Backend Development with Java

“Java Standard Edition & Java 8 Features”

Detailed Course Syllabus

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

A. Second Part - Object Oriented Programming & Java 8

1. Object-Oriented Programming (OOP)
    a. Object and class
    b. Constructors, object initialization
    c. Types of variables
        - Instance variables
        - Local variables
        - Static (global) variables
    d. Static vs non-static methods and variables
    e. References/Garbage Collection
    f. Getters and setters
2. Object-Oriented Programming (OOP)
    a. Encapsulation
        - Access modifiers
        - Getters-setters
    b. Quiz & Practice
    c. Inheritance
        - IS-A relationship
        - HAS-A relationship
        - Object class
        - toString(), equals(), hashcode()
    d. Quiz & Practice
    e. Polymorphism
    f. Quiz & Practice
    g. Abstraction
    h. Quiz & Practice
    i. Keywords: this & super & instanceof
    j. @Override
    k. Compile-time (overloading) vs runtime (overriding) polymorphism
3. Object-Oriented programming (OOP)
    a. Abstract classes
    b. Quiz & Practice
    c. Interfaces
    d. Quiz & Practice
    e. Abstract classes vs interfaces in depth
    f. Functional & Marker Interfaces
    g. Quiz & Practice

4. Object-Oriented programming (OOP)
    a. Enumeration
    b. Immutability
        - Final class
        - Final method
        - Final fields, parameters
        - recursive immutability
    c. Var keyword
5. Object-Oriented programming (OOP)
    a. Packaging, built-in packages
    b. Importing: single vs whole imports, static imports
    c. UML diagrams for class designing
    d. Wrapper types
    e. Casting (upcating, downcasting)
    f. Boxing and unboxing. Autoboxing
    g. Quiz & Practice
6. Date and Time API
    a. LocalDate
    b. LocalTime
    c. LocalDateTime
    d. Date vs LocalDate
    e. java.util.Date vs java.sql.Date
7. Exceptions
    a. Exception hierarchy
    b. Error vs Exception
    c. Checked and unchecked exceptions
    d. Try-catch
    e. Multiple catch and union catch
    f. Swallowing exceptions
    g. Custom Exceptions
    h. throw vs throws
    i. Quiz & Practice

8. Module02 Midterm/Part01 Exam

9. Generics & Optional
    a. Need for Generics
    b. Diamond operator
    c. Type wildcards (lower and upper bounds)
    d. Generic class definitions
    e. Generic method definitions
    f. Optional class and its usage
    g. Introduction to Functional Programming
    h. Method chaining strategy
    i. Practice
10. Sorting and Comparing
    a. Comparable vs Comparator, ***Hackerrank Task Link!!!***
    b. Functional Interfaces, Common Functional Interfaces in Java8
    c. Anonymous classes & methods, lambda expressions
    d. Method references
    e. Arrays.sort()
    f. Quiz & Practice
11. Introduction to Algorithms
    a. Introduction to complexity analysis
        - Worth case scenario (Big O)
        - Best case scenario (Big Omega)
    b. Searching
        - Linear search
        - Binary search
    c. Sorting
        - Bubble sort
        - Selection sort
        - Merge sort
12. Introduction to Data Structures
    a. Introduction to Java Collection Framework (API)
        - ArrayList
        - LinkedList
        - Map,
            a. Hashing vs Encoding vs Encryption
            b. Contract between equals() and hashcode()
        - Set
        - Queue vs Deque (Stack)
        - HashSet vs LinkedHashSet vs TreeSet
        - HashMap vs LinkedHashMap vs TreeMap
        - Quiz & Practice

13. Introduction to Java Stream API
    a. Introduction to Java Stream API
    b. Input --> Process --> Output
    c. Controller --> Service --> DAO
    d. Source --> Intermediate --> Terminal operations
    e. Quiz & Practice
14. File Input/Output
    a. File reading and writing with “io”
    b. Input, output, error with System class (in, out, err)
    c. Character streams vs byte streams
    d. FileReader and FileWriter
    e. Buffered file operations
    f. File reading and writing with “nio”
    g. Try-with-finally
    h. Try-with-resources
    i. Quiz & Practice
15. Serialization & Reflection
    a. Serialization, object streams
    b. Writing object into file (text, binary & object)
    c. Binary vs XML vs JSON serialization
    d. Transient keyword and its mechanism
    e. Introduction to Reflection API
    f. Java class object, fields, methods, constructors
    g. Dynamic invocation, annotations
16. Multithreading
    a. Introduction to multithreading, process vs thread vs task
    b. Thread class
    c. Runnable interface
    d. Callable interface
    e. Execution service
    f. Concurrency API
    g. Atomic Scalars
17. Creating proper project structure
    a. Build tools & packaging with Maven & Gradle
    b. Step Project Intro
    c. Module02 final exam preparation
    d. Quiz & Practice
18. Student Management App Coding via DAO(in-memory & file) GitHub
19. Module02 Final Exam