AP Computer Science Principles

Syllabus Checklist · 大纲自查表

Tick one box per statement: ☐ not yet ☐ nearly ☐ confident. 每条打一个勾：尚未掌握 / 快会了 / 有把握。

1. Creative Development 创造性开发

1.1 Collaboration 协作

☐☐☐ Explain how computing innovations are improved through collaboration. [Skill 1.C]
☐☐☐ Explain how computing innovations are developed by groups of people. [Skill 1.C]
☐☐☐ Demonstrate effective interpersonal skills during collaboration. [Skill 1.C]

1.2 Program Function and Purpose 程序的功能与目的

☐☐☐ Describe the purpose of a computing innovation. [Skill 1.A]
☐☐☐ Explain how a program or code segment functions. [Skill 4.A]
☐☐☐ Identify input(s) to a program. [Skill 3.A]
☐☐☐ Identify output(s) produced by a program. [Skill 3.A]

1.3 Program Design and Development 程序设计与开发

☐☐☐ Develop a program using a development process. [Skill 1.B]
☐☐☐ Design a program and its user interface. [Skill 1.B]
☐☐☐ Describe the purpose of a code segment or program by writing documentation. [Skill 4.A]
☐☐☐ Acknowledge code segments used from other sources. [Skill 1.C]

1.4 Identifying and Correcting Errors 识别与纠正错误

☐☐☐ For errors in an algorithm or program:
☐☐☐ Identify inputs and corresponding expected outputs or behaviors that can be used to check the correctness of an algorithm or program. [Skill 4.C]

2. Data 数据

2.1 Binary Numbers 二进制数

☐☐☐ Explain how data can be represented using bits. [Skill 3.C]
☐☐☐ Explain the consequences of using bits to represent data. [Skill 1.D]
☐☐☐ For binary numbers:

2.2 Data Compression 数据压缩

☐☐☐ Compare data compression algorithms to determine which is best in a particular context. [Skill 1.D]

2.3 Extracting Information from Data 从数据中提取信息

☐☐☐ Describe what information can be extracted from data. [Skill 5.B]
☐☐☐ Describe what information can be extracted from metadata. [Skill 5.B]
☐☐☐ Identify the challenges associated with processing data. [Skill 5.D]

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2.4 Using Programs with Data 用程序处理数据

☐☐☐ Extract information from data using a program. [Skill 2.B]
☐☐☐ Explain how programs can be used to gain insight and knowledge from data. [Skill 5.B]

3. Algorithms and Programming 算法与编程

3.1 Variables and Assignments 变量与赋值

☐☐☐ Represent a value with a variable. [Skill 3.A]
☐☐☐ Determine the value of a variable as a result of an assignment. [Skill 4.B]

3.2 Data Abstraction 数据抽象

☐☐☐ Represent a list or string using a variable. [Skill 3.A]
☐☐☐ For data abstraction:

3.3 Mathematical Expressions 数学表达式

☐☐☐ Express an algorithm that uses sequencing without using a programming language. [Skill 2.A]
☐☐☐ Represent a step-by-step algorithmic process using sequential code statements. [Skill 2.B]
☐☐☐ Evaluate expressions that use arithmetic operators. [Skill 4.B]

3.4 Strings 字符串

☐☐☐ Evaluate expressions that manipulate strings. [Skill 4.B]

3.5 Boolean Expressions 布尔表达式

☐☐☐ For relationships between two variables, expressions, or values:
☐☐☐ For relationships between Boolean values:

3.6 Conditionals 条件语句

☐☐☐ Express an algorithm that uses selection without using a programming language. [Skill 2.A]
☐☐☐ For selection:

3.7 Nested Conditionals 嵌套条件语句

☐☐☐ For nested selection:

3.8 Iteration 迭代

☐☐☐ Express an algorithm that uses iteration without using a programming language. [Skill 2.A]
☐☐☐ For iteration:

3.9 Developing Algorithms 开发算法

☐☐☐ Compare multiple algorithms to determine if they yield the same side effect or result. [Skill 1.D]
☐☐☐ For algorithms:

3.10 Lists 列表

☐☐☐ For list operations:

☐☐☐ For algorithms involving elements of a list:

3.11 Binary Search 二分查找

☐☐☐ For binary search algorithms:

3.12 Calling Procedures 调用过程

☐☐☐ For procedure calls:

3.13 Developing Procedures 开发过程

☐☐☐ Explain how the use of procedural abstraction manages complexity in a program. [Skill 3.C]

☐☐☐ Develop procedural abstractions to manage complexity in a program by writing procedures. [Skill 3.B]

3.14 Libraries 库

☐☐☐ Select appropriate libraries or existing code segments to use in creating new programs. [Skill 2.B]

3.15 Random Values 随机值

☐☐☐ For generating random values:

3.16 Simulations 模拟

☐☐☐ For simulations:

3.17 Algorithmic Efficiency 算法效率

☐☐☐ For determining the efficiency of an algorithm:

3.18 Undecidable Problems 不可判定问题

☐☐☐ Explain the existence of undecidable problems in computer science. [Skill 1.A]

4. Computer Systems and Networks 计算机系统与网络

4.1 The Internet 互联网

☐☐☐ Explain how computing devices work together in a network. [Skill 5.A]

☐☐☐ Explain how the Internet works. [Skill 5.A]

☐☐☐ Explain how data are sent through the Internet via packets. [Skill 5.A]

☐☐☐ Describe the differences between the Internet and the World Wide Web. [Skill 5.A]

4.2 Fault Tolerance 容错

☐☐☐ For fault-tolerant systems, like the Internet:

4.3 Parallel and Distributed Computing 并行与分布式计算

☐☐☐ For sequential, parallel, and distributed computing:

☐☐☐ Describe benefits and challenges of parallel and distributed computing. [Skill 1.D]

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5. Impact of Computing 计算的影响

5.1 Beneficial and Harmful Effects 有益与有害的影响

☐☐☐ Explain how an effect of a computing innovation can be both beneficial and harmful. [Skill 5.C]

☐☐☐ Explain how a computing innovation can have an impact beyond its intended purpose. [Skill 5.C]

5.2 Digital Divide 数字鸿沟

☐☐☐ Describe issues that contribute to the digital divide. [Skill 5.C]

5.3 Computing Bias 计算偏见

☐☐☐ Explain how bias exists in computing innovations. [Skill 5.E]

5.4 Crowdsourcing 众包

☐☐☐ Explain how people participate in problem-solving processes at scale. [Skill 1.C]

5.5 Legal and Ethical Concerns 法律与伦理问题

☐☐☐ Explain how the use of computing can raise legal and ethical concerns. [Skill 5.E]

5.6 Safe Computing 安全计算

☐☐☐ Describe the risks to privacy from collecting and storing personal data on a computer system. [Skill 5.D]

☐☐☐ Explain how computing resources can be protected and can be misused. [Skill 5.E]

☐☐☐ Explain how unauthorized access to computing resources is gained. [Skill 5.E]