Backend Development with Java

"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
      - 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, init, status, add, commit, push, pull
   g. Quiz & Practice
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

      h. Quiz & Practice

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
    f. Quiz & Practice

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
    f. Quiz & Practice

5. Methods
    a. Declaration of methods, method signature
    b. Parametric & non-parametric methods
    c. Void & value methods
    d. Overloading, rules for overloading
    e. Quiz & Practice

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
    i. Quiz & Practice
7. Problem Solving with predefined tasks/games
        ● Number guess game
        ● Ship battle game
        ● Week planner game

8. Module01 Final Exam