COMPUTER SCIENCE

Computer Studies courses provide students with the opportunity to become knowledgeable about computers – their history, capabilities, functions and prospective uses. An additional purpose is to provide the opportunity for students to become versatile computer users and for some students to become proficient in a programming language. At the same time, developing and refining computer skills, based on individual interests and abilities will be a major component.

Students should elect a sequence that best matches their computer interests. The selection of a sequence should be based on their choice of business, mathematical or scientific applications.

Computer Science: Advanced Programming

Open to Grades: 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 400

Type: Elective - Fulfills Fine/Practical Arts or Partial STEM Requirement

Prerequisite: AP Computer Science with a grade of B+ or higher and permission of the teacher.

Course Objectives: 1. To build on their solid foundation in Computer Science. 2. To explore GUI (graphical user interface) programming. 3. To learn basic data structures and their efficiencies. 4. To independently research an area of Computer Science where they have an interest.

Description: This course is the final level in the Computer Studies department. Students that take this course have demonstrated a strong work ethic and keen interest in Computer Science. Students will be introduced to many high level concepts that are beyond the scope of the AP curriculum.

Expectations: Students will achieve the objectives of this course through a series of individual, small group, and large group projects. All students will be involved in the presentation of their work to the group. All students are expected to be able to work independently in researching solutions to higher level programming algorithms. Students are encouraged to enter computer based competitions.

Computer Science: AP Computer Science A

Open to Grades: 10, 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 400

Type: Elective - Fulfills Fine/Practical Arts or Partial STEM Requirement

Notes:

Prerequisite: Computer Science with a grade of B+ or higher.

Course Objectives: 1. To design and implement computer based solutions to a variety of problems. 2. To design and select appropriate algorithms and data structures, which are applied to the solution of a problem. 3. To identify and apply well-known algorithms and data structures. 4. To read and understand the design and development of a large program, as well as its resulting code. 5. To code fluently in a well-structured high level language. 6. To develop an awareness of the social, ethical, and professional aspects of computer technology.

Description: This course is intended to serve as an introductory course for Computer Science majors, a substantial course for students who will major in other disciplines that require significant involvement with computing, or for individuals with a high level of interest in Computer Science. In the second semester, students will have the option of preparing for the AP Computer Science exam or an appropriate related experience in Computer Science topics.

Course Curriculum: AP Computer Science

Computer Science: AP Computer Science Principles

Open to Grades: 10, 11, 12

Number of Semesters: 2

Number of Credits: 1

Level: 400

Type: Elective - Fulfills Fine/Practical Arts or Partial STEM Requirement

Prerequisite: B- or better in Algebra I and departmental approval. Students should have successfully completed a high school algebra course with a strong foundation in function notation, problem-solving strategies and a Cartesian coordinate system. Students do not need to have prior knowledge of any programming language.

Course Objectives: The course outline is built on seven big idea principles: 1. Computing is a creative human activity that engenders innovation and promotes exploration. 2. Abstraction reduces information and detail to focus on concepts relevant to understanding and solving problems. 3. Data and information facilitate the creation of knowledge. 4. Algorithms are tools for developing and expressing solutions to computational problems. 5. Programming is a creative process that produces computational artifacts. 6. Digital devices, systems, and the networks that interconnect them enable and foster computational thinking. 7. Computing enables innovation in other fields including science, social science, humanities, arts, medicine, engineering business.

Description: "The AP Computer Science Principles is designed to be equivalent to a first-semester introductory college computing course for students who may or may not be computer science majors. In this course, students will develop computational thinking skills vital for success across all disciplines, such as using computational tools to analyze and study data and working with large data sets to analyze, visualize, and draw conclusions from trends. The course is unique in its focus on fostering student creativity. Students are encouraged to apply creative processes when developing computational artifacts and to think creatively while using computer software and other technology to explore questions that interest them. They will also develop effective communication and collaboration skills, working individually and collaboratively to solve problems, and discussing and writing about the importance of these problems and the impacts to their community, society and the world." (College Board, About APCSP)

Expectations: Students enrolled in this class will achieve the objectives of the course through a series of individual, small group, and large group projects. All students will be involved in the presentation of their work to the group. All students are expected to be able to work independently in researching solutions to higher level programming algorithms in efforts to create innovative solutions to real world problems. Students will be expected to take the AP Assessment which consists of an exam and two performance tasks submitted via the AP Digital Portfolio.

Course Curriculum: AP Computer Science Principles

Computer Science: Computer Animation

Open to Grades: 9, 10, 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 900

Type: Elective - Partially Fulfills Fine/Practical Arts or STEM Requirement

Prerequisite: None

Course Objectives: 1. To introduce students to computer animation. 2. To allow students to use their creativity and design skills. 3. To give students an opportunity to learn Action Script, the programming component of Flash, or other current programs.

Description: The course is an introductory course in Computer Animation. The course is designed to give students a solid foundation in animation, using programming and design concepts contained within the Flash program. It also allows the students an opportunity to use creativity in creating their programs. The students learn to use the timeline, drawing components, symbols, tweening, motion, movie clips, advanced animation concepts, buttons and ActionScript, to create sophisticated computer animated movies.

Expectations: The students learn a wide range of design and animation tools, which are used in conjunction with foundational programming constructs, and logic and analysis skills, create well designed and functional animated programs.

Computer Science: Computer Science

Open to Grades: 9, 10, 11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 900

Type: Elective - Partially Fulfills Fine/Practical Arts or STEM Requirement

Notes: Open to all students regardless of prior computer experience.

Prerequisite: None

Course Objectives: 1. To develop the ability to create logical algorithms which represent real world situations. 2. To introduce a specific high level computer language and develop competence in this area. 3. To develop a working knowledge of operating systems and user support systems commonly used in the world today. 4. To develop a basic knowledge of computer architecture. 5. To develop an awareness of the social, ethical, and professional aspects of computer technology.

Description: This is a comprehensive Computer Science course that includes an overview of the field, analysis of important issues, and problem solving techniques. In the past decade, Computer Science has matured and gained an enormous influence in all areas of the Sciences. Students need a comprehensive Computer Science course which precedes the Honors or Advanced Placement level, as in other academic areas. This course will provide a foundation for the use of computer technology for all students.

Expectations: Students will achieve the objectives of this course through a series of individual, small group, and large group projects. Individual assessment will be based on projects completed and quizzes. Students will be actively involved in all course activities.

Computer: Web Design and App Development

Open to Grades: 9,10,11, 12

Number of Semesters: 1

Number of Credits: 0.5

Level: 300

Type: Elective - Partially Fulfills Fine/Practical Arts or STEM Requirement

Prerequisite: None

Course Objectives: 1. To demonstrate knowledge of how the Internet works and the various tools utilized to make it happen including: browsers, FTP clients, compression utilities, and search utilities. 2. To demonstrate an understanding of basic Web design and app design principles. 3. To demonstrate awareness of design considerations that affect Web page and app construction including audience, browser version, OS requirement, and cross platform issues. 4. Understanding the development and usage of APPS and how they help to compliment existing web pages.

Description: This course introduces students to basic concepts, issues, and techniques required to develop and maintain websites and mobile applications. During this course students will learn about Web page planning, design, layout, construction, and setup of a website. HTML, XHTML, basic JavaScript, CSS, Photoshop, and various other web page and image creation tools will be utilized in this course. Students will also use tools to understand and develop APPS. Students will master the core concepts and practices in app development softwares such as Swift in an Xcode environment that professional programmers use daily and build basic fluency in Xcode (or similar) leading them to creating mobile applications.

Expectations: This course is geared for all students with an interest in designing and creating websites and apps. Students will design and create websites and apps for various purposes similar to what already exists in our society.