AP Computer Science Unit 5: Advanced Programming Structures

Unit #:	APSDO-00019739	Duration:	4.0 Week(s)	Date(s):	

Team:
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Grades:
11, 12
Subjects:
Mathematics, Science

Unit Focus

In this unit students focus on the creation of advanced data structures and algorithms. Topics include 1-D and 2-D arrays, ArrayLists, sorting and searching algorithms (Insertion Sort, Selection Sort, and Merge Sort). Students will use Big O notation to compare sorts and searches. Students will understand the differences between static and dynamic data structures. Summative assessments may include projects, labs and tests. Primary instructional materials include: Java Software Solutions for AP Computer Science, Lewis Loftus and Cocking, APCentral Computer Science Course Webpage.

Stage 1: Desired Results - Key Understandings

Established Goals

Common Core
Mathematics: 11

- Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
  CCSS.MATH.CONTENT.HSN.VM.C.6
- Use appropriate tools strategically.
  CCSS.MATH.MP.5

Transfer

T1 (T51) Examine alternate methods to accurately and efficiently solve problems.
T2 (T52) Use appropriate tools strategically to deepen understanding of mathematical concepts.
T3 (T31) Represent, summarize, and interpret data to clarify and solve problems or to make informed decisions.

Meaning

Understandings	Essential Questions
U1 (U502) Effective problem solvers identify and apply an appropriate model, tool, or strategy. **U2** (U511) Placing a problem in a category	**Q1** (Q541) How do I use tools to solve problems? **Q2** (Q503) What strategies/approaches are best for this problem?

	gives you a familiar approach to solving it. **U3** (U561) Recognition of patterns and structures fosters efficiency in solving problems.	**Q3** (Q541) How do I use tools to solve problems?
	Acquisition of Knowledge and Skill	
	Knowledge	**Skills**
		S1 The declarations, instantiation and use of one dimensional arrays **S2** The use of linear searches and binary searches on sorted and unsorted arrays and array lists **S3** The use of sorts on one dimensional data constructs **S4** The comparison of sort efficiencies using Big O notation **S5** Traversing two dimensional and multi dimensional data structures

Stage 3: Learning Plan

Coding	Code	Description of Learning Activity