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	*Test Review & Reteach*
Objectives	Students will re-learn or strengthen content knowledge and skills from Unit 2.
Assessments	Students will re-submit test answers with updated corrections for partial or full credit, depending on instructor preference.
In Class	Algorithm for Solving Problems
Reading	3.1 up to "*Limitations of Parameters*"
Homework	Test corrections

3.01

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

3.02

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

3.03

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

Lesson 3.03	*Return Values*
Reading	
Homework	SC 3.17 E 3.1

3.04

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

3.05

Lesson 3.05	*Using Objects & String Processing*
Objectives	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.
Assessments	Students will complete WS 3.5
In Class	WS 3.5
Reading	3.3 "*Interactive Programming*" and "*Sample Interactive Program*"
Homework	SC 3.19–21

3.06

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

3.07

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

3.08

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

3.09

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

3.10

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

3.11

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

3.12

Lesson 3.12	*Cumulative Algorithms*
Objectives	Students will find and correct syntax errors in conditional cumulative algorithms.

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

3.13

Lesson 3.13	*while Loops*
Objectives	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.
Assessments	Students will complete Practice questions.
In Class	Practice SC 5.1–4 E 5.2 WS 3.13
Reading	5.1 "*Random Numbers*"
Homework	EX 5.2

3.14

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

3.15

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

3.16.1

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

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

3.16.2

Lesson 3.16	*Boolean Logic (Day 2)*

3.17

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

3.18.1

Lesson 3.18	*Consumer Review Lab (Day 1)*
Objectives	Students will complete a long-form lab, using string literals, static methods, if statements, while loops, algorithms, and the String class.
Assessments	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.
In Class	Lab: Consumer Review Lab Consumer Review Lab Activity 1
Reading	
Homework	

3.18.2

Lesson 3.18	*Consumer Review Lab (Day 2)*
Objectives	
Assessments	
In Class	Consumer Review Lab Activity 2
Reading	
Homework	

3.18.3

Lesson 3.18	*Consumer Review Lab (Day 3)*
Objectives	
Assessments	
In Class	Consumer Review Lab Activity 3
Reading	
Homework	

3.18.4

Lesson 3.18	*Consumer Review Lab (Day 4)*
Objectives	
Assessments	
In Class	Consumer Review Lab Activity 5
Reading	
Homework	

3.18.5

Lesson 3.18	*Consumer Review Lab (Day 5)*
Objectives	
Assessments	
In Class	Consumer Review Lab Activity 5
Reading	
Homework	

3.18.6

Lesson 3.18	*Consumer Review Lab (Day 6)*
Objectives	
Assessments	
In Class	Consumer Review Lab Activity 5 (day 2)
Reading	
Homework	

3.19

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

3.99

Unit 3 Test	*Advanced Data & Control Flow*
Guide	Test 2 Guide
In Class	Test 2 Section I Test 2 Section II

3.XX

Unit 3 Alternative Project	*Frac Calc*
In Class	Frac Calc

3.XX1

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