

HONORS PHYSICS

Credit Value: 1.5

(#3075)

Periods Per Week:	**7**	**Semester:**	**Full Year**
Prerequisites:	**Concurrent enrollment in/or successful completion of Precalculus**	**Open to Grades:**	**11, 12**

Honors Physics is an academic course for those who want to know how the world works and plan to attend university. Practical considerations of motion, energy, momentum, electricity, and optics are a few of the topics addressed in this course. Students in Honors Physics will learn basic physical laws through a series of demonstrations and discovery experiments with accompanying discussions. There will be a strong emphasis on problem solving techniques and critical writing. The use of computer technology for experiments and for access to class materials is an integral part of this class.

PHYSICS

Credit Value: 1.5

(#3080)

Periods Per Week:	**7**	**Semester:**	**Full Year**
Prerequisites:	**Concurrent enrollment in/or successful completion of Algebra 2**	**Open to Grade:**	**11, 12**

Physics is a course designed for students to experience science through demonstrations and discovery experimentation. Motion, force, light, and electricity are just a few of the many topics presented in this course. They will also study various problem-solving techniques which will assist any student who plans on any type of post-secondary education. Physics is recommended for the student going on to some form of higher education.

CONCEPTUAL PHYSICS

Credit Value: 1.0

(#3085)

Periods Per Week:	**5**	**Semester:**	**Full Year**
Prerequisites:	**None**	**Open to Grades:**	**11, 12**

The Conceptual Physics course is designed to explore the numerous phenomena concerning the world around us as it relates to matter and energy. Motion, forces, electricity, and heat will be investigated through conceptual explanations. Mathematical skills will not be emphasized but will assist in concept construction and evaluation. Students will increase their ability to think logically and improve their mathematical reasoning through the use of quantitative labs and word problems. Students are encouraged to ask questions as to how or why a physical concept works in the real world. The course also includes lab summaries, performance-based assessments, labs, and discussions. Students will be responsible for their success by becoming an active listener, staying organized, and using additional resources such as the instructor's webpage to increase their understanding.

SCIENCE ELECTIVES

*These courses are electives and may not be used to fulfill the third year of science required for grades 9–12.

HONORS ANATOMY & PHYSIOLOGY

Credit Value: 1.5

(College in High School - Carlow)
(#3100)

Periods Per Week:	**7**	**Semester:**	**Full Year**
Prerequisites:	**80% or above in Honors Chemistry or 89% or above in Chemistry <u>and</u> Proficiency on the Keystone Biology Exam**	**Open to Grades:**	**12**

Honors Anatomy & Physiology is an intensive two-course sequence designed for a student preparing for a career in the medical/allied health professions. This comprehensive year-long college course covers the anatomical structure of the major organ systems of the body (Integumentary, Skeletal, Muscular, Nervous, Endocrine, Cardiovascular, Respiratory, Digestive, Urinary, and Reproductive) and the physiological and homeostatic mechanisms that are associated with their functions. Scheduled lab activities include comprehensive, comparative rat, mink and animal organ (eye, heart and brain) dissections. In addition to regularly scheduled class time, students will participate in lab activities at the Palumbo Science Center on the Carlow College campus.

Students have the opportunity to take this course as a **College in High School** course and receive university/college credit upon successful completion of the course requirements.

College/University:	Carlow College (May be accepted at other universities/colleges)
Course Equivalent/Credits:	BIO 201/BIO 202: Human Anatomy & Physiology I & II/4 credits per sem.
Cost:	$300 per semester (2023-24)
Registration Deadline:	See Teacher
Summary Assignment:	Yes

ANATOMY & PHYSIOLOGY

Credit Value: 1.0

(#3110)

Periods Per Week:	**5**	**Semester:**	**Full year**
Prerequisites:	**70% or above in Chemistry or 80% or above in Conceptual Chemistry**	**Open to Grades:**	**12**

Anatomy & Physiology is a yearlong course designed for students that are interested in learning about the structure and function of the human body. This course is also intended for students who are preparing for a career in a health profession such as nursing or physical therapy. The course focuses on some of the major organ systems of the body (Integument, Skeletal, Muscular, Nervous, Cardiovascular, and Digestive) as well as the physiological and homeostatic mechanisms that are associated with their functions. Scheduled lab activities include comparative dissections of model animals and animal organs.

FORENSIC SCIENCE

Credit Value: .5

(#3105)

Periods Per Week:	**5**	**Semester:**	**Either**
Prerequisites:	**Completed or concurrent enrollment in Chemistry or Conceptual Chemistry**	**Open to Grades:**	**11, 12**

Forensic Science is a one semester elective course that incorporates the application of biology and chemistry into criminal investigation. Through lectures and laboratory experiments, students will learn the skills used by forensic scientists for solving crimes. The course is primarily designed as a laboratory-oriented course that focuses on the development of logical thinking skills and problem-solving procedures through the collection and analysis of data. Some of the topics to be included are specimen collections, glass and soil analysis, analyses of DNA, fingerprints, hair & fibers, documents, simulated blood splatter, simulated drugs and poisons, and murder mystery scenarios.

NUCLEAR ASTRONOMY

Credit Value: .5

(#3095)

Periods Per Week:	**5**	**Semester:**	**Either**
Prerequisites:	**Completion of/or concurrent enrollment in Chemistry**	**Open to Grades:**	**11, 12**

This course combines the related studies of Nuclear Science and Astronomy. All the elements in the periodic table were created by nuclear fusion in stars. We will study the life cycle of these stars, the planets that orbit them, and the history of the innumerable galaxies in our universe.

Some of the elements created in those stars are unstable and give us radioactivity here on Earth. We will study those radioactive isotopes and how they might cause cancer, treat cancer, power space craft, give us electricity, or be used in nuclear weapons.

SUSTAINABILITY

Credit Value: 1.0

(College in High School - University of Pittsburgh)

(#3115)

Periods Per Week:	**5**	**Semester:**	**Full Year**
Prerequisites:	**Advanced/Proficient on the Biology Keystone Exam or successful completion of AP, CHS, or Honors-level Science course**	**Open to Grades:**	**10,11, 12**

Sustainability is a class for students interested in protecting our environment through personal action and becoming involved in community projects to combat climate change and promote climate justice. Sustainability is a college-level elective class offered in conjunction with the University of Pittsburgh college in high school program. Sustainability involves examining energy and resource use in our own lives so that we can begin to understand the complex web of production, distribution, and consequences of human society today. Sustainability will require that students conduct a series of experiments for various environmental issues. Students will document their experiments and write a reaction paper articulating their thoughts. Onsite and offsite field trips will be conducted to enhance class discussions and student experiments. Students will also have the opportunity to work on environmental projects in our own community.

College/University:	University of Pittsburgh
Course Equivalent/Credits:	GEOL 1330/3 credits
Cost:	$75 per credit/$225 per course (2023-24)
Registration Deadline:	See teacher
Summer Assignment:	No