PRECISION EXAMS

Computer Programming IA

EXAM INFORMATION

Items
42
Points
51
Prerequisites
NONE
Grade Level
10-12
Course Length
ONE SEMESTER

Career Cluster
INFORMATION TECHNOLOGY

Performance Standards
INCLUDED

Certificate Available
YES

DESCRIPTION

Computer Programming IA introduces students to the fundamentals of computer programming. Students will learn to design, code, and test their own programs while applying mathematical concepts. Topics include concepts and problem-solving skills to beginning students through a programming language such as Delphi, C++, C#, Java, Python, or VB.

EXAM BLUEPRINT

STANDARD	PERCENTAGE OF EXAM
1- Programming Environment	8%
2- Accepted Programming Methodology	15%
3- Commands and Operations	27%
4- Control Structures	40%
5- Current Ethical Issues	10%
6- Career Opportunities (optional)	

STANDARD 1

STUDENTS WILL BE FAMILIAR WITH AND USE A PROGRAMMING ENVIRONMENT

Objective 1 Demonstrate knowledge of external and internal computer hardware.

1. Describe the functions of basic computer hardware devices (monitor, Fprinter, keyboard, mouse, adapters, and other devices).
2. Describe the functions of the internal components of computers (CPU, RAM, ROM, motherboard, graphics card, hard drive, and optical drive).
3. Understand what a bit and bye is and how it relates to memory storage.

Objective 2 Demonstrate knowledge of software concepts.

1. Define the distinction between computer software and hardware.
2. Identify software categories such as Application Software, Web Based Software, or OS.
3. Describe the difference between an interpreted language vs. a compiled language.

Objective 3 Demonstrate the ability to compile, debug, and execute programs.

1. Demonstrate how to use the editor/IDE to compile and run programs.
2. Understand the difference between syntax, run-time, and logic errors.
3. Demonstrate how to debug programs.
4. Optional: Use a debugger to set break points and step through code to track down errors at runtime.

Standard 1 Performance Evaluation included below (Optional)

STANDARD 2

STUDENTS WILL EMPLOY ACCEPTED PROGRAMMING METHODOLOGY

Objective 1 Demonstrate the ability to use good programming style.

1. Demonstrate how to use white space properly.
2. Employ proper naming convention.
3. Construct identifiers with meaningful format (i.e.: camelCase, under_scores, PascalCase, and ALLCAPS).

Objective 2 Understand that software development is a process and use a variety of creation techniques to develop 21st Century Skills. (www.p21.org)

1. Understand specifications and requirements for computer programs.
2. Decompose the problem into appropriate components.
3. Design solutions using algorithms and other problem-solving techniques.
4. Write code for a program.
5. Test programs for errors and proper functionality.
6. Provide internal and external documentation for a program during development.
7. Redo all steps as needed.

Objective 3 Identify the syntactical components of a program

1. Identify keywords, identifiers, operators, operands, and literals.
2. Identify the entry-point of a program.

3. Identify statements and expressions in a program.
4. Identify program components such as functions, methods, or procedures.

Standard 2 Performance Evaluation included below (Optional)

STANDARD 3

STUDENTS WILL PROPERLY USE LANGUAGE-FUNDAMENTAL COMMANDS AND OPERATIONS

Objective 1 Demonstrate the ability to use basic elements of a specific language.

1. Write programs formatted based on the conventions of the utilized language.
2. Declare, initialize, and assign values to constants and variables.
3. Demonstrate the ability to use input and output commands.
4. Communicated clearly with output values stored in identifiers. (www.p21.org)
5. Demonstrate the ability to use strings in programs.

Objective 2 Employ basic arithmetic expressions in programs.

1. Use basic arithmetic operators (modulus, multiplication, division, addition, subtraction).
2. Understand order of operation of expressions.
3. Write expressions that mix floating-point and integer expressions.

Objective 3 Demonstrate the ability to use data types in programs.

1. Declare and use variable types (primitives, reference, or object)
2. Declare and use constants.
3. Know the difference between data types and their application (boolean, integer, floating point, strings).
4. Optional: Declare and use enumerators as a list of constants.

Standard 3 Performance Evaluation included below (Optional)

STANDARD 4

STUDENTS WILL PROPERLY EMPLOY CONTROL STRUCTURES

Objective 1 Demonstrate the ability to use relational and logical operators in programs.

1. Compare values using relational operators.
2. Form complex expressions using logical operators.

Objective 2 Demonstrate the ability to use decisions in programs.

1. Employ simple IF structures.
2. Use IF-ELSE structures.
3. Write programs with nested IF-ELSE structures.
4. Make multiple-way selections (switch, case).

Objective 3 Demonstrate the ability to use loops in programs.

1. Use initial, terminal, and incremental values in loops.
2. Construct while, do-while, and for loops.

3. Describe the various ways that loops can end.
4. Utilize nested loops.
5. Explain how to avoid infinite loops.
6. Accumulate running totals using loops.

Objective 4 Demonstrate the ability to use modularity in programs using functions or methods.

1. Demonstrate how to use language-defined subroutines.
2. Utilize value and reference parameters.
3. Understand the scope of identifiers (local, class variables).
4. Return values.

Standard 4 Performance Evaluation included below (Optional)

STANDARD 5

STUDENTS WILL DEMONSTRATE KNOWLEDGE OF CURRENT ETHICAL ISSUES DEALING WITH COMPUTERS AND INFORMATION IN A GLOBAL SOCIETY USING 21ST CENTURY SKILLS

Objective 1 Understand ethical responsibility of software developers.

1. Explain the ethical reasons for creating reliable and robust software.
2. Explain the impact software can have on society.
3. Show how security concerns can be addressed in a program.

Objective 2 Demonstrate knowledge of the social and ethical consequences of computers.

1. Describe how computer-controlled automation affects a workplace and society.
2. Explain the ramifications of society's dependence on computers.
3. Use 21st Century Skills to understand and address global issues
4. Identify advantages and disadvantages of changing workplace environments.
5. Be aware of changing tools in technology and adapt to a changing environment.

Objective 3 Demonstrate knowledge of the right to privacy.

1. Explain how computers can compromise privacy.
2. Exhibit knowledge of privacy laws.
3. Describe responsibilities of people who control computer information.

Objective 4 Demonstrate knowledge of computer, information, and software security.

1. Exhibit knowledge of copyright laws.
2. Explain how computers could erroneously be used to compromise copyright laws.
3. Give examples of ways to protect information on computer systems.
4. Identify ways to protect against computer viruses.

Standard 5 Performance Evaluation included below (Optional)

STANDARD 6 (Optional)

STUDENTS WILL DEVELOP AWARENESS OF CAREER OPPORTUNITIES IN THE COMPUTER PROGRAMMING/SOFTWARE ENGINEERING INDUSTRY AND OF ITS HISTORY

Objective 1 Identify personal interests and abilities related to Computer Programming/Software Engineering careers.

1. Identify personal creative talents.
2. Identify technical/programming talents.
3. Identify organizational and leadership skills.
4. Explore aptitude for innovation.
5. Determine aptitude for working as a member of a Computer Programming/Software Engineering team.

Objective 2 Investigate career opportunities, trends, and requirements related to Computer Programming/Software Engineering careers

1. Identify the members of a Computer Programming/Software Engineering team: Team Leader, Analyst, Sr. Developer, Jr. Developer, and Client/Subject Matter Expert.
2. Describe work performed by each member of the Computer Programming/Software Engineering team.
3. Investigate trends associated with Computer Programming/Software Engineering careers.
4. Discuss related career pathways.
5. Compile a portfolio of the individual and group programs developed during the course.

Objective 3 Discuss relevant history of software development.

1. Discuss relevant history of computer technology.
2. Identify key points in the history of the computer programming/software engineering industry.

Standard 6 Performance Evaluation included below (Optional)

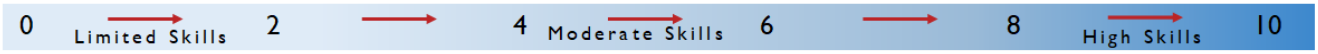
Computer Programming IA Performance Standards (Optional)

Performance assessments may be completed and evaluated at any time during the course. The following performance skills are to be used in connection with the associated standards and exam. To pass the performance standard the student must attain a performance standard average of **8 or higher** on the rating scale. Students may be encouraged to repeat the objectives until they average **8 or higher**.

Students Name_____

Class_____

PERFORMANCE RATING SCALE



STANDARD 1 Programming Environment — Score:

- ☐ Become familiar with and use a program environment

STANDARD 2 Programming Methodology — Score:

- ☐ Employ accepted programming methodology

STANDARD 3 Commands and Operations — Score:

- ☐ Properly use language-fundamental commands and operations

STANDARD 4 Control Structures — Score:

- ☐ Properly employ control structures

STANDARD 5 Current Ethical Issues — Score:

- ☐ Demonstrate knowledge of current ethical issues dealing with computers and information in society

STANDARD 6 Career Opportunities — Score:

- ☐ Develop awareness of career opportunities in the computer programming/software engineering industry and of its history

PERFORMANCE STANDARD AVERAGE SCORE: