

Computer Science II: Programming

Task Analysis

1 Students evaluate the tasks a computer program is to perform.

- 1 Differentiate between the different tasks a computer program should perform [CS2P-1.1](#)
 - 2 Formulate solutions to the different tasks a computer program should perform [CS2P-1.2](#)
 - 3 Interpret prior solutions; In case prior code and design could be reused [CS2P-1.3](#)
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Problem Analysis

1 Students analyze a problem and develop an advanced solution by creating a computer program.

- 1 Recognize and explain how to use a computer program to solve a problem [CS2P-2.1](#)
 - 2 Construct interactive computer programs that accept various forms of input and produce various forms of output, as a solution to an advanced computer programming problem [CS2P-2.2](#)
 - 3 Use print charts, file layouts, program narratives, hierarchy charts, and system flowcharts, which accurately depict the problem assigned and describe the solution [CS2P-2.3](#)
 - 4 Justify what programming methodology to use—object oriented or procedural [CS2P-2.4](#)
 - 5 Appraise the program schematics and usage; document the program and describe its use [CS2P-2.5](#)
 - 6 Recognize and explain the standard program flowchart symbols and use them correctly within the context of the basic control structures of sequence, selection and looping [CS2P-2.6](#)
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Software Tools

1 Students apply and adapt software tools to develop an advanced computer program.

- 1 Construct an advanced program that processes information [CS2P-3.1](#)
 - 2 Identify programming languages as procedural and object oriented [CS2P-3.2](#)
 - 3 Recognize and explain class in object oriented programming [CS2P-3.3](#)
 - 4 Recognize and explain object in object oriented programming [CS2P-3.4](#)
 - 5 Recognize and explain method in object oriented programming [CS2P-3.5](#)
 - 6 Recognize and explain instance variable in object oriented programming [CS2P-3.6](#)
 - 7 Recognize and explain polymorphism in object oriented programming [CS2P-3.7](#)
 - 8 Recognize and explain inheritance in object oriented programming [CS2P-3.8](#)
 - 9 Recognize and explain overwriting methods in OOP [CS2P-3.9](#)
 - 10 Recognize and explain encapsulation in computer programming [CS2P-3.10](#)
 - 11 Apply and adapt at an advanced level fundamental programming concepts, including data types, control structures, methods, and arrays [CS2P-3.11](#)
 - 12 Develop advanced programs using reusable modules (modularization) [CS2P-3.12](#)
 - 13 Use advanced debugging techniques to correct and validate the computer program [CS2P-3.13](#)
 - 14 Construct the program in a high-level programming language based on a created design [CS2P-3.14](#)
 - 15 Determine how to integrate a computer program with a web browser [CS2P-3.15](#)
 - 16 Determine how to use a common code/ GUI library [CS2P-3.16](#)
 - 17 Identify controls (push buttons, entry fields, etc.), their properties, methods, and when to use each control [CS2P-3.17](#)
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Algorithms

1 Students design a solution to the problem using algorithms.

- 1 Develop advanced algorithms to solve a computer programming problem(s) [CS2P-4.1](#)
 - 2 Apply and adapt math operators in a computer program [CS2P-4.2](#)
 - 3 Prescribe the use of algorithms to provide a solution to a programming problem [CS2P-4.3](#)
 - 4 Use pseudo code to describe a solution to an advanced programming problem [CS2P-4.4](#)
 - 5 Create a program flowchart and ANSI standard flowcharting symbols to define a solution to an advanced programming problem [CS2P-4.5](#)
 - 6 Explain how the algorithm can be used to solve a problem [CS2P-4.6](#)
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Program Development

1 Students create an advanced functional computer program.

- 1 Define the process of programming. For example: STAIR, Statement, Tools, Algorithm, Implement, and Refine [CS2P-5.1](#)
 - 2 Create an advanced computer program that corresponds to an algorithm or proposed solution [CS2P-5.2](#)
 - 3 Demonstrate programming structures [CS2P-5.3](#)
 - 4 Appraise the use of data variables and constants [CS2P-5.4](#)
 - 5 Appraise the use of local and global scope [CS2P-5.5](#)
 - 6 Appraise the use of conditionals (IF statements) [CS2P-5.6](#)
 - 7 Appraise the use of loops (while statements, for statements) [CS2P-5.7](#)
 - 8 Use single and multidimensional Arrays [CS2P-5.8](#)
 - 9 Create programmer defined functions and methods to break down the program logic and support reuse [CS2P-5.9](#)
 - 10 Define the graphical user interface [CS2P-5.10](#)
 - 11 Identify the parts of the programming platform [CS2P-5.11](#)
 - 12 Identify different types of errors and handle them programmatically [CS2P-5.12](#)
 - 13 Use the order of operations when using calculations [CS2P-5.13](#)
 - 14 Construct an advanced computer program using proper condition and loop techniques [CS2P-5.14](#)
 - 15 Use correct naming conventions in variable declarations, function declarations, class declarations, and other [CS2P-5.15](#)
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Program Verification and Debugging

1 Students prove that an advanced computer program solution works by using verification and debugging techniques.

- 1 Predict and explain output [CS2P-6.1](#)
 - 2 Identify cause/effect for input/output [CS2P-6.2](#)
 - 3 Perform input validation [CS2P-6.3](#)
 - 4 Scrutinize peers code for errors [CS2P-6.4](#)
 - 5 Show the use of proper internal documentation and coding comments [CS2P-6.5](#)
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Documentation

1 Students connect the associated task with the code by providing documentation.

- 1 Describe the function of an advanced computer program [CS2P-7.1](#)
- 2 Identify the purposes of an advanced computer program [CS2P-7.2](#)
- 3 Explain concepts related to an advanced computer program [CS2P-7.3](#)
- 4 Evaluate how to use an advanced computer program [CS2P-7.4](#)
- 5 Identify cause/effect by explaining input and output related to an advanced computer program [CS2P-7.5](#)
- 6 Interpret input/output of an advanced computer program [CS2P-7.6](#)