

# AP Computer Science Unit 5: Advanced Programming Structures

<b>Unit #:</b>	APSDO-00019739	<b>Duration:</b>	4.0 Week(s)	<b>Date(s):</b>	
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**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	Transfer	
<p><b>Common Core</b> <i>Mathematics: 11</i></p> <ul style="list-style-type: none"> <li>• Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network. <i>CCSS.MATH.CONTENT.HSN.VM.C.6</i></li> <li>• Use appropriate tools strategically. <i>CCSS.MATH.MP.5</i></li> </ul>	<p><b>T1</b> (T51) Examine alternate methods to accurately and efficiently solve problems.</p> <p><b>T2</b> (T52) Use appropriate tools strategically to deepen understanding of mathematical concepts.</p> <p><b>T3</b> (T31) Represent, summarize, and interpret data to clarify and solve problems or to make informed decisions.</p>	
	Meaning	
	Understandings	Essential Questions
	<p><b>U1</b> (U502) Effective problem solvers identify and apply an appropriate model, tool, or strategy.</p> <p><b>U2</b> (U511) Placing a problem in a category</p>	<p><b>Q1</b> (Q541) How do I use tools to solve problems?</p> <p><b>Q2</b> (Q503) What strategies/approaches are best for this problem?</p>

		gives you a familiar approach to solving it. <b>U3</b> (U561) Recognition of patterns and structures fosters efficiency in solving problems.	<b>Q3</b> (Q541) How do I use tools to solve problems?
<b>Acquisition of Knowledge and Skill</b>			
		<b>Knowledge</b>	<b>Skills</b>
			<p><b>S1</b> The declarations, instantiation and use of one dimensional arrays</p> <p><b>S2</b> The use of linear searches and binary searches on sorted and unsorted arrays and array lists</p> <p><b>S3</b> The use of sorts on one dimensional data constructs</p> <p><b>S4</b> The comparison of sort efficiencies using Big O notation</p> <p><b>S5</b> Traversing two dimensional and multi dimensional data structures</p>
<b>Stage 3: Learning Plan</b>			
<b>Coding</b>	<b>Code</b>	<b>Description of Learning Activity</b>	