



Syllabus for Offline – Full Stack Development Course

- Programming Fundamentals – 2 weeks
 - Data Types, Variables, Methods, Conditional Statements, Loops
 - Data Structures, Pseudo Programming, IDEs
- Backend Development – 8 weeks
 - Java
 - Encapsulation, Abstraction, Inheritance, Polymorphism
 - Package, Import Statements, Class Structure, Constructors, Class Variables, Methods, Parameters. Object Creation, Object Utilisation, Object Lifecycle, Main Method execution, Naming Conventions
 - Private, public, protected, getters & setters, final, static, this
 - Primitive Types - int, float, double, char, byte, short, long, boolean. Non-primitive types - String, Object, enum. MetaData - Class, Interface. Data Type Casting
 - Method Execution, Stack visualisation, Local Variables, Class Level Variables, Function scope, Return types
 - Interfaces & Dependency Injection, Inheritance - super, Parent Child classes, Typecasting, Diamond Problem, Polymorphism - Override & Overload, Abstract classes, Anonymous Inner Classes
 - Arithmetic, Unary, Assignment, Relational, Logical, Ternary operators, Basic for loop, forEach loop, while loop, do while loop, if, else, else if, switch, case, continue
 - Array, ArrayList, LinkedList, HashTable, Set, HashMap, Stack, Queue, Collections special operations - sort, Comparator, Comparable, equals, hashCode
 - Daemon Programming, Multi-Threading, Producer-Consumer problem, Synchronization, Thread pools, Runnable, Threads
 - File I/O, File Streams, File Read/Write, Stream, Buffered Stream, Input Stream, Output Stream

- Try, catch, finally, throw, throws, Checked Exceptions, Runtime Exceptions, Object serialisation, transient, Object cloning - shallow/deep cloning, Generics & its uses, Annotations
- Database Drivers, Database I/O, Statement executions, ResultSet processing
- Thread & Heap Dump Generation, Configurations, Heap Dump Analysis, Thread Dump Analysis - IBM Heap Analyzer, JVisualVM
- Streams
- Spring Boot, Maven, REST APIs
 - Maven Build, Jenkins, Version Management, Class Loaders - Bootstrap, Extension, Application ClassLoaders, Jars
 - Spring Framework Introduction, Dependency Injection, Inversion of Control, Aspect Oriented Programming, Authentication, Authorisation, Transaction Management
 - @Autowired, @RestController, @ExceptionHandler, @ConfigurationProperties, @Value, @Transactional, @Component, @Service, @Repository, @Bean, @RequestMapping, @RequestBody, @ResponseBody, @RequestEntity, @ResponseEntity, @ComponentScan, @PathVariable, @RequestParam, @RequestAttribute, @RefreshScope
 - CrudRepository methods, Custom Queries, Named Queries
 - Write RestControllers, Services, Repositories & Test APIs using Postman. Different Http Methods - GET/POST/OPTIONS, Tomcat Deployment
 - Configuration files, get config values, refresh config updates using Actuators, Configuration Server, Configuration Client
 - Spring Security configuration - Authentication, Role Based Authorisation, OAuth Integration, CORS, CSRF, Open & Restricted APIs
 - @Transactional working principles - inside same class, between different classes. Rollback for Checked & Runtime Exceptions. Global Exception Advice Point & Efficient Exception Handling
 - FilterChain, Writing Custom Filters & Interceptors, Chaining Custom Filters & Interceptors
- Object-Oriented Programming (OOP): Classes, Objects, Inheritance, Abstraction, Polymorphism
- Multi-threading, Concurrency, Exception Handling, Database CRUD operations
- Database Management – 3 weeks
 - Relational Database Basics, Difference between SQL & No SQL Database. Market Product Examples - Postgres, Oracle, MySQL. Open source vs Licensed Databases. SQL Developer/PG Admin Basics

- PostgreSQL: Configuration, Queries, Tables Design, Indexing, Triggers
 - Postgres Installation & Setup, PgAdmin Installation
 - Servers, Databases, Schemas - Public & User Schemas, Tablespaces, Credential Management, Advanced Configurations, Locale & Timestamp
 - Char, Varchar, Numeric(Integer & Decimals), Data, Timestamp, Data Length Restrictions, Arithmetic, Comparison, Bitwise, Logical operators
 - Table Normalization, Data Definition Language(DDL), Data Manipulation Language(DML), Create table, Alter table, Drop table, Truncate table, Default column values, Serial(Sequences), Primary Key, Foreign Key, Constraints - Unique, Check, Not Null
 - Insert Query, Select Query, Where Clause, Delete Query, Update Query, Sorting
 - Substring, Upper, Lower, Trim, Pad, Concat, Ceil, Floor, Distinct, Like, Limit, In, Not In, Sysdate, Systimestamp, to_date, Row_Number, RowId
 - Inner Join, Outer Join, Left Outer Join, Right Outer Join, Sum, Concatenate, Min, Max, Average, Count, Group By, Having, Partition By
 - Union, Intersect, Except, Exists, Case, Subqueries, Aliases, With Clause
 - B-tree indexes, Create Index, Drop Index, Table Scan, Index Scan, Triggers
 - Commit, Rollback, Start Transaction, Close Transaction, Repeatable Read, Dirty Read, Read Committed
- MongoDB: Configuration, Collections, Sharding, Indexing
 - Mongo DB Installation & Setup
 - Read, Write - Collections & Documents
 - High Throughput Configurations for Read, Write
 - Sharding & Replica Configurations
 - Mongo Queries
 - Mongo Indexes
 - Logging
- Frontend Development – 4.5 weeks
 - HTML, CSS, JavaScript Basics, DOM Handling
 - DOM Structure
 - HTML Elements, Ids, Names, Classes – Paragraphs, Headings, Images, Lists, Forms, Links, Semantic HTML, Audio, Video

- CSS Styles – Basic Styling, Advanced Flex box & Grid Styling, Positioning, Indexes, Animations, Parent Child – Sibling Styling, Browser Support for different styles, Responsive Design, Psuedo Classes
- Javascript – Syntax, Variables, Functions, Functions Scope, Arrow Functions, DataTypes, Constants, Operators, Loops, DOM Manipulation, Arrays & Objects, Important Functions, Libraries, Closures, Promises, Error Handling
- ReactJS: Components, Hooks, Events, Redux Cache, Navigation
 - Component Based Architecture, Virtual DOM
 - Installation & Setup
 - Functional Components, Component Lifecycle, Developing Reusable Components, Parent Child Relationship
 - React State Handling – State Mutations, Parent Child State Mutations
 - Component properties
 - Event Handlers
 - Conditional Rendering
 - Lists & Keys
 - React Hooks – useState, useEffect, useContext, useMemo
 - React Navigation
 - Redux – Stores, Reducers, Actions, useDispatch, useSelector
 - Styling in React
- Data Structures & Algorithms – 24 weeks – 1 hour/day
 - Data Structures Basics
 - Mathematical Problems
 - Array Problems
 - 2D Array Problems
 - Sorting Problems – Bubble Sort, Quick Sort, Merge Sort, Heap Sort
 - String Problems
 - Hashing Problems
 - Bit Manipulation Problems
 - Recursion, Advanced Recursion Problems
 - Binary Search Problems
 - Two Pointer Problems
 - LinkedList Problems

- LRU Cache
- Stack Problems
- Queue Problems
- Binary Tree Problems – Traversal, Add, Delete, Search
- Heap Problems – Priority Queue, MinHeap, MaxHeap
- Greedy Problems
- Dynamic Programming Problems
- Graph Problems
- Trie Problems
- Low Level Design – 2 weeks
 - Creational Design Patterns
 - Builder, Singleton, Prototype, Factory, Abstract Factory
 - Structural Design Patterns
 - Decorator, Flyweight, Proxy, Facade, Bridge, Composite, Adapter
 - Behavioral Design Patterns
 - Chain of Responsibility, Observer, State and other patterns
 - Parking Lot Design
- System Design – 3 weeks
 - Microservices Design
 - Caching
 - Async Messaging
 - Real Time Chat App Design
 - BookMyShow Design
 - URL Shortener Design
 - Video Streaming App Design
 - Twitter Design
- Interview Preparation - Mock Interview – 1.5 weeks

