AP Computer Science A Course and Exam Description

There are two computer science offerings, and students can take either course in any order or concurrently:
■ AP Computer Science A focuses on computing skills related to programming in Java.
■ AP Computer Science Principles provides students with a broad introduction to computer science and how it relates to other fields. The courses underscore the importance of communicating solutions appropriately and in ways that are relevant to current societal needs. AP Computer Science courses can help address traditional issues of equity, access, and broadening participation in computing while providing a strong and engaging introduction to fundamental areas of the discipline

AP Computer Science A introduces students to computer science through programming. Fundamental topics in this course include the design of solutions to problems, the use of data structures to organize large sets of data, the development and implementation of algorithms to process data and discover new information, the analysis of potential solutions, and the ethical and social implications of computing systems. The course emphasizes object-oriented programming and design using the Java programming language.

RECOMMENDED PREREQUISITES

It is recommended that students have successfully completed a first- year high school algebra course with a strong foundation of basic linear functions, composition of functions, and problem-solving strategies that require multiple approaches and collaborative efforts. In addition, students should be able to use a Cartesian (x, y) coordinate system to represent points on a plane. It is important that students and their advisers understand that any significant computer science course builds upon a foundation of mathematical reasoning that should be acquired before attempting such a course.
Prior computer science experience is not required to take this course.

COMPUTER LANGUAGE

The course requires that solutions of problems be written in the Java programming language. Because the Java programming language is extensive, the AP Computer Science A Exam covers a subset of Java.

AP Computer Science A Course and Exam Content

Course Content

The course content is organized into ten commonly taught units:

- Unit 1: Primitive Types
- Unit 2: Using Objects
- Unit 3: Boolean Expressions and if Statements
- Unit 4: Iteration
- Unit 5: Writing Classes
- Unit 6: Array
- Unit 7: Array List
- Unit 8: 2D Array
- Unit 9: Inheritance
- Unit 10: Recursion

Big Ideas

The following big ideas serve as the foundation of the course, enabling students to create meaningful connections among concepts:

- Modularity: Modularity in object-oriented programming allows us to use abstraction to break complex programs down into individual classes and methods.
- Variables: Variables create data abstractions, as they can represent a set of possible values or a group of related values.
- Control: Doing things in order, making decisions, and doing the same process multiple times are represented in code by using control structures.
- Impact of Computing: Computers and computing have revolutionized our lives. To use computing safely and responsibly, we need to be aware of privacy, security, and ethical issues.

AP Computer Science A

Computational Thinking Practices

The following computational thinking practices describe what skills students should develop during the course:

- Program Design and Algorithm Development: Determine required code segments to produce a given output.
- Code Logic: Determine the output, value, or result of given program code given initial values.
- Code Implementation: Write and implement program code.
- Code Testing: Analyze program code for correctness, equivalence, and errors.
- Documentation: Describe the behavior and conditions that produce identified results in a program.

AP Computer Science A course and exam

UNIT 1 PRIMITIVE TYPES	
1.1	Why Programming? Why Java?
1.2	Variables and Data Types
1.3	Expressions and Assignment Statements
1.4	Compound Assignment Operators
1.5	Casting and Ranges of Variables
UNIT 2 USING OBJECTS	
2.1	Objects: Instances of Classes
2.2	Creating and Storing Objects (Instantiation)
2.3	Calling a Void Method
2.4	Calling a Void Method with Parameters
2.5	Calling a Non-void Method
2.6	String Objects: Concatenation, Literals, and More
2.7	String Methods
2.8	Wrapper Classes: Integer and Double
2.9	Using the Math Class

	UNIT 3 BOOLEAN EXPRESSIONS AND I F STATEMENTS
3.1	Boolean Expressions
3.2	i f Statements and Control Flow
3.3	i f -else Statements
3.4	else i f Statements
3.5	Compound Boolean Expressions
3.6	Equivalent Boolean Expressions
3.7	Comparing Objects
	UNIT 4 ITERATION
4.1	While Loops
4.2	For Loops
4.3	Developing Algorithms Using Strings
4.4	Nested Iteration
4.5	Informal Code Analysis

	UNIT 5 WRITING CLASSES
5.1	Anatomy of a Class
5.2	Constructors
5.3	Documentation with Comments
5.4	Accessor Methods
5.5	Mutator Methods
5.6	Writing Methods
5.7	Static Variables and Methods
5.8	Scope and Access
5.9	This Keyword
5.10	Ethical and Social Implications of Computing Systems
	UNIT 6 ARRAY
6.1	Array Creation and Access
6.2	Traversing Arrays
6.3	Enhanced for Loop for Arrays
6.4	Developing Algorithms Using Arrays

	UNIT 7 ARRAYLIST
7.1	Introduction to ArrayList
7.2	ArrayList Methods
7.3	Traversing ArrayLists
7.4	Developing Algorithms Using ArrayLists
7.5	Searching
7.6	Sorting
7.7	Ethical Issues Around Data Collection
	UNIT 8 2D ARRAY
8.1	2D Arrays
8.2	Traversing 2D Arrays
	UNIT 9
9.1	Creating Superclasses and Subclasses
9.2	Writing Constructors for Subclasses
9.3	Overriding Methods
9.4	Super Keyword
9.5	Creating References Using Inheritance Hierarchies
9.6	Polymorphism
9.7	Object Superclass

	UNIT 10 RECURSION
10.1	Recursion
10.2	Recursive Searching and Sorting

AP COMPUTER SCIENCE A COURSE AND EXAM: 3 HOURS

The AP Computer Science A Exam assesses student understanding of the computational thinking practices and learning objectives outlined in the course framework. The exam is 3 hours long and includes 40 multiple-choice questions and 4 free-response questions. As part of the exam, students will be given the Java Quick Reference, which lists accessible methods from the Java library that may be included in the exam.

Další informace:

AP Computer Science A Course Overview – 2 stránky
https://apcentral.collegeboard.org/pdf/ap-computer-science-a-course-overview.pdf?course=ap-computer-science-a

AP Computer Science A Course at a glance – 4 strany
https://apcentral.collegeboard.org/pdf/ap-computer-science-a-course-a-glance.pdf?course=ap-computer-science-a

AP Computer Science A Course and Exam Description – 228 stran
https://apcentral.collegeboard.org/pdf/ap-computer-science-a-course-and-exam-description.pdf?course=ap-computer-science-a

Příklady zkouškových otázek
https://apcentral.collegeboard.org/pdf/ap21-frq-computer-science-a.pdf?course=ap-computer-science-a

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