JAVA

The training is grouped into modules in order to gain better knowledge of participants and connect the different areas used in Java programming.

Modules:

- Module 1 (48 classes): **Structural programming**
  - Introduction to programming languages and algorithms
  - Algorithms of linear, branched structures and cyclic structures
  - Advanced algorithms
  - Development environment preparation, data types, libraries, mathematical functions (Math)
  - Branched structures (if, switch)
  - Cyclic structures (for, while, do while)
  - Defining, calling and applying functions
  - One-dimensional arrays
  - Matrices (two-dimensional arrays)
  - Functions with arrays and matrices
  - Work with input-output files
  - Working with files
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- Module 2 (54 classes): **Object Oriented Programming**
  - Introduction to object oriented programming
  - Basic concepts of Java programming language
  - Classes, methods and attributes, toString method
  - Access modifiers
  - Constructors
  - Static attributes and methods
  - Date, time, calendar (Gregorian Calendar)
  - Collections
  - Arrays
  - Lists (ArrayList, LinkedList, HashSet, HashMap)
  - Inheriting classes and constructors
  - Polymorphism (Override and Overload methods)
  - Object instance compatibility
  - Abstract classes and methods
  - Final classes, methods and attributes
  - Interfaces and their implementation
  - Exceptions and their processing (try-catch-finally block and keyword throw)
  - Hierarchy of exceptions

- Module 3 (24 classes): **Advanced object oriented programming**
  - Competitive programming

- Creating threads via the Thread class or the Runnable interface
- Merge, synchronize and thread priorities (highPriority, lowPriority)
- Software patterns of micro-architecture (Singleton, Builder, Observer, Template Method) and macro-architecture (MVC)
- Generic methods
- Network programming, Sockets

- Module 4 (12 classes): **Databases**
  - Basic database concepts
  - Data and information
  - Data models
  - Database management systems
  - Conceptual and physical model
  - Entities, instances, attributes and identifiers
  - Object-link model
  - Normalization of the first, second and third normal forms
  - Translating a conceptual model into a physical model
  - Creating a database based on a physical model
  - SQL quering
  - DDL - CREATE, ALTER, DROP and TRUNCATE commands
  - DML - SELECT, UPDATE, INSERT and DELETE commands

- Module 5 (12 classes): **Graphical user interface**
  - User interface concept
  - Forms (JFrame)
  - Layout
  - Open embedded option panels (JOptionPane)
  - Events, ActionListener, ActionEvent
  - User Interface Editor (Eclipse WindowBuilder)
  - User interface components
  - Panel (JRanel)
  - Multi-panel operation
  - MVC pattern in a user interface application
  - Connecting the application to the database
  - Creating CRUD methods
  - Validation of input data on the user interface

- Module 6 (12 classes): **UML design**
  - Modeling using UML
  - Use case diagrams
  - Class diagram
  - Activity diagram

    - UML sequence diagram
    - UML communication diagram

- Module 7 (24 classes): **Web programming**
    - Design of static web pages, HTML, CSS
    - Servlet JSP technology
    - JAX-RS API for RESTful Web Service
    - Routing
    - REST route testing
    - Use JavaScript language using the jQuery library

- Module 8 (54 classes): **Advanced Web programming**
    - Spring framework – concepts
    - Spring dependacy injection, DI
    - Spring aspect oriented programming, AOP
    - Spring application context
    - Spring Boot arthitecture
    - Spring model view controller, MVC
    - REST controllers
    - Route mapping
    - Java persistence api, JPA
    - Thymeleaf

- Module 9 (12 classes)**: Software testing**
    - Introduction to software testing
    - Testing by black and white box methods
    - Testing with JUnit framework
    - Test automation with SeleniumHQ framework