UPPER SCHOOL COMPUTER SCIENCE

**Computer Science Courses**

**710. Intro to Computer Science**
3 meetings per seven-day cycle/2 credits
Open to all students. No previous experience with computer science is needed.

This project-based course delves into the basic principles of computer science. Students will explore the history of computers, learn about hardware, operating systems, and software, and be introduced to fundamental programming concepts. A visual programming language will be used to create apps for the Android operating system that enable novice programmers to take advantage of features such as GPS, texting, and sensors. Emphasis will be placed on problem-solving and the need to structure and develop solutions in a logical manner. Other topics include: creativity and conceptualization, analysis of algorithms, the influence computer science has on economic, social, and cultural innovation, and an introduction to syntax-based programming language.

**725. Programming, Simulations & Design**
3 meetings per seven-day cycle/2 credits
Prerequisite: Intro to Computer Science 710 or special permission of the department head.
This course is a prerequisite for AP Computer Science 723.

This course is recommended for students who are comfortable moving into syntax-based programming and have a basic understanding of loops, selection statements, variables and logical thought.

The course will use visual programming, an IDE (Integrated Development Environment), and the Java programming language to build on the concepts learned in the prerequisite Intro to Computer Science 710 course. Students will use object oriented concepts to structure syntactically valid programming statements in a logical manner to develop games and simulations. Programming concepts include: objects, primitive data types, classes, inheritance, conditional statements, iteration and introduction to arrays. You will learn strategies to assist with planning, designing and implementing programs.

**726. Design Thinking, Applied Programming and Fabrication**
3 meetings per seven-day cycle/2 credits

Working in the Hackley Makerspace and applying the processes of design thinking and problem solving, students will engage in projects that result in the creation of a physical object. After skill building in the tools of the maker lab, (i.e., 3D printers, Raspberry Pi, power tools), students will discuss project scope and materials, and will implement their ideas through the use of 3D design software, such as Tinkercad and Sketchup. Prototyping with construction materials and tools in a "maker lab," students will test designs for viability. Construction project materials will include items such as LEGO, plastics for 3D printing, and recycled materials. Some projects, including robotics and circuit boards, will allow for computer programming of constructed objects.
**755 Game Design and Programming**  
6 meetings per seven-day cycle/3 credits  
Prerequisite: Programming, Simulations, and Design 725

This course is recommended for students who have an intermediate understanding of programming concepts. Correlations to topics learned in the prerequisite will be created while students develop a variety of interactive text and graphical games via hands-on projects. A variety of environments and languages will be utilized as new concepts are taught. Students must be able to navigate an API, debug code and construct syntactically valid programming statements. Understanding of control flow, variables, objects, functions, and inheritance are necessary. By class’s end, students will have programmed several of their own games and gained a thorough understanding of the basics of game design and development.

**723. AP Computer Science**  
6 meetings per seven-day cycle/3 credits  
Prerequisite: Programming, Simulations and Design 725 and departmental recommendation. Special permission of the department head may be granted in lieu of prerequisites.

This course is recommended for students who are can construct syntactically valid programming statements and understand flow of control, variables, methods, classes, IDE's and APIs.

This rigorous course will prepare students for the AP Computer Science examination in the Java programming language. Fundamental skills are necessary in order to design and implement computer programs that are understandable, adaptable, reusable and solve a problem. The goals of this course are comparable to those found in an introductory Computer Science course offered at a university. Topics include: algorithm analysis and development, advanced data structures, program implementation, analysis and computing in context.

**715. Post-AP Mobile App Development**  
(715b: Minor course - 3 meetings per seven-day cycle/2 credits)  
(715a: Major course - 6 meetings per seven-day cycle/3 credits)  
Prerequisite: A grade of “B” or above in AP Computer Science 723 and departmental recommendation.

This course is recommended for self-motivated students who can construct syntactically valid programming statements with an understanding of object-oriented programming concepts including: encapsulation, abstraction, inheritance, interfaces, flow of control, method decomposition, and construction.

This project-based course examines the principles of mobile application design and development. Students specify and clearly define a project which produces a quality mobile app pursued throughout the course. Course work will include project conception, design, implementation, and pilot testing through mobile phone applications on a predetermined platform (iOS/Android). Students are required to meet deadlines towards a proposed project.
Electronic Publishing Courses

731. Electronic Publishing I
3 meetings per seven-day cycle/2 credits
Open to all students.
This course is a prerequisite for 732a. Electronic Publishing II: Dial and 732b. Electronic Publishing II: Hilltop

This course combines the study of print and digital media with an emphasis on creating multimedia stories. As the course is designed to give structure to the creation and maintenance of student publications, students will explore all aspects of the journalistic process, including writing and presenting content using electronic publishing applications for print and online delivery. Students will learn the basics of journalistic writing, including composing interesting leads and nut grafis, and organizing facts using an inverted pyramid style. Students will also develop proficiency in the use of a variety of commercially available software packages for electronic publishing, video production, color printers, digital cameras, and scanners to layout and publish their work. The course will include extensive hands-on practice.

732a. Electronic Publishing II: Dial
3 meetings per seven-day cycle/2 credits
Prerequisite: Electronic Publishing I or special permission of the department head
Required of all members of Dial Staff.

This course continues building on the skills learned in Electronic Publishing I. This is an advanced course which continues to explore all aspects of the journalistic process begun in Electronic Publishing I and is designed to give structure to the creation and maintenance of the student newspaper, the Dial, in both its print as well as digital formats. Students will enhance their skills in journalistic writing begun in Electronic Publishing I; however, the emphasis is on the elements of production including scheduling, assignments, design, layout and graphics. Students will use computers, a variety of commercially available software packages for desktop and web publishing and multimedia creation, color printers, digital cameras, and scanners to layout and publish their work. The course will center around hands-on practice. Requirements center around the timely completion and publication of the print and digital formats of the student newspaper.

732b. Electronic Publishing II: Hilltop
3 meetings per seven-day cycle/2 credits
Prerequisite: Electronic Publishing I or special permission of the department head

This course is designed for those who are interested in working on the yearbook. Having already learned Adobe InDesign and journalistic writing in Electronic Publishing I, students will apply their skills in copy editing, caption writing and design concept. Upon joining this course, each student will be assigned to be the editor for a specific section of the yearbook. Through the completion of the yearbook pages, students will build and strengthen their organization skills and learn how best to manage yearbook page deadlines. Some knowledge in Photoshop is helpful but not required.

732f. Advanced Electronic Publishing II: Dial Editors
5 meetings per seven-day cycle/3 credits
Open to Dial Editors

This course continues to build on the skills learned in Electronic Publishing II and to explore all
aspects of the journalistic process in the electronic-publishing track. The course focuses on the creation and maintenance of Hackley’s award-winning student newspaper, *The Dial*. In addition to practicing advanced skills in journalistic writing, layout, design and graphics, students will develop the collaborative leadership roles needed to complete each issue in an efficient and timely manner. Students are responsible for all elements of production—scheduling, assignments, mentoring, design, layout, and graphics. For example, students will develop proficiency in using commercially available software packages for desktop and web publishing, color printers, digital cameras and scanners.

**152. The Vision: Multiple Views, Rich Media**
3 meetings per seven-day cycle/2 credits
Open to grades 10-12. No prerequisites, but experience preferred. Enrollment by application only. See English Department listings for details.