



**CODE**  
WITH US

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# COMPUTER SCIENCE

## SOFTWARE DEVELOPMENT IN JAVA





# LEVEL 1 - JAVA

DURATION - 5 WEEKS (1 TO 2 HRS/WK)

VARIABLE CREATION AND CONVENTIONS  
DATA TYPES (STRING, INT, FLOAT, BOOLEAN)  
PRINT STATEMENTS  
TAKING USER INPUT  
IF AND ELSE STATEMENTS

## SAMPLE PROJECTS

- BITCOIN CONVERSION (ASK THE USER FOR USD AND CONVERT TO BITCOIN)
- MONEY GAME (USER INPUTS PENNIES, NICKELS, DICES, AND QUARTERS AND THE PROGRAM CONVERTS THEM TO DOLLARS)
- ROCK, PAPER, SCISSORS (USER CHOOSES A MOVE AND THE PROGRAM CHOOSES A MOVE RANDOMLY AND THEN CALCULATES THE WINNER)
- CALCULATOR (MAKE A BASIC CALCULATOR WITH ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION)

# LEVEL 2 - JAVA

DURATION - 5 WEEKS (1 TO 2 HRS/WK)

BOOLEAN LOGIC WITH AND/OR OPERATORS  
WHILE LOOPS AND FOR LOOPS  
STRING CREATION  
STRING SLICING AND INDEXING  
SEARCHING STRINGS WITH LOOPS

## SAMPLE PROJECTS

- PIG LATIN (ASK THE USER FOR A SENTENCE AND TRANSLATE IT TO PIG LATIN BY FOLLOWING ITS RULES)
- HANGMAN (SELECT A RANDOM WORD FROM AN ARRAY, ASK USERS TO GUESS LETTERS UNTIL THEY GUESS THE WORD OR RUN OUT OF LIVES)
- WORDLE (SELECT A RANDOM WORD FROM AN ARRAY, ASK THE USER TO GUESS FIVE LETTER WORDS AND THEN LET THE USER KNOW WHAT LETTERS ARE IN THE RIGHT PLACE OR WRONG PLACE BUT IN THE WORD. THEY HAVE 6 GUESSES TO GET IT RIGHT)



## LEVEL 3 - JAVA

DURATION - 5 WEEKS (1 TO 2 HRS/WK)

CREATING FUNCTIONS WITH OR WITHOUT INPUTS  
USING FUNCTIONS TO MAKE CODE MORE READABLE AND REUSABLE  
CREATING ARRAYS WITH OR WITHOUT ITEMS  
ARRAY NOTATION FOR CHANGING ELEMENTS  
USING FOR LOOPS TO SEARCH ARRAYS

### SAMPLE PROJECTS

- SNAKE AND LADDERS (USERS WILL ROLL A DICE AND VIRTUALLY PLAY THE BOARD GAME SNAKES AND LADDERS. THE GAME BOARD WILL BE ORGANIZED USING AN ARRAY)
- TICTACTOE (USER WILL BE ASKED TO PLAY AGAINST A NAIVE COMPUTER IN A CLASSIC GAME OF TIC TAC TOE)
- SECRET MESSAGES ( THIS PROGRAM GETS PLAYER INPUT FOR A MESSAGE AND USES A PLAYER-SPECIFIED KEY TO ENCRYPT/DECRYPT THE MESSAGE USING THE CAESAR CIPHER METHOD)

## LEVEL 4 - JAVA

DURATION - 5 WEEKS (1 TO 2 HRS/WK)

SWITCH STATEMENTS  
ARRAYS VS ARRAYLISTS  
BUILT-IN ARRAYLIST FUNCTIONS  
USING FOR LOOPS TO SEARCH ARRAYLISTS

### SAMPLE PROJECTS

- POKEMON REGISTRY (USER WILL TAKE THE INFORMATION GIVEN BY THE USER ABOUT A POKEMON AND ITS OWNER AND STORE IT INTO ARRAYLISTS. IT WILL THEN ALLOW THE USER TO SEARCH THE DATA AND ASK FOR SPECIFIC PETS)
- PERSONALITY QUIZ (USERS WILL BE ASKED QUESTIONS, AND THEIR ANSWERS WILL DETERMINE WHETHER THEY ARE AN INTROVERT OR AN EXTROVERT)
- TEXT ADVENTURE GAME (THE GAME OFFERS THE PLAYER SEVERAL OPTIONS TO CHOOSE FROM AND CONTINUE IN THE GAME. THE GOAL IS TO GET INTO THE TOWN - KILL THE GOBLIN TO BE ALLOWED IN)



# LEVEL 5 - JAVA

DURATION - 5 WEEKS (1 TO 2 HRS/WK)

OBJECTS AND OBJECT CREATION

METHODS WITHIN OBJECTS

STATIC, PUBLIC, PRIVATE KEYWORDS

OVERRIDING METHODS

CREATING INSTANCES OF OBJECTS

INHERITANCE AND POLYMORPHISM

## SAMPLE PROJECTS

- POKEMON BATTLE SIMULATOR (STUDENTS WILL CREATE A POKEMON CLASS, CREATE METHODS FOR BATTLING, AND THEN SIMULATE A BATTLE BETWEEN TWO POKEMON)
- BLACKJACK GAME (CREATES A DECK OF CARDS USING OBJECTS, USERS WILL BE ABLE TO PLAY BLACKJACK AGAINST THE COMPUTER)

# LEVEL 6 - JAVA

DURATION - 6 WEEKS (1 TO 2 HRS/WK)

INTRODUCTION TO 2D ARRAYS

USING LOOPS TO SEARCH 2D ARRAYS

INTRODUCTIONS TO JAVA.SWING GRAPHICS

BUTTONS, JFRAMES, AND VISUAL EDITOR

GRAPHICS AND OVERRIDING PAINT FUNCTION

KEYLISTENER AND MOUSELISTENER CLASSES

## SAMPLE PROJECTS

- CONNECT 4 (USING A 2D ARRAY STUDENTS WILL BUILD A TEXT-BASED CONNECT 4 GAME. USERS WILL PLAY AGAINST A SIMPLE AI)
- VISUAL CALCULATOR (USERS WILL BE ABLE TO USE A VISUAL CALCULATOR THAT ALLOWS THEM TO PUSH BUTTONS TO UTILIZE THE CALCULATOR. IT WILL BE ABLE TO ADD, SUBTRACT, MULTIPLY AND DIVIDE)
- BOUNCING BALL SIMULATION (PROGRAM WILL ALLOW USERS TO CLICK ON A SCREEN TO CREATE A BALL THAT WILL BOUNCE OFF THE EDGES OF THE PROGRAM WINDOW. IT WILL ALSO CHANGE TO A RANDOM COLOR EVERY TIME IT COLLIDES WITH A WALL)



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# LEVEL 7 - JAVA

DURATION - 6 WEEKS (1 TO 2 HRS/WK)

INTRODUCTION TO LIGHTWEIGHT JAVA GAME LIBRARY

START CODE AND LOOP CODE

CREATING GAME OBJECTS

COLLISION DETECTION

ERROR CHECKING

GRAPHICS AND ANIMATIONS

## SAMPLE PROJECTS

- SPACE SHOOTER (CREATE A GAME WHERE ENEMIES WILL SPAWN FROM THE TOP OF THE SCREEN AND THE USER WILL BE ABLE TO MOVE WITH ARROW KEYS AND SHOOT MISSILES AT ENEMIES)
- PLATFORMER GAME (CREATE A GAME WHERE A USER WILL BE ABLE TO JUMP FROM PLATFORM TO PLATFORM TO REACH A GOAL)
- CUSTOM GAME (STUDENTS WILL CREATE THEIR OWN CUSTOM GAME USING THE GAME ENGINE. GAMES MUST HAVE AN OBJECTIVE)

# LEVEL 8 - JAVA

DURATION - 6 WEEKS (1 TO 2 HRS/WK)

RECURSION AND WHY IT IS IMPORTANT

LINEAR SEARCH

BINARY SEARCH

SELECTION SORT

MERGE SORT

INSERTION SORT

## SAMPLE PROJECTS

- FIBONACCI RECURSION PROBLEM (A FUNCTION WILL ALLOW THE USER TO CALCULATE THE NTH FIBONACCI NUMBER USING RECURSION)
- ALGORITHMIC PROBLEMS (SELECTION OF CORRECT STRATEGIES TO SORT OR SEARCH A DATA SET)



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# TECHNOLOGY REQUIREMENTS

DESKTOP, LAPTOP OR CHROMEBOOK WITH MICROPHONE AND SPEAKER (CAMERA IS OPTIONAL)

MOUSE FOR EFFICIENT BROWSING

UPDATED WEB BROWSER (EXAMPLE; CHROME, FIREFOX, OR SAFARI)

HIGH-SPEED INTERNET CONNECTION

A PROJECTOR OR SMARTBOARD IN THE CLASSROOM

HEADPHONES ARE RECOMMENDED FOR THE STUDENTS TO EFFECTIVELY COMMUNICATE WITH TEACHERS IN ONLINE CLASSROOMS.

ACCESS TO [HTTPS://PORTAL.CODEWITHUS.COM](https://portal.codewithus.com)

\*THE CLASSES ARE LECTURE STYLE, COMPLETION TIME MAY VARY BASED ON LEARNING PACE AND PRIOR KNOWLEDGE.

