

YOSEMITE REGIONAL OCCUPATIONAL PROGRAM

Pre-Engineering Programming in C/C++ Mathematics

Course ID: 14013

CBEDS Code: 4619

JOB TITLES

DOT NO.

Electrical Engineering Technicians	17-3023.03
Surveying Technicians	17-3031.01
Maintenance and Repair Workers, General	49-9071.00
Architectural and Engineering Managers	11-9041.00
Computer Systems Analyst	15-1121.00
Computer Programmers	15-1131.00

Course description:

In this course students will obtain a computer literacy that goes well beyond that of a typical computer user. Students will understand how a computer works, and therefore be able to control the computer rather than simply react to it. Students will learn to use an integrated development environment for computer programming in C/C++ with mathematics. To attain these goals students will have to use critical thinking, problem solving, effective communication, and team work. Modular robots will be used so that students can see further application of programming. This course emphasizes object-oriented programming methodology with a concentration on problem solving and algorithm development, it also includes the study of data structures.

Recommended Prerequisites: Grade 11, 12

DURATION: 2 semesters

CREDIT: 5 units per semester

SCHOOLS OFFERED: Beyer, Davis, Downey, Enochs, Gregori, Johansen, Modesto

MEETS UNIVERSITY OF CALIFORNIA ENTRANCE REQUIREMENTS:

MEETS CALIFORNIA STATE UNIVERSITY REQUIREMENTS:

ARTICULATED WITH POSTSECONDARY INSTITUTIONS: No

RECOMMENDED INSTRUCTIONAL RESOURCES

Basic Text(s):

Learning C Programming Using C/C++ Interpreter Ch for the Absolute Beginner: An Introduction to Computer Science

Supplementary Text(s):

Learning Algebra Using C/C++ Interpreter Ch

Instructional Content
Instruction will include:

Student Outcomes
At the end of instruction, the student will be able to:

Hours
CL=Classroom
CC=Comm. Class.

<p>4. Operators and Expressions: <i>(continued)</i></p>	<p>F. Demonstrate compound assignment operators as a shortcut when modifying the value of a variable. E. Demonstrate increment and decrement operators to add or subtract values from/to a variable</p>	Anchor/CR	CTE	CL	CC
<p>5. Introduction to the MoBot programming and The Robot Remote Control Program Configuring MoBots.</p>	<p>Goal: Students will demonstrate ability to solve problems and think critically by completing challenging group and individual projects. A. Configure MoBots for remote control B. Demonstrate basic functions C MoBots C. Demonstrate Blocking and nonblocking motions D. Program multiple MoBots to perform identical tasks.</p>	5.1 5.4 2.1	B3.1 B4.0 B10.0 B3.4 C6.4 D6.7 C1.4		
<p>6. Flowcharts, Making Decisions, Loops, and Random Numbers:</p>	<p>Goal: The student will understand the concept of visually planning a computer program. A. Demonstrate use of graphical symbols to represent the actions and flow of a computer algorithm. B. Use selection/decision symbols in a flowchart.</p>	5.3 5.7 CR 1	C1.6 C4.5		
<p>7. Modular Programming with Functions, Standard C Header Files and Libraries</p>	<p>Goal: The student will understand the concept of using functions to modularize a program. A. Incorporate a function prototype B. Demonstrate the concept of "void" type. C. Demonstrate CPlot graphical library to plot functions and computer generated data in different graphical formats E. Recognize there are several mathematical functions in a Standard C library</p>	A4.5	C4.6 C4.7 C4.9		
<p>8. Arrays for Data Processing:</p>	<p>Goal: The student will demonstrate ability to write computer code A. Use computer code to initialize and assign values to an array B. Demonstrate structure of how an array is implemented in computer memory C. Write computer code D. Differentiate behavior of array variables against non-array variables when passed to a function</p>	A5.4 CR 1	C4.6 C4.9 C4.7		
<p>9. Working with data files:</p>	<p>Goal: Students will demonstrate ability to write code. A. Utilizing the FILE data type and functions "fopen()", "fclose()", "fgets()", "fscanf()", B. Plot graphs</p>	Anchor/CR 2.7 4.1	CTE C4.6 C4.9	CL	CC

Instructional Content

Instruction will include:

Student Outcomes

At the end of instruction, the student will be able to:

HoursCL=Classroom
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10. Variables in Algebra and their applications in computing:	Goal: Students will understand systems of linear equations. A. Point slope, standard form B. Linear inequalities C. Polynomials	5.1 CR 1	C4.6 C4.9		
11. Exponential functions:	Goal: Students will demonstrate C algorithms using mathematical algorithms A. Use the rules for radicals and exponents B. Use general formulas C. Graph a system of equations in two variables D. Write programs calculating the solutions to a quadratic equation				
12. Applications:	Goal: Students will demonstrate writing interactive code: A. Use of Pythagorean Theroem, plot scatter plots, answers area and perimeter questions, calculates distance, and compound interest	2.7 5.1 CR 1	10.4 4.6		
13. Impact of Computing:	Goal: Students will acquire an awareness and understanding of the ethical and social implications of computing systems. A. System reliability B. Privacy C. Legal issues D. Intellectual property E. Social & ethical ramifications of computer use	8.4 8.6 9.1 9.2 9.3 5.1 CR 8,7, and 4			