

## Unit 3: Advanced Data & Control Flow (4 weeks)

The following curriculum map is a day-by-day listing of the AP Computer Science course in Chronological order. Each row represents one day of class, based on a medium-paced class. Readings from the textbook and homework assignments are included on the day when they should be assigned. Refer to the Introduction document for information about how to adjust this pacing for your specific classroom.

- Unit 3 Slides
- Unit 3 Word Bank
- Curriculum Assets
- Consumer Review Lab

LP	Title	In Class	Reading	Homework
3.00	Test Review & Reteach	Algorithm for Solving Problems	3.1 up to “Limitations of Parameters”	Test corrections
3.01	Parameters	Practice SC 3.1 - 3.3	“3.1 “Limitations of Parameters”, “Multiple Parameters”, “Parameters versus Constants””	SC 3.4-3.7
3.02	Limitations of Parameters & Multiple Parameters	(Art project)	“3.1 “Overloading Methods”, 3.2 “Methods That Return Values””	Jazz up art project and program
3.03	Return Values	Practice SC 3.14 - 3.16		SC 3.17, E 3.1
3.04	Programming Project	WS 3.4 Equestria	3.3 up to “Interactive Programs and Scanner Objects”	SC 3.18, 3.19
3.05	Using Objects & String Processing	WS 3.5	3.3 “Interactive programming” and “Sample interactive program”	SC 3.19-3.21
3.06	Interactive Programs & Scanner Objects	Practice SC 3.24 - 3.26, (5th: 3.23 - 3.25); E 3.12, 3.14, 3.15		Outline Ch. 3 (omit 3.4)
3.07	Pokémon Battle Programming Project	WS 3.7 LP Battle		Summarize notes since last exam
3.08	Finding & Fixing Errors	Fix HW webmaker.org	4.1 up to “nested if else statements”	SC 4.1-4.4
3.09	Relational Operators & if/else	Operator Precedence Grudgeball	4.1 “Nested if/else” and “Flow of control”	SC 4.7-4.9; E 4.1-4.2
3.10	Nested if/else Statements	WS 3.10 TeaCh. mini-lessons Practice SC 4.5, 4.6, E 4.3	4.1, “Factoring if/else statements” and “Testing multiple conditions”	E 4.4, 4.5

LP	Title	In Class	Reading	Homework
3.11	Reducing Redundancy	(Refactoring com petition)	Read 4.2	Outline Ch. 4 (omit 4.4, 4.5)
3.12	Cumulative Algorithms	Tally code on board, Collaborative Programming Exercise WS 3.12	5.1 skip "do/while loops"	PP 4.2
3.13	while Loops	Practice SC 5.1 - 5.4, E 5.2 WS 3.13	5.1 "Random numbers"	E 5.2
3.14	Random Numbers	Practice SC 5.5-5.7; E 5.4, 5.5	5.2	PP 5.1
3.15	Fencepost & Sentinel Loops	WS 3.15 TeaCh. mini-lessons	5.3	E 5.6, 5.8
3.16.1	Boolean Logic	Practice SC 5.27, 5.29 WS 3.16 (RPS, Pig) DeMorgan's Law Poster 3.16.1 Poster 3.16.2		Outline Ch. 5 (through 5.3)
3.16.2	Boolean Logic (Day 2)			
3.17	Finding & Fixing Errors	(Fix HW)	Review Ch. 3-5	Submit questions for review
3.18.1	Consumer Review Lab (day 1)	Consumer Review Lab Activity 1		
3.18.2	Consumer Review Lab (day 2)	Consumer Review Lab Activity 2		
3.18.3	Consumer Review Lab (day 3)	Consumer Review Lab Activity 3		
3.18.4	Consumer Review Lab (day 4)	Consumer Review Lab Activity 4		
3.18.5	Consumer Review Lab (day 5)	Consumer Review Lab Activity 5		
3.18.6	Consumer Review Lab (day 6)	Consumer Review Lab Activity 5 (day 2)		
3.19	Review	(Review questions), WS 3.18 practice test		Study
3.99	Unit 3 test	Test 2 Guide Test 2 Section I Test 2 Section II		
3.XX	Alternative Project: Frac Calc			

LP	Title	In Class	Reading	Homework
3.XX1	Alternative Project: Calculator	work on project	conduct research	Continue working on project

### 3.00

Lesson 3.00	<i>Test Review &amp; Reteach</i>
<b>Objectives</b>	Students will re-learn or strengthen content knowledge and skills from Unit 2.
<b>Assessments</b>	Students will re-submit test answers with updated corrections for partial or full credit, depending on instructor preference.
<b>In Class</b>	Algorithm for Solving Problems
<b>Reading</b>	3.1 up to “ <i>Limitations of Parameters</i> ”
<b>Homework</b>	Test corrections

### 3.01

Lesson 3.01	<i>Parameters</i>
<b>Objectives</b>	Students will correctly construct formal and actual parameters (arguments). Students will predict the output of programs that use parameters.
<b>Assessments</b>	Students will teaCh. a mini-lesson explaining the relationship between parameters and values stored in memory. Students will submit Practice questions.
<b>In Class</b>	Practice SC 3.1–3
<b>Reading</b>	3.1 “ <i>Limitations of Parameters</i> ”, “ <i>Multiple Parameters</i> ”, “ <i>Parameters versus Constants</i> ”
<b>Homework</b>	SC 3.4–7

### 3.02

Lesson 3.02	<i>Limitations of Parameters &amp; Multiple Parameters</i>
<b>Objectives</b>	Students will modify programs using parameters and class constants to create original artworks.
<b>Assessments</b>	Students will complete an art project and “artist statement” justifying their programming choices.
<b>In Class</b>	Art project
<b>Reading</b>	3.1 “ <i>Overloading Methods</i> ” 3.2 “ <i>Methods That Return Values</i> ”
<b>Homework</b>	Jazz up art project and program

### 3.03

Lesson 3.03	<i>Return Values</i>
<b>Objectives</b>	Students will write a program that returns values.
<b>Assessments</b>	Students will complete Practice questions and write a program to meet a Pokémon Challenge.
<b>In Class</b>	Practice SC 3.14–16

Lesson 3.03	<i>Return Values</i>
<b>Reading</b>	
<b>Homework</b>	SC 3.17 E 3.1

### 3.04

Lesson 3.04	<i>Programming Project</i>
<b>Objectives</b>	Students will write a program that uses parameters, the math class, and returns values.
<b>Assessments</b>	Students will submit an Equestria program by the end of class.
<b>In Class</b>	WS 3.4 Equestria
<b>Reading</b>	3.3 up to “Interactive Programs and Scanner Objects”
<b>Homework</b>	SC 3.18–19

### 3.05

Lesson 3.05	<i>Using Objects &amp; String Processing</i>
<b>Objectives</b>	Students will be able to differentiate between primitive and object types. Students will apply 0-indexing and string processing techniques to predict the output of a program.
<b>Assessments</b>	Students will complete WS 3.5
<b>In Class</b>	WS 3.5
<b>Reading</b>	3.3 “Interactive Programming” and “Sample Interactive Program”
<b>Homework</b>	SC 3.19–21

### 3.06

Lesson 3.06	<i>Interactive Programs &amp; Scanner Objects</i>
<b>Objectives</b>	Students will write programs that accept user input using a scanner object.
<b>Assessments</b>	Students will complete Practice problems.
<b>In Class</b>	Practice SC 3.24–26 E 3.12,14,15
<b>Reading</b>	
<b>Homework</b>	Outline Ch. 3 (omit 3.4)

### 3.07

Lesson 3.07	<i>Pokémon Battle Programming Project</i>
<b>Objectives</b>	Students will write a program that requests user input and returns data.
<b>Assessments</b>	Students will write a program that calculates damage done to Pokémon in a battle.
<b>In Class</b>	WS 3.7 LP Battle
<b>Reading</b>	
<b>Homework</b>	Summarize notes since last exam

### 3.08

Lesson 3.08	<i>Finding &amp; Fixing Errors</i>
<b>Objectives</b>	Students will find errors and correct their previously submitted homework and classwork assignment.
<b>Assessments</b>	Students will re-submit all homework assignments with corrected answers.
<b>In Class</b>	Fix homework webmaker.org
<b>Reading</b>	4.1 up to “ <i>Nested If/Else Statements</i> ”
<b>Homework</b>	SC 4.1–4

### 3.09

Lesson 3.09	<i>Relational Operators &amp; if/else</i>
<b>Objectives</b>	Students will be able to evaluate relational expressions, predict and trace the flow of an if statement.
<b>Assessments</b>	Students will evaluate relational expressions and practice correct if statement syntax during a game of Grudgeball.
<b>In Class</b>	Operator Precedence Grudgeball
<b>Reading</b>	4.1 “ <i>Nested If/Else</i> ” and “ <i>Flow of Control</i> ”
<b>Homework</b>	SC 4.7–9 E 4.1–2

### 3.10

Lesson 3.10	<i>Nested if/else Statements</i>
<b>Objectives</b>	Students will be able to Choose which if statements to use for different problems Students will use correct syntax for the different if statements.
<b>Assessments</b>	Students will teaCh. a mini-lesson on sequential or nested if statements. Students will submit several Practice questions.
<b>In Class</b>	WS 3.10 TeaCh. mini-lessons Practice SC 4.5–6 E 4.3
<b>Reading</b>	4.1, “ <i>Factoring If/Else Statements</i> ” and “ <i>Testing Multiple Conditions</i> ”
<b>Homework</b>	EX 4.4–5

### 3.11

Lesson 3.11	<i>Reducing Redundancy</i>
<b>Objectives</b>	Students will simplify code and reduce redundancy by factoring if/else statements and testing multiple conditions simultaneously.
<b>Assessments</b>	Students will complete a class competition.
<b>In Class</b>	Refactoring competition
<b>Reading</b>	4.2
<b>Homework</b>	Outline Ch. 4 (omit 4.4, 4.5)

### 3.12

Lesson 3.12	<i>Cumulative Algorithms</i>
<b>Objectives</b>	Students will find and correct syntax errors in conditional cumulative algorithms.

Lesson 3.12	<i>Cumulative Algorithms</i>
<b>Assessments</b>	Students will write, modify, and correct programs written by others.
<b>In Class</b>	Tally code on board Collaborative Programming Exercise WS 3.12
<b>Reading Homework</b>	5.1 (skip “ <i>Do/While Loops</i> ”) PP 4.2

### 3.13

Lesson 3.13	<i>while Loops</i>
<b>Objectives</b>	Students will trace while loops to predict (1) the number of times the body executes and (2) the output of the code. Students will be able to differentiate between while loops, if statements, and for loops.
<b>Assessments</b>	Students will complete Practice questions.
<b>In Class</b>	Practice SC 5.1–4 E 5.2 WS 3.13
<b>Reading Homework</b>	5.1 “ <i>Random Numbers</i> ” EX 5.2

### 3.14

Lesson 3.14	<i>Random Numbers</i>
<b>Objectives</b>	Students will be able to write expressions that generate a random integer between any two values.
<b>Assessments</b>	Students will complete Practice questions.
<b>In Class</b>	Practice SC 5.5–7 E 5.4–5
<b>Reading Homework</b>	5.2 PP 5.1

### 3.15

Lesson 3.15	<i>Fencepost &amp; Sentinel Loops</i>
<b>Objectives</b>	Students will be able to describe when to use fencepost and sentinel loops. Students will use proper syntax to construct these control structures.
<b>Assessments</b>	Students will teaCh. a mini-lesson explaining the relationship between parameters and values stored in memory.
<b>In Class</b>	WS 3.15 TeaCh. mini-lessons
<b>Reading Homework</b>	5.3 EX 5.6,8

### 3.16.1

Lesson 3.16	<i>Boolean Logic (Day 1)</i>
<b>Objectives</b>	Students will work in pairs to write a game that plays Rock Paper Scissors.
<b>Assessments</b>	Students will submit a program at the end of 2 or 3 class periods.

Lesson 3.16	<i>Boolean Logic (Day 1)</i>
<b>In Class</b>	Practice SC 5.27, 5.29 WS 3.16 (RPS, Pig) DeMorgan's Law Poster 3.16.1 Poster 3.16.2
<b>Reading Homework</b>	Outline Ch. 5 (through 5.3)

### 3.16.2

Lesson 3.16	<i>Boolean Logic (Day 2)</i>
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### 3.17

Lesson 3.17	<i>Finding &amp; Fixing Errors</i>
<b>Objectives</b>	Students will find errors in their returned homework assignments, and correct their code.
<b>Assessments</b>	Students will re-submit all homework assignments with corrected answers.
<b>In Class</b>	Fix homework
<b>Reading</b>	Review Ch. 3–5
<b>Homework</b>	Submit questions for review

### 3.18.1

Lesson 3.18	<i>Consumer Review Lab (Day 1)</i>
<b>Objectives</b>	Students will complete a long-form lab, using string literals, static methods, if statements, while loops, algorithms, and the String class.
<b>Assessments</b>	Students will complete the College Board's AP CS A Consumer Review Lab. Students will answer end of activity Check your understanding and complete Open-ended activity.
<b>In Class</b>	Lab: Consumer Review Lab Consumer Review Lab Activity 1
<b>Reading Homework</b>	

### 3.18.2

Lesson 3.18	<i>Consumer Review Lab (Day 2)</i>
<b>Objectives</b>	
<b>Assessments</b>	
<b>In Class</b>	Consumer Review Lab Activity 2
<b>Reading Homework</b>	

### 3.18.3

Lesson 3.18	<i>Consumer Review Lab (Day 3)</i>
<b>Objectives</b>	
<b>Assessments</b>	
<b>In Class</b>	Consumer Review Lab Activity 3
<b>Reading</b>	
<b>Homework</b>	

#### 3.18.4

Lesson 3.18	<i>Consumer Review Lab (Day 4)</i>
<b>Objectives</b>	
<b>Assessments</b>	
<b>In Class</b>	Consumer Review Lab Activity 5
<b>Reading</b>	
<b>Homework</b>	

#### 3.18.5

Lesson 3.18	<i>Consumer Review Lab (Day 5)</i>
<b>Objectives</b>	
<b>Assessments</b>	
<b>In Class</b>	Consumer Review Lab Activity 5
<b>Reading</b>	
<b>Homework</b>	

#### 3.18.6

Lesson 3.18	<i>Consumer Review Lab (Day 6)</i>
<b>Objectives</b>	
<b>Assessments</b>	
<b>In Class</b>	Consumer Review Lab Activity 5 (day 2)
<b>Reading</b>	
<b>Homework</b>	

#### 3.19

Lesson 3.19	<i>Review</i>
<b>Objectives</b>	Students will identify weaknesses in their Unit 3 knowledge.
<b>Assessments</b>	Students will create a personalized list of review topics to guide tonight's study session.
<b>In Class</b>	Review questions WS 3.18 Practice Test
<b>Reading</b>	
<b>Homework</b>	Study

#### 3.99



Unit 3 Test	<i>Advanced Data &amp; Control Flow</i>
<b>Guide</b>	Test 2 Guide
<b>In Class</b>	Test 2 Section I Test 2 Section II

### 3.XX

Unit 3 Alternative Project	<i>Frac Calc</i>
<b>In Class</b>	Frac Calc

### 3.XX1

Unit 3 Alternative Project	<i>Programming Project (FracCalc Alternative)</i>
<b>Guide</b>	[Consumer Review Lab] []
<b>Objectives</b>	Students will conduct user-centered research, plan and create, and test, evaluate, and share the end product.
<b>Assessments</b>	Students will submit project for end of Unit 3 assessment.
<b>In Class</b>	Students are expected to work on project in class.
<b>Reading</b>	Students are expected to conduct research
<b>Homework</b>	Continue working on project.

### Abbreviations

- **WS** — Worksheet
- **SC** — Self-Check problem (in the textbook)
- **EX** — Exercise (in the textbook)
- **PP** — Programming Project (in the textbook)