

# Pittsburgh Science and Technology Academy



Course Offerings  
2021-2022

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## Art & Music

### **Art Technology Specialized Accelerated Grad**

Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Quarter

Credit: .5

In this course, students are introduced to Visual Communication through exploration of how humans effect and create the visual culture. The art that the students create will be used to acquire a working knowledge of the Adobe Creative Suite; the industry standard design software. Students will use the tools and techniques of the digital art room to delve into ideas of express through themes of: Inspiration, Reflection, Creation of Voice, and Communication.

### **Art Through Science**

Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Quarter

Credit: .5

In this course, students will be introduced to photography and digital video as well as the science and technology of digital cameras. The art the students create will be used to acquire a working knowledge of Adobe Photoshop and Premiere; the industry standard photo and video editing programs. Students will use artistic tools and personal experiences to delve into different creative genres, including abstract photography, portraiture, photo essays, as well as create short movies and documentaries.

### **Music Composition and Arranging**

Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Quarter

Credit: .5

The music composition and arranging class will study composition, arranging, scoring, and production techniques and approaches. The student will apply those skills and concepts by writing for and overseeing the production of a wide variety of instrumental, vocal, acoustic, or electronic combinations. The student will explore contemporary concepts and techniques of arranging and sound production in both the analog and digital domains and will gain valuable experience by being able to create, arrange, and produce projects. Interpersonal and other situational skills will be developed as the student works with the instructor, and other students, in a variety of creative settings as music writer, and/or producer. Students will learn to use both traditional and non-traditional music notation in their projects. We use Logic ProX for instruction. Ableton Live and FL Studio are also available for use.

### **Music Production and Engineering**

Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Quarter

Credit: .5

This course is designed to develop an appreciation of music through listening, analyzing, evaluating, and composing skills. The curriculum in Music Production and Engineering encourages students to develop

an understanding of music elements, including rhythm, melody, harmony, form, and tone color, while fully engaging students in hands-on activities. Students then showcase their knowledge and skills learned through original, creative projects. Music technology in our Mac Lab is an integral part of the course. We use Logic ProX for instruction. Ableton Live and FL Studio are also available for use.

## Business Technology

### Accounting Technology

Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Quarter

Credit: .5

This course focuses on preparing students to understand the function of money in today's technological society. Students will explore different accounting systems and financial practices that are used in the STEM field. Technology applications will be used to create and further analyze personal and corporate financial documents. It is highly recommended that any student who would like to pursue further education in the business field after high school to take this course.

### Career Tech

Level: 9<sup>th</sup>

Length: Quarter

Credit: .5

This course will focus on the use of software (MS Office), personal exploration, and college and career readiness. Students will also be introduced to the content of each SciTech STEM concentration.

### Science of Economics and Personal Finance

Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Quarter

Credit: .5

This class is a crash course in economics. Fundamentals from both AP Micro and AP Macroeconomics will be explored in the beginning of the class. Not only will students learn concepts but they will also be able to put them in to practice with this class. Topics include: Basic Economics, Microeconomics, Macroeconomics, economic models, supply and demand, taxes, trade, international trade, personal finance, investing, and the stock market. All of these topics will be looked at through the backdrop of our current president's domestic policy and economic plan for the United States.

## English/ Literature

### African-American Literature

Level: 12<sup>th</sup>

Length: Semester

Credit: 1

This course is offered to students interested in an intense study of African-American writing (poetry, novels, drama, non-fiction texts) at a college-level of rigor and pacing. Students will study African-American writers in a chronological manner in order to most effectively gain an understanding in a historical and cultural context. Essay writing will focus upon analyzing the texts in a complex and in-depth manner. \*\*This course is offered in the fall semester so that students choosing AP Literature can also take African-American Literature as an elective.

### AP English 3- Language and Composition

Level: 11<sup>th</sup>

Length: Semester

Credit: 1

This course is directly aligned with the College Board's internationally-recognized Advanced Placement English Language and Composition program which focuses on non-fiction text, writing theory, rhetoric, and the synthesis of multiple primary sources in thinking, reading and writing. AP English 3 is open to all students who are interested in pushing their boundaries and working vigorously to participate in a high-level English coursework experience. The class is designed to be in step with college-level coursework on rhetoric, text analysis, speech, and debate, offering students the opportunity to earn college credit by completing the optional AP Exam at the end of the term. The course focuses on the spoken word as it is used to persuade audiences in politics, media, art, music, and more.

### AP English 4- Literature and Composition

Level: 12<sup>th</sup>

Length: Semester

Credit: 1

This course is offered to all students interested in an intense study of literature and composition at a college-level of rigor, pacing and complexity. Students will study British and American poetry, novels, drama and short fiction in an effort to broaden their understandings of philosophy, psychology, anthropology, mythology, history and culture through the perspectives of multiple authors. Aligned with the College Board's internationally-recognized Advanced Placement English Literature and Composition course, AP English 4 affords students the opportunity to learn at an accelerated level and potentially earn college credit for their work.



**English 1**Level: 9<sup>th</sup>

Length: Year

Credit: 1

This is a required, semester course for all 9th grade students at SciTech. Students explore the overarching theme of Identity in a focused study of novels, drama, poetry and non-fiction texts. Students are expected to read and write with fluency using MLA formatting for all formally written work. This is the foundational English course designed to provide all students with an understanding of note-taking, reading and writing, research competency, and critical thinking.

**English 2**Level: 10<sup>th</sup>

Length: Semester

Credit: 1

During this course, students are invited to explore how language and literature simultaneously emerge as products and producers of society. In the process, students begin building on the solid foundation of critical thinking, research skills, and writing proficiency established in earlier years to analyze literature on a more sophisticated level. Intensive focus on the major literary genres demonstrates to students how structures of communication contribute to meaning. While deciphering and interpreting how other writers have manipulated structure, text, and images to create meaning, students acquire the insight and techniques needed to communicate effectively themselves. To that end, the intensified study of rhetorical and literary conventions parallels instructional emphasis on developing organization and focus in the students' own writing assignments. Major works studied include A Lesson Before Dying, Night, and Julius Caesar.

**University English Credit 1 (College in High School English 3)**Level: 11<sup>th</sup>

Length: Semester

Credit: 1

This college-level course is designed to introduce students to the fundamentals of research and argument construction. Focus is placed on helping students to defend an argument both verbally and in writing, with lessons designed to help learners differentiate between the differences in the two constructs. This writing-intensive course includes learning topics in the areas of argument types, constructing formal arguments, research methods, delivering arguments, refutation and cross-examination; and evaluation, criticism, and analysis of arguments in historic speeches, essays, both fiction and non-fiction books, podcasts, stories, interviews, commercials, drama, and other media. Students who elect to purchase dual-enrollment with our partner institution will be guaranteed 3 college credits (transferrable to other colleges and universities) upon successful completion of all parts of the course. The cost of this course is \$225, financial aid is available through the University of Pittsburgh.

## Graduation Project

### Executive Experience

Level: 12<sup>th</sup>

Length: minimum is Semester, maximum is Year-long

Credit: varies depending on time taken

The goal of the Executive Experience is to give students the real-world skills necessary to succeed in a postsecondary professional or academic environment. Students will be grouped into interdisciplinary project teams, and design and implement a project for a client over the course of the year. Projects may include research and design components and will list specific deliverables and outcomes, which students must meet. Students will be responsible for project design and implementation, client communication, and final deliverables, including analysis, presentation and reporting.

## Health and Physical Education

### Health

Level: 9<sup>th</sup>

Length: Quarter

Credit: .5

Produces health literate citizens through a curriculum that addresses physical, mental, emotional, and social dimension of health. The curriculum provides students with an in-depth study of: comprehensive sexuality education, first aid, mental health, diseases, body systems and nutrition.

### Personal Fitness

Level: 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>

Length: Quarter

Credit: .5

Personal Fitness is an elective for those who are interested in enhancing their fitness level. Personal Fitness is a sequentially planned, developmentally appropriate curriculum and instruction that promotes a health and active lifestyle. It helps students develop the knowledge, motor skills, self-management skills, social skills, attitudes and confidence needed to adopt and maintain physical activity throughout their lives.

Quality personal fitness programs provide opportunities for:

- Students to learn the five component of personal fitness
- Introductory to the weight room
- Skills necessary to perform a variety of physical activities
- Implications and benefits of participating regularly in physical activity
- All students to be physically active

## Mathematics

### Algebra 2

Length: Semester

Credit: 1

In this course, students build on and deepen their understanding of Algebra 1, learning mathematical habits of mind and skills in the context of more advanced topics. These topics include linear functions, quadratic functions, complex numbers, exponential functions, polynomial functions, rational functions and logarithms. Students also deepen their study of data analysis and probability.

### AP Calculus

Length: Year Long

Credit: 1 Math, 1 Elective

This year-long block math course is the standard first year AP Calculus program focused primarily on an intuitive understanding of the concepts of calculus. Students will experience the methods and applications of limits, differentiation and integration. It is intended for students who wish to pursue their study of higher level mathematics or try for advanced placement credit when they enter college. Students are prepared for and expected to take the Calculus AB Advanced Placement exam in the spring. The course carries one mathematics credit towards graduation requirements and one elective credit for the year.

### AP Statistics

Length: Semester

Credit: 1

This rigorous course is designed for students who have successfully completed Algebra 1, Algebra 2, and Geometry, and if possible Elementary Functions or Probability and Statistics. This course emphasizes technology, analyzing and interpreting data, calculating probability, and making inferences. In addition to learning how statistics is used and found in the world around you, there is an emphasis on communicating clearly and concisely. Many colleges and universities offer Advanced Placement and/or college credit to students who perform successfully on the AP Statistics Exam and students are encouraged to take the exam.

### Biostatistics

Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Quarter

Credit: .5

Students will analyze biological data such as the relationships between pollution and health, analyze a LD50 bioassay for toxic substances and will conduct research and data-analysis on the genetics of fruit flies. There are no mathematical prerequisites as the statistics the students encounter will be based on their prior knowledge. Students who haven't take a statistics course will learn descriptive statistics (mean, median, standard deviation, etc.) as well as ways of displaying data (histograms, box plots,

scatter plots, etc.). Students who have taken a statistics course will be able to use more sophisticated methods for exploring their data (hypothesis testing and confidence intervals).

### Enhanced Algebra 1

Length: Year

Credit: 1 Math, 1 Elective

The course develops and uses students' understanding of number and operation to build algebraic understanding. This course explicitly develops students' mathematical habits of mind in conjunction with algebraic content and skills. Students will also have the opportunity to deepen their understanding of algebra through a lens of social justice. The topics studied include Equations & Expressions, Data Analysis & Probability, Graphs, Linear Functions, Non-Linear Functions, Inequalities and Systems of Equations. Students will receive a 1 math credit and 1 elective credit for the year. This course has more time for enhancements such as focused activities and support on concepts of Algebra 1. Enrichment will take place in the context of individualized standards-based assignments as well as rigorous technology-based projects.

### Enhanced Geometry

Length: Year

Credit: 1 Math, 1 Elective

This course is designed to provide a deep investigation of geometry. It is a student centered course incorporating logic and Euclidean geometry while emphasizing student problem solving through the development of Geometry Habits of Mind, which are critical for advanced mathematics courses. Using Habits of Mind, this course investigates the big ideas and skills of Geometry, including mathematical reasoning and proof, plane and solid Geometry topics (including area and volume), similarity and congruence. Enrichment will take place in the context of individualized standards-based assignments and projects, which will allow students to receive extra support when needed. Students will solve real-life Geometry problems that make connections to higher-level mathematics. Students will also have the opportunity to deepen their understanding of geometry and algebra through a lens of social justice.

### Enhanced Pre-Calculus

Length: Year

Credit: 1 Math, 1 Elective

This course is the same as semester Pre-Calculus. However, this course has more time for enhancements such as focusing on application problems and reviewing algebraic concepts. Upon successful completion of this course, students will be prepared to take AP Calculus or AP Statistics.

### Financial Algebra

Length: Semester

Credit: 1

This is a course for any student who has successfully completed Algebra 1, Geometry, and Algebra II. Financial Algebra is an application-rich, algebra-based, technology-oriented program that incorporates

mathematical skills in real-world contexts. The topics studied include Finances, Income Taxes, Banking Services, Consumer Credit, Retirement, Business Management and more.

### Matrix and Linear Algebra

Length: Semester

Credit: 1

This course teaches higher level problem solving skills and techniques using special systems of algebraic notations involving matrices and determinants. It includes college level preparation in principles of systems of equations in n-dimensional space and incorporates applications in diverse fields of mathematics and science. Graphic utilities are used extensively.

### Pre-Calculus

Length: Semester

Credit: 1

This course is designed for students who have successfully completed Algebra 2 and want to prepare for College Level Mathematics. Graphing calculators are used extensively to investigate functions and their behavior. Topics include polynomial, rational, exponential, logarithms, and trigonometric functions. Additional topics are covered. Emphasis is on using concepts and skills to model situations and solve application problems.

### Quantitative Ecology

Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Quarter

Credit: .5

Students will research and conduct data-analysis for a variety of ecological, global environmental issues. Students will analyze data from SciTech's campus and investigate issues such as biodiversity, species distributions, climate change, and population growth. There are no mathematical prerequisites as the statistics the students encounter will be based on their prior knowledge. Students who haven't take a statistics course will learn descriptive statistics (mean, median, standard deviation, etc.) as well as ways of displaying data (histograms, box plots, scatter plots, etc.). Students who have taken a statistics course will be able to use more sophisticated methods for exploring their data (hypothesis testing and confidence intervals).

## Post-Secondary Preparation

Career Tech

Level: 9<sup>th</sup>

Length: Quarter

Credit: .5

This course will focus on the use of software (MS Office), personal exploration, and college and career readiness. Students will also be introduced to the content of each SciTech STEM concentration.

### Post-Secondary Prep 1

Level: 11<sup>th</sup>

Length: Quarter

Credit: .5

It is the goal of PSP1 to help prepare students for an enlightened and informed post-high school life. Student will begin to understand the pathways to desired careers through inquiry, self-reflection, and implementation. Students will be given the opportunity to explore their post-high school choices which include but are not limited to searching for colleges, understanding the process to apply for college, getting an overview financial aid and working on the college essay. Students will also have the opportunity to maintain fictitious budgets.

### Post-Secondary Prep 2

Level: 12<sup>th</sup>

Length: Semester

Credit: .5

This course is a semester-length hybrid course taught to all senior students. The goal of PSP 2 is to continue the preparation for plans after high school. Specific attention will be given to resumes, college/trade/apprentice applications, essay writing and editing. Much of the course will build on what was accomplished in Post-Secondary Prep 1 during the 11th grade year.

## Science

### **Big Ideas in Science – Biology**

Level: 9<sup>th</sup>

Length: Semester

Credit: 1

This advanced learning course is filled with challenging content and engaging activities, aligned to the Pennsylvania Keystone Biology Standards. Beginning with the cell, students will begin a journey that challenges them to wrestle with Biology's great problems, past and present. Students will be challenged to demonstrate further growth in scientific inquiry and writing through extensive inquiry based activities. Major topics covered are macromolecules, cell structures and functions, genetic studies, evolutionary processes, and ecology.

### **Big Ideas in Science –Chemistry**

Level: 9<sup>th</sup>

Length: Semester

Credit: 1

This laboratory based approach to Chemistry is absolutely unique to Science and Technology Academy. Students begin the semester with a week-long Chemistry Blitz that focuses on matter and the properties of matter. This phase of the course ensures that all students begin on equal footing and closes any lingering physical science content gaps. Students will then explore chemistry's remaining six units that include: The Atom, Electron Configurations and the Periodic Table, Bonding and Compounds, The Mole, Chemical Reactions and Gas Laws.

### **Honors Physics 1**

Level: 11<sup>th</sup>

Length: Semester

Credit: 1

Honors Physics 1 is an inquiry-based laboratory study of rectilinear and two-dimensional motion and the mathematical relationship of work, power, energy, momentum, electricity, magnetism, light, quantum, and kinetic theory.



## Science Electives

### *Electives for Computer Science*

#### **Arduino for ALL**

Level: 11th, 12th

Length: Quarter

Credit: .5

This quarter-length elective is designed for students who are not in the C&C concentration and will serve as an introductory course to robotics using Arduino. The course will incorporate essential core competencies related to safety, basic electronics, and work from the Arduino starter guide. The second half of the course will consist of multiple projects in a PBL setting. Students will be presented with a list of problems/projects to select from and the students will be expected to produce or solve a problem using an Arduino and the tools at hand. In addition to actually creating the projects, students will be expected to document and demonstrate the process through which they complete in a medium that fits their learning style.

#### **Applications of Computer Science**

Level: 11th, 12th

Length: Quarter

Credit: .5

This quarter-length elective is designed to teach students with no prior background in computer programming how to write code. The language that will be covered will be Python. After completing this course, students can expect to be able to know how to read and write code in the Python language as well as being able to write their own unique programs.

#### **Computer Programming and Game Design**

Level: 11th, 12th

Length: Quarter

Credit: .5

This quarter-length elective is designed to teach students with no prior background or interest in computer programming how to write code. The format and structure will follow that of Game Design. Game Design will move quickly and cover a broader range of topics. Topics include: Objects and classes, method structure, class structure, variables, conditional programming, object interaction, iterators, loops, arrays, and more. By the end of the course, a student will be able to write and compile their own original program that solves a problem in their life.

*Electives for Environmental Science, Biology and Chemistry***Ecology and Nature Study**

Level: 11th, 12th

Length: Quarter

Credit: .5

Students will focus on ecological principles as they apply to the Pittsburgh region. Students will incorporate art, literature, and journaling as they study the natural world around them focusing on trees and plants and animals. They will study population dynamics, environmental influences on populations, ecosystem structure, energy, biogeochemical cycles, biodiversity, and evolution.

**Environmental Science**

Level: 11th, 12th

Length: Quarter

Credit: .5

Students will be able to round out their science experience by being introduced to basic environmental science concepts, focusing on: Humans in the environment, resources, environmental concerns, environmental laws, economics, and ethics, human health and environmental toxicology, population change, addressing population issues, fossil fuels, nuclear energy, renewable energy and conservation, water, soil, minerals, biological diversity, pollution, and climate change.

**Forensics**

Level: 11th, 12th

Length: Quarter

Credit: .5

In this course students will study human anatomy and basic physiology and apply those skills to areas focused in forensic science. Students will specifically study: forensic anthropology, osteology, odontology, forensic science, laboratory analysis, field methods, and how to write reports. In addition, they will use biotechnology skills to investigate mock crime scenes. Students will also learn the large scale applications of forensic science such as: disasters, human rights, and POW/MIS recovery. This class is primarily a “hands-on” lab based class. This is an elective course.

**Genetics**

Level: 11th, 12th

Length: Quarter

Credit: .5

This course is an introduction to the basic concepts of genetics, in particular how they affect the world surrounding the students. The course is project based, with additional labs added for supplemental learning. Through this course the students will not only be able to understand the genetic terms and principles used in medical practices, but also the current research being discussed in the scientific community. Furthermore, through this course students will apply business and genetics principles to a real world application, in the form of a mock pet breeding business. This is an elective course.

**Introduction to Environmental Science**Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Quarter

Credit: .5

Students will be able to round out their science experience by being introduced to basic environmental science concepts, focusing on: Humans in the environment, resources, environmental concerns, environmental laws, economics, and ethics, human health and environmental toxicology, population change, addressing population issues, fossil fuels, nuclear energy, renewable energy and conservation, water, soil, minerals, biological diversity, pollution, and climate change.

**University of Pittsburgh Biology**Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Semester

Credit: 1 Science

The goal of this course is to provide students with a foundation in biology. This course focuses on a subset of major topics covered in Foundations of Biology I and II (BIOSCI 150, 160), including a review of chemistry as it applies to biology, the structure and function of macromolecules, the basic structure of cells, energy and cellular respiration, introduction to genetics and molecular biology, and development. While these topics are covered in high school Biology courses, Preparation for Biology delves deeper and applies chemistry concepts to achieve a more complete understanding of Biology. This, combined with practicing critical thinking skills, and primary literature and data analyses, prepares students for the rigors of the Foundations of Biology series. The cost of this course is \$225, financial aid is available through the University of Pittsburgh.

**University of Pittsburgh General Chemistry**Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Year

Credit: 1 Science, 1 Elective

This is the first half of a two-term introduction to general chemistry. Topics covered include stoichiometry, atomic and molecular structure and states of matter. Problem solving and laboratory experiences are a functional part of this course. Grades are determined by the student's performance on three exams, weekly quizzes, laboratory exercises and a comprehensive final. Five laboratory exercises, three exams and the comprehensive final will all be conducted at the University of Pittsburgh. The cost of this course is \$310, financial aid is available through the University of Pittsburgh.

*Electives for Engineering and Physics***Engineering for ALL**Level: 12<sup>th</sup>

Length: Quarter

Credit: .5

Engineering for All is a quarter length elective course aligned with the Form and Function concentration. It is intended for students that wish to learn basic skills engineers use in the field including design, analysis, and fabrication. In addition to lessons in technical drawing, students will employ the engineering design process to build a mouse trap powered car that will be used in a competition between classmates.

**Physics 2C Mechanics AP**Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Semester

Credit: 1

This course is designed around the Advanced Placement course for physics (Physics C). One-half of the semester is devoted to mechanics. Use of calculus in problem solving and in derivations is expected to steadily increase as the course progresses. The second half of the Level C course focuses on classical electricity and magnetism. This course follows the suggested AP course outline. Many colleges and universities offer Advanced Placement and/or college credit to students who have performed successfully on the AP Physics C exam and students are encouraged to take the exam.

## Social Studies/Citizenship/Humanities

### African American History

Level: 12th

Length: Semester

Credit: 1

The course is a survey of African-American History from the African background to today. Topics include the African background and Middle passage experience; enslaved Africans and African Americans in British North America; African Americans and the American Revolution; Slavery and Antebellum America; Civil War and Reconstruction; African Americans in a Globalizing America to the Second World War; Cold War and Civil Rights; Black Power to post-racial America. The readings and lectures will highlight the following issues and themes: African origins and the making of African American identity in British North America and the United States; the African contribution to African-American culture; Race and the struggle of enslaved Africans and African-Americans for human rights in ante-bellum America; leadership and ideology from Reconstruction to World War II; African-American experience from a global perspective, post-World War II to today. Focusing on these themes will allow students to develop deeper insights into how Africans and African Americans shaped their own history in America, while at the same time illustrating how the African-American experience is an essential part of the larger American experience.

### AP U.S. History

Level: 12<sup>th</sup>

Length: Semester

Credit: 1

In AP U.S. History students investigate significant events, individuals, developments, and processes in nine historical periods. Students develop and use the same skills, practices, and methods employed by historians: analyzing primary and secondary sources; developing historical arguments; making historical comparisons; and utilizing reasoning about contextualization, causation, and continuity and change over time. The course also provides seven themes that students explore throughout the course in order to make connections among historical developments in different times and places: American and national identity; migration and settlement; politics and power; work, exchange, and technology; America in the world; geography and the environment; and culture and society.

### Civics: Be the Change

Level: 9<sup>th</sup>

Length: Semester

Credit: 1

This course is built around topics considered vital to the development of educated citizens in the context of Pittsburgh. The following four themes run through this year-long course: 1) Understanding the Constitution and the Bill of Rights and their application to current issues; 2) How citizens generate change in society, government, and economics; 3) The relationship between local, state and national economic and policy issues; 4) A focus on Pittsburgh: Application of learning of above themes to the lives of Pittsburghers, past and present.

**University of Pittsburgh CHS Western Civilization 101**

Level: 11th

Length: Semester

Credit: 1

This is an introductory-level course in Western European History that handles topics from the Scientific Revolution to the Cold War. It provides a framework for those who will continue in the study of History, and it provides an overview for those seeking to fulfill “General Education” requirements. There are no prerequisites. This course will introduce major questions of historical process and it will emphasize chronological, comparative, and contextual reasoning and the construction of original arguments grounded in historical evidence. Each student will encounter and engage secondary and primary sources, assigned regularly throughout the course. They will participate in detailed discussions and debates about these sources. They will conduct independent research and develop original arguments to present verbally and/or in written form. Formal evaluations consist mainly of essay-based quizzes, midterms and a final exam. In all cases, students work to assimilate the different types of historical evidence and to develop their own interpretive analyses.

**World History**Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Semester

Credit: 1

This course focuses on major themes, events and people in world history from roughly 1500 to the present. Topics include the growth of an interconnected world in the Age of Exploration, the impact of colonization, imperialism, and the growth of powerful nation states and clashes among them through 2 world wars. Also emphasized is the gradual push for expanding rights for more people around the world through the Age of Revolutions and colonial revolutions/ decolonization in the 20th century.

## World Languages

### Portuguese 1

Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Semester

Credit: 1

Portuguese 1 students develop listening and speaking skills and become familiar with the Portuguese-speaking world. Learning World Languages is an essential component of a 21st century global education. This course is a stand-alone, World Languages elective and it doesn't fulfill SciTech's two-semester World Languages requirement.

### Spanish 1

Level: 10<sup>th</sup>

Length: Semester

Credit: 1

In Spanish 1, the primary emphasis is on developing listening and speaking skills. Students also practice reading and writing. Students talk about everyday situations using simple questions and short answers at the phrase or memorized sentence level. Cultural awareness of the areas of the world where Spanish is spoken is an integral component of the course. This academic elective places students on the "Pathway to the Promise" and begins to prepare students for the 21st century global economy.

### Spanish 2

Level: 10<sup>th</sup>

Length: Semester

Credit: 1

Spanish 2 expands the basic listening, speaking, reading, and writing skills so that students can begin to create with the language. Students participate in simple conversations and write brief descriptions on familiar topics. Students also gain a deeper appreciation of and sensitivity to the diverse cultures and customs of the Spanish speaking world. This academic elective places students on the "Pathway to the Promise" and continues to prepare students for the 21st century global economy.

### Spanish 3

Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Semester

Credit: 1

In Spanish 3, students are able to create in Spanish at the sentence level, in survival situations such as ordering a meal, asking questions, telling what hurts. Students are able to describe and state opinions on familiar situational and cultural themes. Students engage in pair and group work. This intermediate level academic elective provides opportunities for enrichment, places students on the "Pathway to the Promise" and continues to prepare students for the 21st century global economy.

**Spanish 4**Level: 11<sup>th</sup>, 12<sup>th</sup>

Length: Semester

Credit: 1

In Spanish 4, students begin to use more complex sentences and are increasingly able to speak about past, present and future events and survival topics. Students create skits or role plays, write personal journals, discuss values and opinions, and view and react to foreign language films and videos. Fine arts and history are integrated into the cultural component of the course. This high level academic elective provides opportunities for student enrichment, places students on the “Pathway to the Promise” and prepares students for the 21st century global economy.

**Spanish 5- CHS Pitt**Level: 12<sup>th</sup>

Length: Semester

Credit: 1

This dual-enrollment course is available to students who have completed Spanish 4 PSP. High School students will take this course instead of the traditional fifth-year Spanish course. It is designed to develop communicative proficiency. This course builds and expands the language skills acquired in the first three semesters of college Spanish. It combines content-based language instruction with an interactive task-based approach and focuses in all relevant language skills: listening, speaking, reading and writing. Culture is integrated in all aspects of the program. Students who enroll and successfully complete the coursework will receive three credits from the University of Pittsburgh for SPAN 0103.



## Body and Behavior Concentration

\*denotes a required concentration course

### AP Biology \*

Level: 11<sup>th</sup>

Length: Semester (quarter 3 and 4)

Credit: .5

This course will provide an intensive approach to the biomedical sciences, specifically in the multi-disciplinary field of biology, biotechnology, anatomy and physiology. This course is designed to complete the preparation for the life sciences Executive Experience and to prepare the students for the Advanced Placement exam in biology if they wish to take it. This course evolves based on student interest with a focus on Anatomy and Physiology and diseases that affect these organ systems. Students that can connect concepts across the curriculum are better prepared to begin their undergraduate careers and will have the prerequisite skills needed for careers in health sciences. Students will be introduced to the world of databases and be able to link them to gene expression profiles on an organism level.

### Cellular Communication and Signaling\*

Level: 11<sup>th</sup>

Length: Quarter

Credit: .5

Students will explore the complex system of cellular communication that governs basic cellular activities and coordinates cellular actions within an organism. Topics will include cell structure and function, cell membrane, proteins, receptor function and structure, regulatory enzymes, informational processing, and the signaling pathways that govern growth and differentiation. Students will focus on the brain and nervous system in collaboration with colleagues from the University of Pittsburgh

### Diseases and Immunity\*

Level: 10<sup>th</sup>

Length: Quarter

Credit: .5

Students will investigate infectious diseases and how they function including disease classification, agents and host pathogens, disease transmission, infections and symptoms, and the concept and knowledge of resistance and immune responses of humans to infection. The role of phagocytic cells, complement, lymphocytes, the development of humoral and cell mediated immunity at the molecular, cellular, and organ level will be covered along with methods of developing vaccines and potential drug therapies. Students will read the text THE HOT ZONE which outlines the ebola virus outbreak in the 1960's through 2015 and be able to identify the important components of managing an outbreak.

### **Genetics and Heredity\***

Level: 10<sup>th</sup>

Length: Quarter

Credit: .5

Students will engage in an active understanding of the molecular basis of life specifically the relationship of DNA, RNA and protein. Through inquiry based learning approaches, this course will lay the ground work for the subsequent curriculum on the specifics of how DNA and protein expression govern our life's processes. Students will implement some of the technical skills learned in the introductory biotechnology course to study the mechanisms of adaptation and behavior and to understand how alteration of our DNA can affect our lives – specifically through genetic mutations. In addition, students will examine their own DNA for polymorphisms used in the real world to identify the ability to tolerate lactose, why vegetables taste bitter and the genetic relatedness of our species.

### **Introduction to Biotechnology \***

Level: 10<sup>th</sup>

Length: Quarter

Credit: .5

This course will be the starting point for a challenging and rewarding career in the high-tech field of biotechnology and the life sciences. An introduction to how biotechnology works, what laboratory techniques are used, what products are being made, what jobs in biotechnology are like, and what challenges biotechnology companies and laboratories here in the Pittsburgh area are working on will be emphasized. Students will develop good laboratory practice skills and be exposed first-hand to laboratory techniques such as micropipeting, gel electrophoresis, polymerase chain reaction, DNA restriction enzymes, molecular cloning, genetic engineering, DNA fingerprinting, bioinformatics, and other applied advanced techniques used in the biotechnology field.

### **Microbiology\***

Level: 10<sup>th</sup>

Length: Quarter

Credit: .5

Students will master the basic principles of understanding and working with microorganisms. Students will learn the structure and function of bacteria, how to grow bacteria, identify bacteria, treat bacteria with antibiotics and design their own research experiment to study microorganisms in our environment. These concepts and skills will be related to diseases and function.

### **Tissue Engineering\***

Level: 11<sup>th</sup>

Length: Quarter

Credit: .5

Regenerative medicine/tissue engineering is a rapidly growing multidisciplinary field that seeks to develop functional cell, tissue, and organ substitutes to repair, replace or enhance biological function that has been lost due to congenital abnormalities, injury, disease, or aging. Students will investigate the structural and functional differences exhibited by cells and tissues through various biotechnology

techniques. Relationships will be developed from the cellular level to the organ level based on how engineered tissues can also be used in the life sciences.

## Computers and Connections Concentration

\*denotes a required concentration course

### **Advanced Programming in Computer Science\***

Level: 11th  
Length: Semester  
Credit: 1

This is the capstone course taken by students in the Computers and Connections Concentration.

The overall goal of this course is to provide a strong foundation in the fundamental areas of programming while broadening participation in computing. Using the Java programming language the process of program design and analysis are explored. Topics covered include basic data types and their operators, I/O, control structures (selection, loops), classes (including methods and fields), files, arrays, and simple sorting and searching algorithms, inheritance, polymorphism and recursion.

This course will provide a solid foundation for continued study of Computer Science at the college level and will prepare students for the AP Computer Science A exam.

### **Hardware and Software Essentials\***

Level: 10th  
Length: Quarter  
Credit: .5

Using Arduino, this course teaches the basics of Computer Science Hardware and Software. Students will get to build robots, gadgets, and wearable technology using sensors, motors and breadboards. Students will learn to develop systems that interact with the environment around them. By programming their own Arduino microcontroller to read inputs and produce outputs, students will be able to control LED flashing lights, switches, buttons, motors etc.

Original thinking is encouraged through project-based work and, in the case of Arduino, students are really only limited by their imagination!

### **Intermediate Programming & Computer Science\***

Level: 11<sup>th</sup>  
Length: Quarter  
Credit: .5

The purpose of this course is to introduce students to an object-oriented programming language, such as Java. Topics include variables, control structures, data types, classes & methods. This course continues the study of problem-solving and fundamental computer science topics by moving to a more formal and in-depth study of programming design and methodology.

**Principles of Computing\***Level: 10<sup>th</sup>

Length: Quarter

Credit: .5

This is a survey course that covers the key building blocks of computer science, including, hardware and software concepts, problem solving, social & ethical issues, algorithm development and computer programming. Students will learn real-world applications of programming and computer science through several hands-on projects with Python the language.

**Programming for Web Applications/Advanced Web Design\***Level: 10<sup>th</sup>

Length: Quarter

Credit: .5

In this course, students take their web development skills from static to dynamic. Using the scripting language JavaScript, students will develop web-based graphical user interfaces (GUIs) that interact with a database. The final project can include web applications incorporating graphics, databases and simulations with a stress on making interactive web experiences.

**Programming in Context\***Level: 11<sup>th</sup>

Length: Quarter

Credit: .5

This is a project-based course, where students apply their programming knowledge to computational challenges in different fields, from mathematics and the sciences to the arts and humanities. Sample topics include computer graphics, social networking, and computer music, Artificial Intelligence (AI) or Robotics.

**Web Design\***Level: 10<sup>th</sup>

Length: Quarter

Credit: .5

This course covers the basic concepts, issues and techniques related to designing, developing and deploying web sites. In this introductory course students will learn to plan, code, test and check their pages for cross-browser compatibility and usability. Topics include Hypertext Markup Language (HTML5), cascading style sheets (CSS), tables, hyperlinks, images and forms.

## Environment and Energy Concentration

\*denotes a required concentration course

### AP Environmental Science\*

Level: 11<sup>th</sup>

Length: Semester

Credit: 1

In the final advanced semester of the E&E rotations, students will apply the concepts and skills from previous courses to examine in-depth the chemical and biological impacts of pollution. Air pollution will be examined through case studies focusing on smog, acid deposition, and air toxics as students conduct experiments involving acid rain, particulate matter, and tropospheric ozone levels. Water pollution will focus on case studies highlighting thermal, nutrient, chemical, and sediment pollution and will involve experimentation on the impacts of each of these on biological systems. The solid waste issues of nuclear byproducts and waste stream management will be examined with projects on the energy use of recycling and waste management. Throughout the course, the students will focus on determining possible sustainable solutions for each issue and will examine pollutant alternatives or mitigations.

### Earth Systems and Resources\*

Level: 10<sup>th</sup>

Length: Quarter

Credit: .5

This is the introductory class that will review students' prior knowledge to the basic concepts of ecosystems, biosphere, geosphere, and energy. In-depth projects will extend student knowledge of atmospheric and oceanic circulations, global convection patterns and impacts, volcanology, seismology, and mineral use, extraction and processing.

### Ecology- The Living World\*

Level: 11<sup>th</sup>

Length: Quarter

Credit: .5

Students will study ecosystem structure and interactions; energy flow; diversity, succession and evolution; natural ecosystem change; and biogeochemical cycles. Students will participate in inquiry and project-based instruction to develop foundational knowledge about their environment, and develop laboratory and analytical skill. This course is taught in the fall semester so the outdoor learning environments of Schenley Park and SciTech's gardens can be used to conduct experiments and collect ecological data.

**Energy Resources\***Level: 10<sup>th</sup>

Length: Quarter

Credit: .5

Students will participate in a comprehensive study to compare and contrast the environmental, societal, and political impacts of various forms of energy, to include potential renewable energy options. Additionally, students will explore residential and industrial energy conservation opportunities.

**Environmental Economics\***Level: 10<sup>th</sup>

Length: Quarter

Credit: .5

Students will study general population dynamics and associated issues with human population growth. Continued study will explore global economics impacted by environmental policy and practices.

**Global Change\***Level: 11<sup>th</sup>

Length: Quarter

Credit: .5

Students will study the interconnected and interrelated systems that provide for the current lifestyle of humans. Through food and waste systems, students will learn the difference between a sustainable and non-sustainable system and how they impact climate and biodiversity through the concept of Ecological Footprint. Students will gain an appreciation of the processes involved with our food system by creating and maintaining a school garden.

**Land & Water Use\***Level: 10<sup>th</sup>

Length: Quarter

Credit: .5

Students will explore the ways in which humans utilize land and water for various resources and the environmental impacts of these efforts, along with experiments that investigate the impacts of soil erosion, nutrient pollution, and crop management techniques. The impact of agriculture, livestock operations, fisheries, and food processing will be examined through the lens of nutrient cycles, biodiversity loss, genetic engineering and pest management. Additional uses of land will also be examined through forestry management techniques and impacts, mineral extraction and processing, and the alteration of environments through urbanization. This course is taught in the spring in order to utilize SciTech's garden for experimentation on agricultural methods.

## Form and Functions Concentration

\*denotes a required concentration course

### **Applied Engineering Physics I\***

Level: 10<sup>th</sup>

Length: Semester

Credit: 1

Engineers use their fundamental knowledge in science and mathematics to design solutions to problems that impact society. Applied Engineering Physics I is the first of three courses designed help students understand the direct correlation between physics and engineering by applying fundamental principles to the design and fabrication of mechanisms that solve specific challenges. Using the material science knowledge and fabrication techniques learned in Introduction to Engineering in conjunction with elementary lectures on topics not limited to kinematics, dynamics, linear momentum, oscillations, and energy, student groups perform design calculations and create original projects such as a catapult and a musical instrument. The use of pre-made kits and “click together” parts is prohibited as all projects are original and created with common building materials.

### **Applied Engineering Physics II\***

Level: 11<sup>th</sup>

Length: Semester

Credit: 1

Using the same approach taken in its pre-requisite, Applied Engineering Physics II continues with the “Physics meets shop” philosophy to engineering and science education. Students are expected to again utilize their design and fabrication skills to create original open-ended projects that solve a problem or fulfill a need. Lectures in heat and temperature, thermodynamics, fluids, fluid dynamics, and optics compliment projects including but not limited to hydraulic arms and heat-engine powered boats. Group presentations are given by the students at the conclusion of each project to highlight its functions and unique features. Topics in modern physics including blackbody radiation, fission, and fusion are also introduced and studied.

### **Digital Electronics\***

Level: Manager/Executive

Length: Semester

Credit: 1

DE is a semester-long course that covers the fundamentals of digital electronics. Topics covered include the operation of logic gates, Boolean algebra, circuit design, and microprocessors. Students will learn theory of digital electronics, simulate their activities on circuit design software, and then create working models of their circuits with the use of breadboard trainers. This is the fourth class in the Form & Function Concentration.



## Introduction to Engineering Design\*

Level: 10<sup>th</sup>

Length: Semester

Credit: .5

IED is a quarter-long introductory course that develops students' problem-solving and critical-thinking skills and emphasizes the concepts of developing three-dimensional models and solid renderings of an object. In addition to general information about engineering including the history, various disciplines, and ethics, students focus on the application of visualization processes and tools provided by current, state-of-the-art computer hardware and software programs. IED emphasizes the design-development process of a product and how a product model is produced, analyzed, and evaluated, using a Computer-Aided Design (CAD) System. Various design applications and possible career opportunities are explored and discussed in detail. This is the first class taken in the Form & Function Concentration.