



Computer Science

The High School Computer Science Program provides students with a strong foundation in digital literacy, programming, and computational thinking. Students explore how technology shapes the modern world while developing practical skills that prepare them for both college pathways and careers in the rapidly growing field of computer science.

Location: Paterson STEAM High School

Courses

Introduction to Programming (Grade 10)

This course introduces Carnegie Mellon University's Computer Science Academy CS1 curriculum, it is a deep dive into the fundamentals of programming concepts and teaches text-based coding using Python. CS1 is predicated on the notion that learning about programming and computer science should be fun and engaging. In our introduction to programming course, we expose students to graphics-based problem solving because it is visually engaging, allows for multiple correct solutions, and provides visual cues when a solution goes awry. Computer Science and computational problem solving are fundamental skills for engaging the 21st-century marketplace of ideas and economies. We believe that all students should have the opportunity to learn these skills as they will use them in whatever career they are likely to enter. This curriculum is designed for students in 8th or 9th grade with algebra readiness skills. No prior programming experience is required. This requires interesting problems to solve, as computational problem-solving is the core of computer science. There are 12 Units to the course, the course is split up into two parts, CS1a (units 1-7) and CS1b (units 8-12) so that it can be taught as a yearlong course or two semester-based courses. Each unit provides content for the topic to be investigated, a worked problem(s) to illustrate and let students explore the topic, a set of exercises to hone their mastery of the topic, some end-of-unit exercises that require students to use and synthesize all the topics found in that Unit, and a creative task that lets them further explore the topics in the Unit in a manner driven by their interests. The course provides its own browser-based Integrated

Development Environment (IDE) that the students will use to create and run their programs. It encompasses an editor and compiler, a custom graphics package, and an auto grader that is capable of grading not only textual problems and solutions but also a broad range of graphics problems and solutions.

Introduction to Artificial Intelligence (Grade 11)

This course introduces high school students to the fundamental concepts of Artificial Intelligence (AI). It covers the history of AI, its current applications, and potential future developments. Students will learn about various AI techniques, engage in hands-on projects, and discuss the ethical implications of AI in society. The Introduction to Artificial Intelligence course teaches students important programming concepts that enable the use of Artificial Intelligence in computer science and society at large. Students will learn how to incorporate basic Artificial Intelligence algorithms in their own work and consider the social and ethical implications of how Artificial Intelligence is used, and how it plans to be used. Students will develop a series of projects that illustrate the variety of ways Artificial Intelligence can be used to optimize and predict information and processes.

AP Computer Science (Grade 12)

This course is for students to learn the content of PSI AP Computer Science Principles and be prepared to take the AP Exam. It focuses on the fundamental understanding of computers, networking, data conversion and use, and life in the digital world.

Programming skills will be deepened throughout this course. Topics that students will be introduced to include an introduction to programming, operators & logic, algorithms and control structures, lists, functions and procedures, the global impact of computing, bits and bytes, data and privacy, graphics and images, and the Internet and networking.

Skills Gained

- Logical and computational thinking
- Problem-solving and creativity
- Collaboration and teamwork in project-based environments
- Technical proficiency in coding and digital tools
- Adaptability to new and emerging technologies

College Credit

Upon passing the AP exam

Careers

*Software Development, Web and App Design, Data Science and Analytics,
Cybersecurity, Computer Engineering, Information Technology (IT) Support, Machine
Learning Engineer, Natural Language Processing Engineer*