

Software Development Training Plan for 2025 Batch- NMIT

Semester A		
Module #	Module	Offline Teaching Duration (In Hrs)
Core Courses		
1	Programming Revision	55 Hours of Live Offline Teaching
2	Competitive Programing	
3	Object-Oriented Programming and Databases	
4	Operating Systems and Networking	
5	System Design	
6	Resume Review + Mock Interviews	
Specialisations/Elective Courses		
1	Full Stack Web Development Practicum	10 Hours of Live Offline Teaching
2	Cloud + DevOps Practicum	
3	Data Science & AI Practicum	
4	Cyber Security Practicum	

Detailed Curriculum

Programming Revision

- Offline Teaching Duration - 5 Hours
- Asynchronous Learning - 20 Hours
- Practice Assessment - 10 Hours
- Graded Assessment - 1 Hour

1. Basics of Programming
 - a. Syntax & Semantics

- b. Variables & Data Types
 - c. Operators & Expressions
- 2. Conditional Statements & Loops
 - a. If, Else, Switch
 - b. For, While, Do-While Loops
 - c. Break, Continue & Return
- 3. Functions & Modules
 - a. Function Definition & Calls
 - b. Recursion
 - c. Modular Programming & Libraries
- 4. File Handling
 - a. Reading & Writing Files
 - b. File Operations: Seek, Tell
 - c. Handling Exceptions

Competitive Programing

- Offline Teaching Duration - 25 Hours
 - Asynchronous Learning - 20 Hours
 - Practice Assessment - 10 Hours
 - Graded Assessment - 2 Hours
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- 1. Introduction to Data Structures
 - a. Importance of Data Structures
 - b. Need of Data Structures
 - c. Classification: Linear & Non-Linear
 - 2. Arrays & Linked Lists
 - a. Static Arrays
 - b. Dynamic Arrays
 - c. Singly Linked Lists
 - d. Doubly Linked Lists
 - e. Circular Linked Lists
 - 3. Stacks & Queues
 - a. Push Operation
 - b. Pop Operation
 - c. Enqueue
 - d. Dequeue
 - e. Expression Parsing
 - f. Queue Simulation
 - 4. Trees & Graphs
 - a. Binary Trees
 - b. Tree Traversals
 - c. Graph Representations
 - d. Adjacency List
 - e. Matrix

5. Basic Algorithms
 - a. Bubble Sort
 - b. Selection Sort
 - c. Insertion Sort
 - d. Linear Search
 - e. Binary Search
6. Algorithmic Complexity & Optimization
 - a. Big O Notation
 - b. Time & Space Complexity Analysis
7. Balanced Trees
 - a. AVL Trees: Rotations & Balancing
 - b. Red-Black Trees: Properties & Operations
8. Hash Tables & Hashing Techniques
 - a. Hash Functions & Collision Resolution
 - b. Separate Chaining & Open Addressing
9. Advanced Graph Algorithms
 - a. Dijkstra's & Bellman-Ford Shortest Path
 - b. Kruskal's & Prim's MST
10. Tries & Heaps
 - a. Trie Insertion, Search, & Deletion
 - b. Min-Heap & Max-Heap Operations

Object-Oriented Programming and Databases

- Offline Teaching Duration - 5 Hours
 - Asynchronous Learning - 5 Hours
 - Practice Assessment - 2 Hours
 - Graded Assessment - 1 Hour
1. Principles of OOP
 - a. Classes & Objects
 - b. Inheritance & Overriding
 - c. Polymorphism & Overloading
 - d. Encapsulation & Abstraction
 2. Introduction to Databases & SQL
 - a. Database Systems: RDBMS, NoSQL
 - b. Basic SQL Commands: SELECT, INSERT, UPDATE, DELETE
 - c. Keys in SQL
 3. CRUD Operations in SQL
 - a. JOIN Operations
 - b. Aggregate Functions: SUM, AVG, COUNT
 - c. Advance Functions: Window Functions, RANK, PERCENT etc
 4. File Organisation and Normalisation
 - a. Normalization in Databases

- b. Indexing in Databases
 - c. Triggers and Stored Procedures in Databases
 - d. Transaction and Concurrency Control
- 5. Database Design and Normalization
 - a. ER Diagrams
 - b. Normal Forms & Denormalization

Operating Systems and Networking

- Offline Teaching Duration - 5 Hours
 - Asynchronous Learning - 5 Hours
 - Practice Assessment - 2 Hours
 - Graded Assessment - 1 Hours
1. Basics of Operating Systems
 - a. Processes & Threads
 - b. Memory Management: Paging, Segmentation
 - c. I/O Management & Device Drivers
 2. Basics of Networking
 - a. OSI Model & TCP/IP Stack
 - b. IP Addressing & Subnetting
 3. Network Protocols and Services
 - a. HTTP, FTP, DNS, DHCP
 - b. VPN & Firewalls
 4. OS & Network Security Basics
 - a. Types of Threats & Attacks
 - b. Encryption & Authentication Methods

Advanced Coding and System Design

- Offline Teaching Duration - 10 Hours
 - Asynchronous Learning - 10 Hours
 - Practice Assessment - 2 Hours
 - Graded Assessment - 1 Hour
1. Design Patterns
 - a. Singleton, Factory, Observer
 - b. Strategy, Command, Decorator
 2. System Design Basics
 - a. Horizontal vs Vertical Scalability
 - b. Load Balancing: Algorithms & Techniques
 - c. Caching Mechanisms & Content Delivery Networks
 3. API Design & Microservices
 - a. RESTful API Principles
 - b. Microservices Architecture & Benefits
 4. Case Studies

- a. Analyzing Scalability of Social Networks
- b. E-commerce System Design

Full Stack Web Development

- Offline Teaching Duration - 10 Hours
 - Asynchronous Learning - 25 Hours
 - Practice Assessment - 3 Hours
 - Graded Assessment - 1 Hour
1. Basics of Web Development
 - a. Web Protocols: HTTP & HTTPS
 - b. HTML5 Elements & Attributes
 - c. CSS3 Selectors & Styling
 - d. JavaScript ES6+ Features
 2. Front-end Frameworks
 - a. React: Components
 - b. Props
 - c. States
 3. Back-end Development
 - a. Node.js: Asynchronous Programming,
 - b. Event Loop
 - c. MongoDB
 4. Full Stack Development Application
 - a. E-Commerce Web Application
 - b. Social Media Platform Application

Cloud + DevOps

- Offline Teaching Duration - 10 Hours
 - Asynchronous Learning - 5 Hours
 - Practice Assessment - 2 Hours
 - Graded Assessment - 1 Hour
1. Fundamentals of Cloud Computing
 - a. Introduction to Cloud Concepts
 - b. AWS Core Services Overview
 2. AWS Cloud Architecture
 - a. Designing Scalable Architectures
 - b. Managing AWS Resources and Services
 3. Introduction to DevOps Tools
 - a. Overview of Docker, Jenkins, Ansible, and Terraform
 - b. Setting Up a DevOps Toolchain
 4. Implementing DevOps Practices
 - a. Continuous Integration and Deployment with Jenkins
 - b. Containerization with Docker and Orchestration

- c. Configuration Management with Ansible
- d. Infrastructure as Code using Terraform

Data Science & AI

- Offline Teaching Duration - 10 Hours
 - Asynchronous Learning - 25 Hours
 - Practice Assessment - 3 Hours
 - Graded Assessment - 1 Hour
1. Advance SQL
 - a. Functions in SQL
 - b. Queries in SQL
 - c. Joins, Unions, Groupby in SQL
 - d. Window Functions in SQL
 2. Advance Python Programming
 - a. Control Flow, Data Structures
 - b. OOPS in Python
 - c. Data Wrangling using Numpy
 - d. Data Wrangling using Pandas
 - e. Data Visualization using Matplotlib and Seaborn
 3. Advance Machine Learning and Generative AI
 - a. Supervised Machine Learning
 - b. Unsupervised Machine Learning
 - c. Deep Learning
 - d. Natural Language Processing
 - e. Generative AI

Cyber Security

- Offline Teaching Duration - 10 Hours
 - Asynchronous Learning - 5 Hours
 - Practice Assessment - 2 Hours
 - Graded Assessment - 1 Hour
1. Cyber Security Essentials
 - a. Network Configuration and Management
 - b. System Administration
 - c. Securing Computing Systems
 - d. Penetration Testing
 - e. Bug Bounty
 2. Cloud Security
 - a. Introduction to Cloud Computing

- b. Malware Analysis
- c. Advance Cloud Security

Resume Review + Mock Interviews

- Offline Teaching Duration - 5 Hours
- Asynchronous Learning - NA
- Practice Assessment - 1 Hour
- Graded Assessment - 1 Hour
- 1. Crafting the Perfect Resume
 - a. Highlighting Key Achievements
 - b. Tailoring Resume to Job Role
- 2. Technical Interview Preparation
 - a. Data Structure & Algorithm Challenges
 - b. System Design & Architecture Discussions
- 3. Behavioral Interview Preparation
 - a. "Tell me about yourself"
 - b. STAR Technique: Situation, Task, Action, Result
- 4. Mock Interview Sessions
 - a. Real-time Feedback
 - b. Areas of Improvement & Strengths