

CE47XX Algorithms and Data Structures

This course explores advanced computational thinking and programming concepts for students with prior programming experience. Students will deepen their understanding of how programs store, organize, and process information by studying common algorithms and data structures. Topics include searching and sorting algorithms, algorithm efficiency, and data structures such as stacks, queues, linked lists, maps, and trees. The course is project-based, with students applying these concepts through regular coding assignments and problem-solving activities. Emphasis is placed on writing efficient, well-structured programs and analyzing different approaches to solving the same problem. Students will have regular homework in this course.

Prerequisites: AP CS Principles, AP CS A, or approval from the curriculum coordinator

Grade: 10-12

Credit: 0.5

CE47XX Systems Programming

This course explores the structure and operation of computing systems for students who are proficient programmers. Students study how software interacts with hardware by examining core system components such as memory, the CPU, and instruction execution. Topics include registers, RAM, system memory, and the fundamentals of low-level program execution. Students apply these concepts by designing and implementing a virtual computer using a high-level programming language and developing a simple instruction set to run programs on that system. The course emphasizes understanding how programs run at the system level and how design choices affect performance and reliability. Students will have regular homework in this course.

Prerequisites: AP CS A, Algorithms and Data Structures, or approval from the curriculum coordinator

Grade: 10-12

Credit: 0.5