Backend Development with Java SE

Fundamentals of Programming

Detailed Course Syllabus

Instructor:	*© Elvin Taghizade*
Duration:	*1 months*
Lesson time:	*3 times a week, 2 hours each lesson*

A. First Part - Programming basics with Java

1. Introduction / Software Setup
    a. Introduction to ICT (Career plan)
        - Syllabus introduction & course procedures
        - Requirements
        - Basics of ICT
        - Information in digital form, number systems, binary system
    b. What is programming?
        - Introduction to Programming
        - Algorithmic thinking, reasoning
    c. What are Programming Languages (PLs)?
    d. How to choose a PL to learn?
    e. JDK, JRE, JVM, IDE?
        - Platform independency, C++ vs Java
        - javac vs java
        - How to compile & run java code from terminal/cmd
        - .java and .class files - source code & bytecode & machine code
        - Compiling vs interpretation vs running
        - JDK & JRE & JVM?
        - IDEs - Intellij IDEA, NetBeans, Eclipse
    f. What is VCS (Git / GitHub)?
        - Git download and installing
        - Overview about version control systems
        - Initializing or cloning a repository
        - Basic git commands: clone, status, add, commit, push, pull
2. Java basics
    a. Java syntax, writing first “Hello, World!” app in Java
    b. Manifest: public static void main (String[] args) { ... }
    c. Print to console
        - System.out.print(“Hello, World”);
        - System.out.println(“Hello, World”);
        - System.out.printf(“Hello, %s”, “World”);
        - System.out.printf(“Hello, World: %.2f\n”, 50.0);
    d. Storing data - Variables - declaration & initialization
    e. Data types
        - Primitive types
            a. byte, short, int, long, float, double,
            b. char, boolean
        - Reference types

   f. Comments
      - Single line comment
      - Multiple lines (block) comment
      - Documentation comment
   g. Operations
      - Arithmetic operations
      - Relational operations
      - Logical operations
      - Assignment operations
      - Miscellaneous operations
3. Control Flow
   a. Input from console - Scanner class
   b. Code structure: input -> process -> output
   c. Conditional statements
      - if
      - if - else
      - if - else if - else
      - switch - case
      - Ternary operator
   d. Loops
      - for
      - while
      - do-while
      - break, continue
   e. Nested conditions and loops
4. Arrays
   a. Declaration, initialization of arrays
   b. Operations on an array (fill, print, find max, min, copy etc.)
   c. Enhanced for loop (“for-each”)
   d. How memory works for arrays (stack vs heap memory)
   e. Two and more dimensional arrays
5. Methods
   a. Declaration of methods, method signature
   b. Parametric & non-parametric methods
   c. Void & value methods
   d. Overloading, rules for overloading
6. String class
   a. Character array and understanding String
   b. String under the hood
   c. Methods of String class (some)

- toLowerCase() & toUpperCase()
- substring() & trim()
- indexOf(String s) & indexOf(int i)
- split(), replace(), length(), concat()

d. Memory (RAM) intro (stack vs heap)
e. Memory for String management, String pool
f. Reference and how this works?
g. Passing values
    - Passing-by-value
    - Passing-by-reference
h. String concatenation:
    - “+” operator for strings
    - concat()
    - StringBuilder
    - StringBuffer
    - Comparison of above solutions

7. First exam - Fundamentals of Programming