

upGrad



International
Institute of Information
Technology Bangalore

EXECUTIVE PG PROGRAM IN SOFTWARE DEVELOPMENT

Three specializations. One destination.



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About

upGrad and IIITB

upGrad has delivered over 20 million hours of learning, delivering programs by collaborating with universities across the world including Duke CE, IIT Madras, IIIT Bangalore and Deakin Business School among others.

Online education is a fundamental disruption that will have a far-reaching impact. **upGrad** was founded taking this into consideration. upGrad is an online education platform to help individuals develop their professional potential in the most engaging learning environment.

Since inception, upGrad has delivered over 20 million hours of learning, delivering programs by collaborating with universities across the world including Duke CE, IIT Madras, IIIT Bangalore and Deakin Business School among others.

upGrad is focused on helping working professionals in their bid to learn, grow and move up in their career through a wide-range of programs designed to improve their expertise.

IIITB is a renowned university offering programs specialising in Computer Science, data science, machine learning and artificial intelligence.

The IIITB faculty includes an average of 15+ years of experience.

IIITB's experienced faculty will teach the core concepts of computer science along with important software development principles. These will be complemented by industry relevant case studies from major industry verticals by industry leaders with 8+ years of experience from upGrad's industry network.

The Executive PG Program in Software Development offers six specialisations in trending topics like in Full Stack Development, Cyber Security, Blockchain, Big data and others - a unique and exciting combination of core Computer Science concepts, development principles and industry-led, hands-on application development experience. Additionally, learners will get opportunities to work on industry-relevant projects and interact with industry experts through upGrad's strong industry network. The program has been designed keeping in mind that the future belongs to the software developers who can think and implement end-to-end

Why

upGrad?

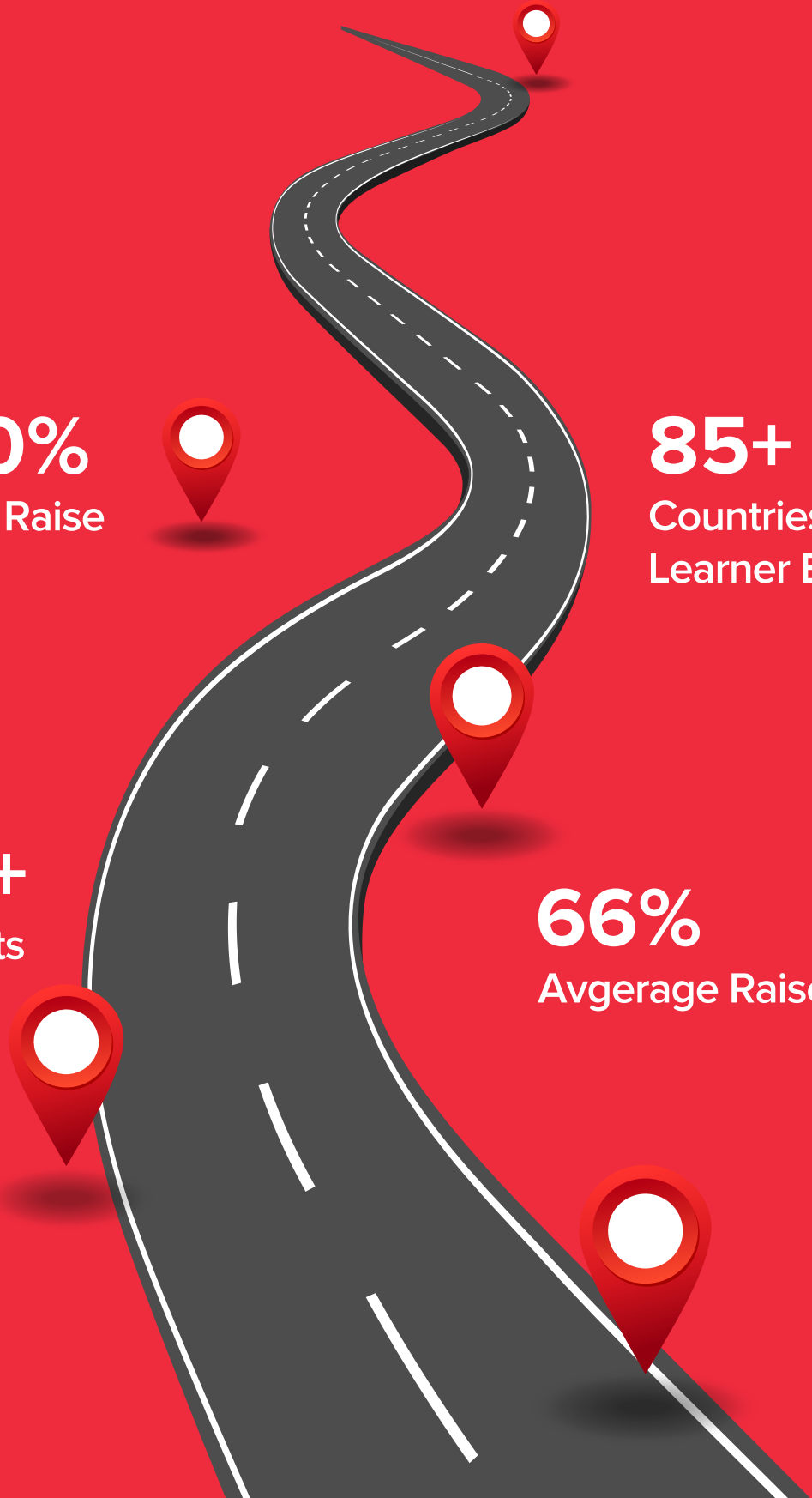
40,000+
Learners

400%
Highest Raise

85+
Countries
Learner Base

700+
Industry Experts

66%
Average Raise



Program

Highlights



Dedicated Career Assistance

Receive 360 degree career support. Attend mock interviews with hiring managers, resume building workshops and career fairs. Interact with industry mentors.



Blended Learning

Learn with the ease and flexibility of recorded sessions as well as live sessions, designed to ensure a wholesome learning experience.



For the Industry, by the Industry

Learn from 30+ case studies and industry experts who mentor you throughout the program.



Exclusive Access

Gain free access to micro-courses in Data Science and Machine Learning.



3 Specializations

Choose from 3 specializations on the basis of your background and career aspirations and get the learning you want.



Personalised Mentorship

Get unparalleled personalised mentorship and doubt resolution from IITB faculty and our panel of industry experts.



Executive PG Program from IITB and Alumni Status

Get certified by IITB and gain alumni status on successful completion of the program.



Learn from Academy &

Industry Experts



Chandrashekar Ramanathan

Dean Academics, IIITB

Prof. Chandrashekar has a PhD from Mississippi State University and experience of over 10 years in several multinational organisations.



Thangaraju B

Professor, IIITB

He has Ph.D in Physics and has published more than 60 papers on OSS and has presented Technical Papers at national and international level.



Ashutosh Shinde

Engineering Manager, IIITB

He has master's degree from IIT Kharagpur and 10+ years experience working as a software engineer in companies like Microsoft, Samsung, Netapp



Tricha Anjali

Ex-Associate Dean, IIITB

Prof. Anjali has a PhD from Georgia Institute of Technology as well as an integrated MTech (EE) from IIT Bombay.



Sujit Kumar Chakraborti

Assistant Professor, IIITB

Sujit Kumar Chakraborti has a Ph.D. from the department of Computer Science and Automation, Indian Institute of Science, Bangalore. Prior to that he has a masters from University of Roorkee (now IIT Roorkee) in measurement and instrumentation.



Abhijeet Singh

Sr. Software Manager, IIITB

He has Master's degree in computer science from IIT Roorkee and 15+ years of experience working in companies like Microsoft, Informatica and CA



Meenakshi Dsouza
Associate Professor, IIITB

She did her Master's in Mathematics from University of Madras, Chennai and her Ph. D. in Theoretical Computer Science from The Institute of Mathematical Sciences.



Cheng-Han Lee
Sr. Program Manager, ex-Microsoft

He has a masters degree in Computer Science from University of California and rich experience working as a curriculum architect for leading Ed-Tech Companies.



Nitin Gaur
Director Blockchain Labs, IBM

He completed his MBA in Finance from the university of Maryland and has worked in IBM for the past 19 years



Vishwanath Pattenshetti
Sr. System Analyst, IIITB

He has 20+ years of rich experience working in software industry for behemoths like Wipro Technologies, Hewlett Packard, and IBM.



Varun Sehgal
Director, FreeCharge

He is IIT Madras Alum and has worked as Director in Zomato and Snapdeal. Starting from Infosys he is now deeply rooted in new age consumer internet.



Prasanna Lohar
Head - Technology and Innovation, DCB Bank

He has 18+ years of experience as a technologist and innovator who has delivered innovative solution for industry-Leading enterprise

upGrad Learning

Experience

Format

- Online format with weekly live sessions from industry experts to help with topic walk-throughs, doubt resolution and personalised project feedback

A truly International Learning Experience

- Live Sessions by International Industry Experts on curriculum and advanced topics
- 1:8 Small Group Coaching Sessions by Global Experts for pro-active mentoring
- Global Career Coach
- 1:1 Session with Global Mentors
- Network with learners from 85+ countries
- Access to Global Job Opportunities
- All Live Interactive Sessions as per local time zones
- Student Support available 24*7

Coaching, Mentoring and Networking

- Weekly real-time doubt clearing sessions
- Live Discussion forum for peer-to-peer doubt resolution monitored by technical experts
- Peer-to-peer networking opportunities with an alumni pool of 40,000+ keen professionals
- 100+ commonly asked interview questions added across modules
- 4 Employability Tests for industry readiness
- Access to the program for up to 3 years
- Live interactive sessions with leading industry experts covering curriculum + advanced topics.
- Fortnightly personalised group (1:8) mentorship sessions with industry experts for pro-active mentoring.



Career Services

Just-In-Time Interviews

Get company and role-specific preparation with mock interviews right before your actual interviews.

Resume Review

Obtain specific, personalised inputs on your resume structure and content.

Personalised Mentorship

Get mentored by an experienced Tech industry expert and receive personalised feedback.

Career Mentor

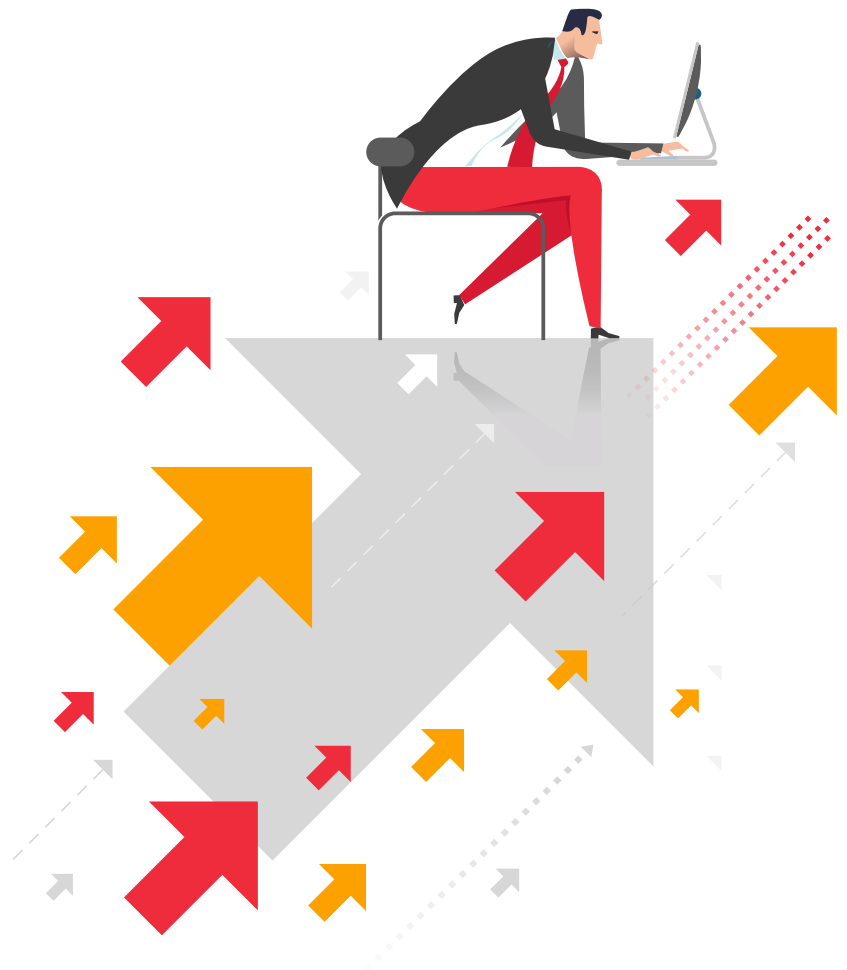
Get a dedicated career mentor to help track your weekly company application targets, coach you on your profile, and support you during your career transition journey.

Post Graduation Career Support

Career sessions are continued post graduation because we want you to have all the help you need. These include: access to all opportunities on upGrad's Job Portal & career assistance resources, access to 1:1 calls with Industry experts, live sessions by industry experts exclusively for alumni live & more.

Company-Specific Preparation

Get company-specific guidance with access to a carefully curated pool of interview resources per company to ensure you are interview-ready for the company of your choice.



Career Transition

Boot Camp

1. Learn skills to help you transition to Software Development roles (SD1, SD2, SD3, Senior Software Engineer, Senior Software Developer)

2. 1:1 Mentorship Sessions with Industry Experts

3. Exhaustive list of Interview Questions curated from Top Companies such as Amazon, Google & Microsoft

4. Personalized content basis your level of knowledge

5. Additional Employability Tests

6. Relevant for preliminary rounds of interview in Tech Companies

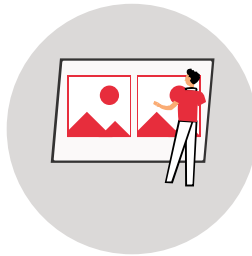


Industry

Projects



**Build a Social Q&A
community like Quora**



**Image viewer web
application like Instagram**



**Image uploader project
like Imgur**



**Blogging website like
blogger.com**



**Decentralised KYC process
for banks**



**Land records and property
registration**



**Supply chain &
logistics**



**Drug traceability & patient data
management- healthcare**

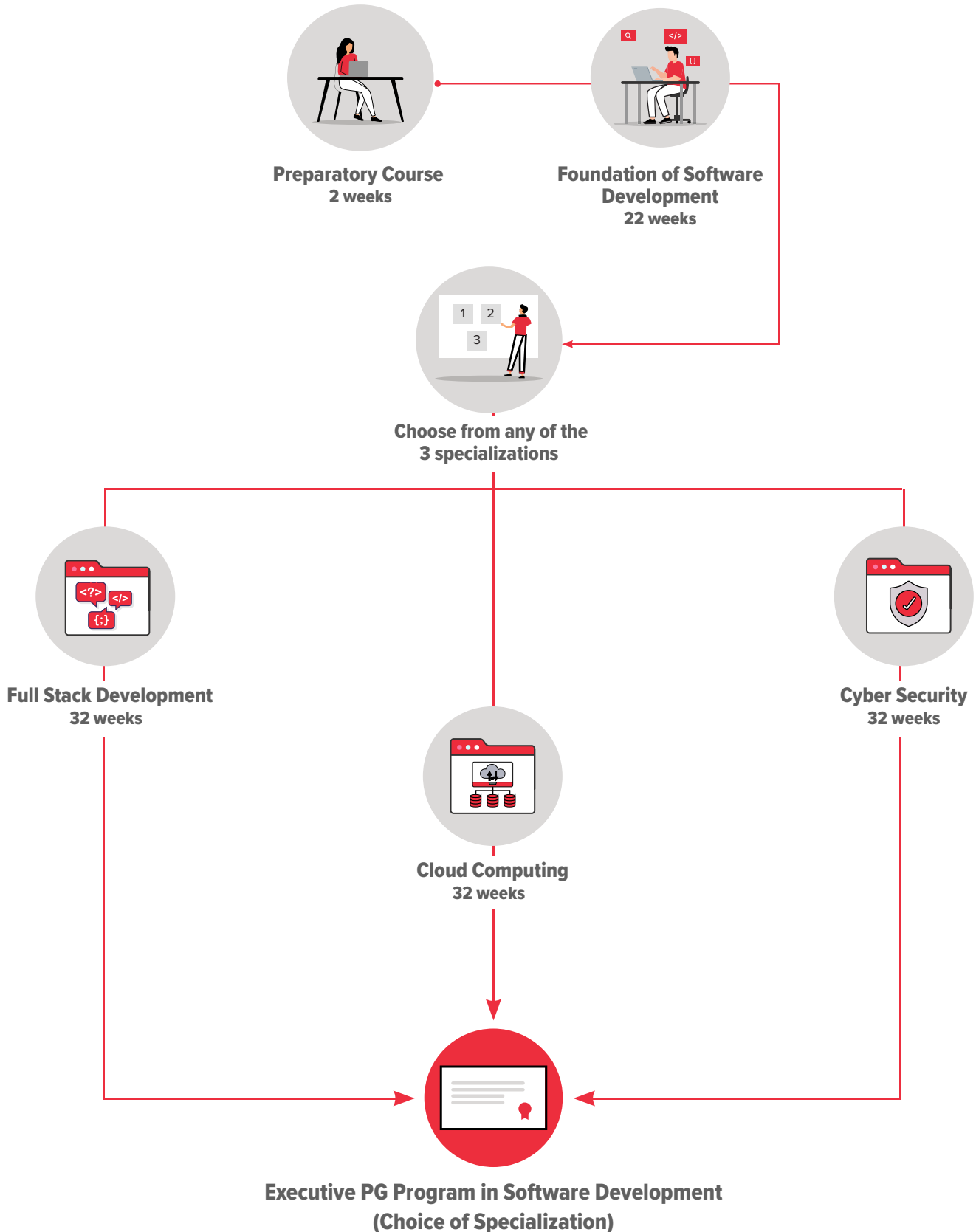


Retail banking



**Build music
recommendation systems**

Our Unique Learning Path



Curriculum

COMMON CONTENT

C0. PREPARATORY COURSE

FUNDAMENTALS OF PROGRAMMING LANGUAGE WITH BASIC DATA STRUCTURES (JAVA)

2 WEEKS

- Learning the fundamentals of Java and its basic building blocks. Start with writing basic Java programs

C1. TOOLKIT FOR EXPERIENTIAL LEARNING

● ABSTRACTION AND ENCAPSULATION

1 WEEK

Understand & apply the concepts of Abstraction & Encapsulation in OOPs

● INHERITENCE AND POLYMORPHISM

1 WEEK

Understand & apply the concepts of Inheritance & Polymorphism in OOPs

● ARRAYS, ARRAYLISTS, ENVIRONMENT SET UP

1 WEEK

Learn about the data structure arrays and ArrayLists, perform some array operations & setup the environment for the upcoming modules

● ASSIGNMENT (OPTIONAL)

Learn to apply your knowledge of OOP to build a simpler version of the Discussion Forum of upGrad platform that can run locally on your computer

C2. EXPERIENTIAL LEARNING

● REQUIREMENTS IDENTIFICATION

4 WEEKS

"Understand the requirements of a software product and think about the product's features & applications

● ASSIGNMENT: REQUIREMENTS IDENTIFICATION

1 WEEK

Design Mock UIs, create use-cases for various stakeholders within the application

● DESIGN AND PROTOTYPING

1 WEEK

Design and architect the blueprint of the product and create a prototype. Connecting all the different components within the product

● ASSIGNMENT: DESIGN & PROTOTYPING (OPTIONAL)

Complete various methods, functions & features wrt to the application

- **MODULE LEVEL IMPLEMENTATION AND UNIT TESTING** 1 WEEK
Implement different components of the product, think of and design the flow between them, and find out of possible fault points in it. Perform Unit testing
- **ASSIGNMENT: MODULE LEVEL IMPLEMENTATION**
Implement various modules within the application
- **INTEGRATION AND TESTING** 1 WEEK
Integrate different components of the product to make them work seamlessly. Ensure that any possible fault points are rectified through testing

C3. OOD + SOFTWARE ENGINEERING

- **SDLC AND AGILE METHODOLOGY** 1 WEEK
Introduction to Software Development Life Cycle and the various steps involved in the development of software. Learn about Agile methodologies in detail
- **OBJECT ORIENTED DESIGN** 1 WEEK
Understand the importance of Objected Oriented Design & UML Diagrams
- **TESTING AND VERSION CONTROL** 1 WEEK
Learn about unit testing i.e. testing individual units/components of a software, characteristics of Test Driven Development & Code Refactoring. Along with this you will also learn modern SE practices and skills and contribute to an existing software project or codebase using version control tools like Git
- **ASSIGNMENT - OOAD** 1 WEEK
Design a basic Food Ordering application from scratch using the concepts of SDLC, OOAD, TDD and version control taught in the course

C4. DATA STRUCTURES AND ALGORITHMS

- **ALGORITHM ANALYSIS + RECURSION** 1 WEEK
Learn about order of growth, Big-Oh, runtime + memory analysis, and time vs space tradeoff; Learn about algorithmic complexity of problems, and improve the efficiency of their implementations
- **SEARCHING AND SORTING (DIVIDE AND CONQUER INCLUDED)** 2 WEEKS
Learn about divide-and-conquer techniques such as merge sort and binary search
- **STACKS & QUEUES** 1 WEEK
Learn about Stacks & Queues and their applications
- **SETS AND DICTIONARIES (HASHTABLE, TREES AND BSTS, HEAPS)** 2 WEEKS
Understand the usage and application of various important data structures such as Hashtables, Trees, Binary Search Trees and Heaps. Learn about their interesting features, their utility and also find solutions of important problems related to these data structures

- **GRAPHS & GRAPH ALGORITHMS** **1 WEEK**
Learn various applications and use cases of Graphs. Work on problems which require the application of Graph principles and also practice essential Graph related questions
- **MANDATORY ASSIGNMENT** **1 WEEK**
An assignment based upon coding questions of all preceding topics
- **GREEDY, DYNAMIC PROGRAMMING - OPTIONAL** **0 WEEK**
Learn about the greedy algorithm and how to use it to solve optimisation problems. Learn about dynamic programming, which is a popular technique to solve a particular kind of problem where you are required to find the best possible solution from a number of different solutions

Exam Week: Exam (Course 2, Course 3, Course 4) **1 WEEK**

- **INTERVIEW SKILLS** **2 WEEKS**
Learn about the essential soft skills.(Resume Building, LinkedIn Building, Networking, Job Interview Skills, Salary Negotiation, etc.) , Communication Skills (Critical Thinking, Business Writing, Confidence Building, Speaking, Listening, Art of Conversing, Business Etiquettes), etc

Buffer Week **1 WEEK**

FULL STACK DEVELOPMENT

C5. USER INTERFACES & FRONTEND DEVELOPMENT

- **HTML & CSS** 1 WEEK
Learn how to create basic websites using HTML & CSS
- **JAVASCRIPT & DOM** 2 WEEKS
Learn the basics of JavaScript and DOM manipulation to create an interactive website
- **ADVANCED JAVASCRIPT** 1 WEEK
Learn the advanced concepts of JavaScript
- **AJAX & BACKEND INTEGRATION** 1 WEEK
Make REST API calls to the backend server and integrate the response accordingly to the front-end
- **WEB DEVELOPMENT FRAMEWORKS (REACT)** 2 WEEKS
Write applications using the React Framework and develop professional grade applications
- **ASSIGNMENT/PROJECT - FRONTEND** 1 WEEK
Creating the front-end of a blogging website using HTML, CSS and JavaScript

C6. BACKEND DEVELOPMENT

- **MULTITHREADING & STREAMS API** 0 WEEK
Learn about multithreading & Streams API
- **MVC ARCHITECTURE** 1 WEEK
Understand a popular software design architecture called MVC and implement MVC architecture using Spring MVC. Create the backend of a simple project using Spring Boot framework. Understand the basic concepts of Spring framework
- **DATA AND DATABASES IN APPLICATION DEVELOPMENT (JDBC, ORM)** 3 WEEKS
Learn how data and databases form an integral part of the application development. Also, understand the NoSQL databases
- **WEB BACKEND AND REST APIS (INTRODUCTION TO SPRING FRAMEWORK, ORM CONNECTION, REST API)** 3 WEEKS
Implement the REST API endpoints using the JPA specification and Spring Boot framework
- **ASSIGNMENT/PROJECT - BACKEND (GROUP)** 1 WEEK
Develop the backend for a Q&A website like Quora

Exam Week: Exam

1 WEEK

Buffer Week

1 WEEK

C7. SOFTWARE ARCHITECTURE AND DEPLOYMENT

- **DISTRIBUTED ARCHITECTURES** 1 WEEK
Learn about distributed systems, where the user load is distributed across various server systems, and learn different techniques to efficiently manage user traffic
- **DESIGN PRINCIPLES (SOLID) AND PATTERNS** 2 WEEKS
Get introduced to various principles, patterns and styles around which the architectures of a myriad of softwares revolve
- **MICROSERVICES ARCHITECTURE** 1 WEEK
Learn about Redis & Kafka, ORM L1 & L2
- **SYSTEM DESIGN** 1 WEEK
Understand what a typical full-stack web application system looks like
- **DEVOPS** 1 WEEK
Understanding of the process to be followed during the development of an application, from the inception of an idea to its final deployment. Learn about the concept of DevOps and the practices and principles followed to implement it in any company's software development life cycle
- **CLOUD-NATIVE DEPLOYMENT** 1 WEEK
Learn how to deploy an application on AWS using Jenkins as a CI/CD tool and following DevOps practices
- **ASSIGNMENT/PROJECT** 1 WEEK
Course Assignment/Project

Exam Week: Exam

1 WEEK

Buffer Week

1 WEEK

C8. CAPSTONE

- **CAPSTONE PROJECT (GROUP)** 4 WEEKS
The capstone project will stitch all the concepts learnt during the program

DEVOPS

SPECIALISATION

C5. DEVOPS ESSENTIALS

- **FUNDAMENTALS OF LINUX & SCRIPTING** **1 WEEK**

Learn the Common linux commands and bash scripting which are frequently used by DevOps engineers in their day to day activities
- **FUNDAMENTALS OF NETWORKING** **1 WEEK**

Learn the concepts of public/private network, internet protocols, DNS, IP address, OSI model, VPN, tunnelling, 3 way handshake, internet protocols such as HTTP and HTTPS, Subnetting - public, private subnets, Nating(Network Address Translation), different security protocols and best practices and SSH
- **INTRODUCTION TO DEVOPS** **1 WEEK**

Learn about the phases of Software Lifecycle. Get familiar with the concept of Minimum Viable Product (MVP) & Cross-functional Teams. Understand why DevOps evolved as a prominent culture in most of the modern day startups to achieve agility in the software development process
- **GIT AND VERSION CONTROL** **1 WEEK**

Learn different braching Strategies- Efficient strategies/disciplines for code promotion and code reviews
- **WEB APPLICATION ON CLOUD** **1 WEEK**

Learn the different architecture patterns of a web application and the ways to deploy it on AWS EC2 instance
- **AWS SERVICES** **1 WEEK**

Learn deployment of a simple monolithic application on AWS VM using AWS services such as VPC, RDS, S3, CLBs/ALBs. Learn sizing strategies-How to decide the config of the instances for any particular web application?
- **COURSE ASSIGNMENT** **1 WEEK**

Automating tasks using bash scripting

C6. WEB APPLICATIONS AT SCALE

- **CONTAINERIZATION** **1 WEEK**

Learn the concepts of docker and the difference between docker and VM. Learn the common commands in docker and deployment of a monolithic application using Docker first on local host and later on AWS VM using AWS ECS service
- **CONTAINERIZATION AT SCALE** **2 WEEKS**

Using ECS, how to containerise applications at scale. Handling scalability issues with web applications by configuring load balancers, deciding server's geographical location, etc

- **CONTINUOUS MONITORING AND LOGGING** **2 WEEKS**
Learn about what Continuous Monitoring is, its role, impact and the tools & techniques associated with it. Explore and know about Site Reliability Engineering. Also, learn about Application Monitoring using Kibana/ELK cluster
- **INTRODUCTION TO CICD AND JENKINS** **1 WEEK**
Learn about CICD pipeline and get introduced to Jenkins- a tool to create CICD pipelines. Also, learn to setup and configure jobs on Jenkins
- **COURSE ASSIGNMENT** **1 WEEK**
Deployment of dockerised web application

Exam Week: Exam	1 WEEK
Buffer Week	1 WEEK

C7. CICD PIPELINE, SYSTEM PROVISIONING AND DEVOPS ADVANCED CONCEPTS

- **AUTOMATED TESTING USING JENKINS AND SELENIUM [OPTIONAL]** **0 WEEK**
Automated Testing. [Selenium and Jenkins as tools for Testing.] Test Automation. [Exercise: Jenkins]. End-to-end Testing. User Acceptance Testing
- **CONTINUOUS INTEGRATION** **1 WEEK**
Learn about build process, continuous integration and automating component assembly. Explore and solve hands-on problems using tools Maven/Gradle and SonarQube
- **CONTINUOUS DEPLOYMENT** **2 WEEKS**
Learn about fully automated deployment and real-time continuous deployment on the Cloud. Practice hands-on cloud deployment on AWS. Learn how fully automated deployment works. (Exercise using shippable.com.) Real-time Continuous Deployment on the Cloud (Amazon Web Services - Exercise and Case Study)
- **SYSTEM PROVISIONING AND CONFIGURATION MANAGEMENT** **2 WEEKS**
Learn about Configuration Management via tools like Ansible and Terraform
- **INFRASTRUCTURE/NETWORK DIAGRAMS** **0 WEEK**
Learn how to create network diagrams and system architecture for different scenarios
- **OPTIMISATION** **0 WEEK**
Learn cost optimisation and performance optimisation using concepts of Serverless Containers, Spot Instances and caching
- **ORCHESTRATION USING KUBERNETES** **2 WEEKS**
Learn the ways to orchestrate multiple docker containers using an orchestration tool like Kubernetes. Learn installation, component, architecture, creating deployment, volumes, secret and creation of CICD pipeline involving Kubernetes

- **COURSE ASSIGNMENT**

1 WEEK

Exam Week: Exam

1 WEEK

Buffer Week


1 WEEK

C8. CAPSTONE

- **CAPSTONE PROJECT**

4 WEEKS

The capstone project will stitch all the concepts learnt during the program



CYBER SECURITY SPECIALIZATION

C5. INFORMATION SECURITY AND APPLIED CRYPTOGRAPHY

- **INTRODUCTION TO CYBERSECURITY** **1 WEEK**
Get introduced to Cybersecurity
- **OS FUNDAMENTALS AND SECURITY** **2 WEEKS**
Linux CLI, Hardening, Bash Scripting and security in Linux
- **INFORMATION PROTECTION AND ENCRYPTION** **1 WEEK**
Basic Information Protection: Data Secrecy/Confidentiality and Integrity - Requirements. Encryption as a Solution for Secrecy. Encryption vs Encryption as a computationally difficult to invert function, Symmetric and Asymmetric encryption techniques. Encryption vs Encoding
- **INTRODUCTION TO CRYPTOGRAPHY** **1 WEEK**
Cryptography - Confusion and Diffusion Properties. Public Key and Private Key Encryption Techniques (RSA and AES as Examples). Password-based Encryption. HSM and PKI
- **CRYPTOGRAPHIC KEY MANAGEMENT** **1 WEEK**
Key Management. Diffie Helman Key Exchange. Java Cryptography Architecture (JCA). Key Stores. Providers
- **MESSAGE DIGESTS AND DIGITAL SIGNATURES** **1 WEEK**
Message Digests. Hashes and Signatures. Keyed Hashing. Digital Signatures. Digital Signatures as Solutions for Sender Identity, Message Integrity and Non-repudiation
- **IDENTITY ACCESS MANAGEMENT** **1 WEEK**
IDAM lifecycle, User Authentication: Passwords and Limitations. Challenge Response Protocols. Replay and Man-in-the-middle Attacks. Freshness / Currency. CAPTCHAS; Multi-factor Authentication; Oauth and OpenId
- **ASSIGNMENT/PROJECT - ACCESS CONTROL** **1 WEEK**
Course Assignment/Project

C6. NETWORK SECURITY IN ETHICAL HACKING

- **INTRODUCTION TO NETWORK SECURITY AND SPOOFING** **1 WEEK**
Local Area Networks - Switched Ethernet. Switches and Security. Addresses: MAC and IP addresses. Address Spoofing. ARP protocol and spoofing, SNMP and IGMP protocols, (SNMP, SNPP, SFTP, SSH protocol basics)
- **SECURED NETWORKS SYSTEM WITH FIREWALL** **2 WEEKS**
Broadcast Domains and Isolation; Virtual LANs. Private vs. Public Addresses. Gateways. Network Address Translation. Demilitarized Zones (DMZs). Firewalls, Access Control, and Firewall Rules

- **PACKET INSPECTION AND ATTACK AGAINST AVAILABILITY** **1 WEEK**
Packet Inspection, Deep Packet Inspection(Intrusions detection system and Intrusion Prevention System), IP Security, ICMP attacks. TCP and UDP Security. Attacking Availability: Denial-of-Service attacks, Distributed DOS attacks, SSL/TLS , IP Table
- **NETWORK ACCESS CONTROL** **4 WEEKS**
Insider Attacks. Network Access Control. Proxy (Web) Servers. Forward proxy and reverse proxy
- **SIEM TOOLS AND ADDITIONAL SECURITY MEASURES** **OPTIONAL**
SIEM basics, Logs and Monitoring, Endpoint security measures
- **MALWARE THREATS AND ANALYSIS** **OPTIONAL**
Malware threat and analysis
- **ASSIGNMENT/PROJECT - INTRUSION DETECTION SYSTEM/EXPLOITING VIRTUAL MACHINE** **1 WEEK**
Course Assignment/Project

Exam Week: Exam	1 WEEK
Buffer Week	1 WEEK

C7. APPLICATION SECURITY IN ETHICAL HACKING AND ADVANCED CONCEPTS IN CYBER SECURITY

- **INTRODUCTION TO APPLICATION SECURITY** **1 WEEK**
Secure Programming. Information Flow and Security. Buffer Overflow Attacks. Managed Execution - JVM. OWASP top 10
- **WEB-BASED APPLICATIONS AND ASSOCIATED VULNERABILITIES** **1 WEEK**
Web-based applications: Browsers and Browser Security, CSP Policies. Javascript vulnerabilities and Cross-Site Scripting. XSS and CSRF vulnerabilities
- **COOKIES AND TRACKING** **1 WEEK**
Cookies and Tracking; User Identities and User profiling
- **DATA AND DATABASE SECURITY** **2 WEEKS**
Data and Database Security - SQL Injection Attacks; Data access and Access Control, Access Control on views, Data Privacy and Anonymity
- **PHISHING AND OTHER ATTACKS ON IDENTITY** **1 WEEK**
Phishing and other attacks on Identity(Social Engineering)

- **CLOUD APPLICATION SECURITY** **OPTIONAL**
Cloud application Security: DOS attacks on the cloud; Process security and Data Access - Protection against multi-tenancy; Isolation in VMs and Containers
- **MOBILE SECURITY** **OPTIONAL**
Android Security from Admin perspective
- **PENETRATION TESTING, FUZZING** **OPTIONAL**
Pentesting and tools, exploiting OWASP top 10 vulnerabilities in web application
- **REGULATION, COMPLIANCE, AND RISK MANAGEMENT** **1 WEEK**
NIST, ISO 27001, GDPR
- **ASSIGNMENT/PROJECT - EXPLOIT WEB APPLICATION** **1 WEEK**

Exam Week: Exam	1 WEEK
Buffer Week	1 WEEK

C8. **CAPSTONE**

- **CAPSTONE PROJECT** **4 WEEKS**

CLOUD COMPUTING SPECIALISATION

C5. DISTRIBUTED SYSTEMS AND CLOUD & DATABASES

- **INTRODUCTION TO DISTRIBUTED SYSTEMS** **1 WEEK**
Understand the notion of Distributed Systems and learn about the various intricacies of Distributed Systems
- **INTRODUCTION TO CLOUD (USING AWS)** **1 WEEK**
Get introduced to the cloud and learn about various cloud services, and their use cases. Understand the concept of virtualisation. Learn about the various intricacies involved in provisioning compute and storage resource on the cloud
- **SQL AND RELATIONAL DATABASE MANAGEMENT SYSTEMS + 1 WEEK OPTIONAL** **1 WEEK**
Get introduced to the Relational Database Management System and learn about the techniques to manage relational databases. Use SQL to perform various DML and DDL queries on the relational database
- **HANDS-ON WITH NOSQL - MONGODB + 1 WEEK OPTIONAL** **1 WEEK**
Understand the notion of NoSQL Database, take a hands-on approach and learn to model and query using MongoDB
- **ASSIGNMENT/PROJECT - SCHEMA DESIGN** **1 WEEK**
Design a data model for an application using both SQL and NoSQL Databases

C6. DESIGN & DEVELOPMENT OF MICROSERVICES

- **INTRODUCTION TO SPRING CORE & SPRING BOOT** **1 WEEK**
Get introduced to Spring boot framework and learn to develop a hello world web-application using Spring-Boot framework
- **DATA ACCESS LAYER & SERVICE LAYER** **1 WEEK**
Take a hands-on approach and learn about how to build data and service layer in your application
- **INTRODUCTION TO BACKEND ARCHITECTURE WITH MONOLITHIC APPROACH, SERVICE ORIENTED ARCHITECTURE** **1 WEEK**
Get introduced to web application the various types of software backend architectures and learn about their use-cases and challenges
- **INTRODUCTION TO MICROSERVICES; DISCOVERY OF MICROSERVICES + DESIGNING APPLICATIONS USING MICROSERVICES[HLD]** **1 WEEK**
Learn about Microservices and the use cases and challenges of the Microservices based architecture
- **INTRODUCTION TO REST & CONTROLLER LAYER** **2 WEEKS**
Get introduced to REST and understand its various intricacies to develop REST APIs

- **AOP - ASPECT ORIENTED PROGRAMMING & APPLICATION SECURITY** **1 WEEK**
Get introduced to Aspect-Oriented Programming. Learn about the various concepts of exception handling and application security
- **COMMUNICATION AMONG MICROSERVICES** **1 WEEK**
Learn and implement various microservices communication techniques
- **NON-BLOCKING APPLICATION(MESSENGING QUEUES) - KAFKA** **1 WEEK**
Understand the need for messaging services and learn to integrate them into your application
- **ASSIGNMENT/PROJECT - APPLICATION DEVELOPMENT** **2 WEEKS**
Use the concept learnt so far and work on a industry grade project

Exam Week: Exam	1 WEEK
Buffer Week	1 WEEK

C7. SERVERLESS DEVELOPMENT AND DEPLOYMENT OF CLOUD-NATIVE APPLICATIONS

- **INTRODUCTION TO LAMBDA/SERVERLESS ARCHITECTURE + SERVERLESS DEVELOPMENT COMPOSING MICROSERVICES** **1 WEEK**
NOTE- CERTAIN TOPICS NEED TO GO OPTIONAL(+1 WEEK OF OPTIONAL CONTENT)
Get introduced to serverless architecture and understand its pros-cons and industry use-case
Learn to develop services using the serverless approach
- **WEB APPLICATION OPTIMISATION** **1 WEEK**
Understand and implement various application optimisation techniques commonly used in the industry
- **MICROSERVICES - DEBUGGING AND TROUBLE SHOOTING** **1 WEEK**
Learn and apply various strategies to debug a microservice-based application
- **INTRODUCTION TO SPRING CLOUD AND DEPLOYMENT** **1 WEEK**
Get introduced to Spring Cloud and learn to deploy microservices-based applications using Spring Cloud
- **CONTAINERS VS. VMS. RESOURCE EFFICIENCY. DOCKERS AS CASE STUDY** **1 WEEK**
Understand the notion of containers and their use cases. Learn about Docker and create Docker images of your application
- **CONCEPTS OF CLOUD DEPLOYMENT & DEPLOYMENT USING KUBERNETES & SERVERLESS DEPLOYMENT + 1 WEEK OPTIONAL** **2 WEEKS**
Get introduced to serverless architecture and understand its pros-cons and industry use-case
Learn to develop services using the serverless approach

- **CONCEPTS OF CLOUD DEPLOYMENT & DEPLOYMENT USING KUBERNETES & SERVERLESS DEPLOYMENT + 1 WEEK OPTIONAL** **2 WEEKS**
Understanding the various intricacies involved in deploying a application in cloud.
Learn to deploy a microservice-based application on Kubernetes.
Learn to deploy a serverless application on the Cloud
- **DEPLOYING WEB APPLICATIONS WITH AWS ELASTIC BEANSTALK (OPTIONAL)** **0 WEEK**
Learn about AWS BeanStack and deploy a web application using BeanStack
- **ASSIGNMENT/PROJECT - APPLICATION DEVELOPMENT** **1 WEEK**
Deploying an application on the Cloud

Exam Week: Exam	1 WEEK
Buffer Week	1 WEEK

C8. CAPSTONE

- **CAPSTONE PROJECT (GROUP)** **4 WEEKS**
The capstone project will stitch all the concepts learnt during the program

BIG DATA

SPECIALISATION

C5. BIG DATA FUNDAMENTALS AND PLATFORMS FOR BIG DATA

- **INTRODUCTION TO BIG DATA + AWS SETUP** **1 WEEK**
Learn what big data is, its various characteristics, and its determining factors. Understand what cloud and setup AWS account which will be required during the program
- **DIMENSIONAL & RELATIONAL DATA MODELLING** **2 WEEKS**
Learn and apply the approach to design dimensional and relational data models
- **DISTRIBUTED SYSTEMS AND PROGRAMMING MODEL** **1 WEEK**
Understand what a distributed system is and learn about the design complication of distributed systems
- **HADOOP AND MAPREDUCE PROGRAMMING** **1 WEEK**
Understand the world of distributed data processing and storage with Hadoop. Learn to write MapReduce jobs in Python
- **LARGE SCALE DATA PROCESSING WITH APACHE SPARK** **2 WEEKS**
Get introduced to Apache Spark, a lightning fast big data processing engine. Use Spark to create highly optimised large scale data processing applications
- **ASSIGNMENT/PROJECT** **1 WEEK**
Solve an assignment to brush up the skills learnt so far

C6. BATCH PROCESSING

- **ETL AND DATA INGESTION- SQOOP AND FLUME** **1 WEEK**
Get familiar with the challenges involed in data ingestion. Use Sqoop and Flume to ingest structured and unstructured data into Hadoop
- **NOSQL DATABASES - HBASE** **1 WEEK**
Learn the concepts of NoSQL databases. Understand the working of Apache HBase
- **NOSQL DATABASES - MONGODB(OPTIONAL)** **0 WEEK**
Get a hands-on understanding of the data model of MongoDB
- **HIVE & QUERYING + 1 WEEK OPTIONAL** **1 WEEK**
Manage and query a data warehouse with Apache Hive. Learn to write optimised HQL for large scale data analysis
- **AMAZON REDSHIFT** **1 WEEK**
Learn to deploy a Redshift cluster and use it for querying data

- **ASSIGNMENT/PROJECT** 2 WEEKS
Make use of Sqoop, Redshift & Spark to design an ETL data pipeline

Exam Week: Exam	1 WEEK
Buffer Week	1 WEEK

C7. REAL TIME DATA PROCESSING

- **STREAMING ALGOS** 1 WEEK
Understand the various core techniques to process real-time streams of data
- **REAL-TIME DATA STREAMING WITH APACHE KAFKA + 1 WEEK OPTIONAL** 1 WEEK
Understand the producer-consumer architecture of Apache Kafka. Learn to set up a Kafka cluster for managing real-time data
- **REAL-TIME DATA PROCESSING WITH APACHE SPARK STREAMING** 2 WEEKS
Learn about the real-time data processing architecture of Apache Spark. Build Spark Streaming applications to process data in real-time
- **FLINK (OPTIONAL)** 0 WEEK
Get introduced to Apache Flink and learn query batch data. Use the DataStream API to create a stream processing application
- **BUILDING AUTOMATED DATA PIPELINES WITH APACHE AIRFLOW** 1 WEEK
Learn to automate ETL data pipelines with Airflow
- **DATA PLATFORM - UPSTAC** 1 WEEK
An industry demo to design a big data platform for the 'UPSTAC' application
- **DESIGN & DEPLOYMENT - STREAMING APPLICATIONS** 1 WEEK
Use the tools and techniques learned in the course to solve an industry problem
- **ASSIGNMENT/PROJECT** 1 WEEK
Build an end-to-end real-time data processing application using Spark Streaming and Kafka

Exam Week: Exam	1 WEEK
Buffer Week	1 WEEK

C8. CAPSTONE

- **CAPSTONE PROJECT (GROUP)** 4 WEEKS
The capstone project will stitch all the components of big data engineering together

BLOCKCHAIN SPECIALISATION

C5. BLOCKCHAIN: BASICS AND APPLICATIONS

- **NODE FUNDAMENTALS** 1 WEEK

In this module, you will learn about the fundamentals of NodeJS
- **BLOCKCHAIN BASICS** 1 WEEK

In this module, you will learn about Bitcoin and fundamentals of a blockchain network. Basic concepts like decentralised ledgers, architecture, consensus, transaction flow, etc., is taught using Bitcoin as a reference.
- **BLOCKCHAIN FEATURES** 1 WEEK

In this module, you will learn fundamental features of the blockchain network - immutability and transparency. You will also learn about different use cases, different type of blockchain and their use cases. You will be introduced to smart contracts as a concept
- **DISTRIBUTED APPLICATION DEVELOPMENT ON ETHEREUM** 4 WEEKS

As a part of this module, you will learn the basics of ethereum, its architecture and the different core concepts of it. You will learn about tokens, wallet creation and how to construct a Dapp on ethereum. Solidity is introduced in this module. You will learn basics of smart contracts and how to write them with an example each. This module will also teach you frameworks like Truffle and how it is used. You will be able to set up your own private ethereum network. By the end of the module, you will learn how to deploy a Dapp on a test network like Ropsten
- **ASSIGNMENT/PROJECT** 1 WEEK

As a part of this module, you will be building a Dapp on Ethereum. The Dapp will be for a Bank KYC system. You will learn how to create and deploy the whole project on your own using the concepts taught in the previous modules

C6. BUILDING A DISTRIBUTED APPLICATION ON HYPERLEDGER FABRIC

- **HYPERLEDEGR FUNDAMENTALS** 1 WEEK

As part of this module, you will learn about Hyperledger and also about Hyperledger Fabric. You will learn the fundamental concepts, components, transaction flow and characteristics of the Hyperledger Fabric with the help of a simple case study
- **FABRIC NETWORK SETUP** 1 WEEK

As part of this module, you will look at an existing problem in the industry for which blockchain could act as a solution. You will learn the different steps required to set up the Hyperledger Fabric network on your local system. You will then start the first step of the solution, which is to set up the network on your computers. You will learn about the different configuration files required to set up the network and their importance

- **CHAINCODE DEVELOPMENT** **2 WEEKS**
As part of this module, you will first learn about the concept of chaincode. Then you will be looking at the chaincode for the problem statement discussed as part of the previous module. Next, you will deploy this chaincode on top of the network that was set up in the previous module. First, this deployment will be done in the 'dev' mode and then after making sure that all the logics are properly implemented, the chaincode will be deployed in 'production' mode. You will also learn how to automate the entire steps done till now using script files
- **DAPP DEVELOPMENT** **1 WEEK**
As part of this module, you will be building a CLI based node applications to interact with the functions defined inside the smart contract. You will be learning about the Software Development Kit for Node.js provided by the Hyperledger Fabric community. You will learn about the different packages that are included in this SDK. Using these packages, you will then start building the node modules to interact with the functions defined inside the smart contracts. You will then test these modules using the Terminal
- **ASSIGNMENT/PROJECT** **1 WEEK**
The project is on building a blockchain solution for the supply chain management. As part of the capstone project, you will first learn the problem statement that a blockchain solution will solve when applied to the supply chain. Post this, you will build a solution to tackle the issue of drug counterfeiting in a pharmaceutical supply chain

Exam Week: Exam

1 WEEK

Buffer Week

1 WEEK

C8. FOUNDATIONS OF BLOCKCHAIN/ DISTRIBUTED COMPUTING AND ARCHITECTING BLOCKCHAIN APPLICATIONS

- **DISTRIBUTED CONSENSUS AND CONSISTENCY MODEL** **2 WEEKS**
In this module, you will learn about different consensus protocols in detail and their use cases. You will learn what are the observed challenges and what are the plans to overcome those challenges. Understand what distributed computing is and what are Distributed ledgers
- **BASIC CRYPTOGRAPHY FOR BLOCKCHAIN** **1 WEEK**
In this module, you will learn about cryptography and why it is important in a blockchain network. You will learn about some encryption methods using examples. Core concepts like Hashing, Merkle trees, digital signatures are covered in this module

- **UPSTAC COVID APP ARCHITECTING AND DEPLOYMENT** **2 WEEKS**
As a part of this module, you will be building an application on Health care management for Covid patients. You will learn how to create user stories, find out which blockchain framework to use and what will be the different tools to create the whole project. You will learn how to code and deploy the backend using smart contracts. Understand how the whole project works as a unit and deploy the solution on cloud. As a part of deployment, you will also be learning about Baas on AWS
- **ARCHITECTING A DEFI APPLICATION** **1 WEEK**
In this module, you will learn about DeFi with a use case. You will learn how to create solution for the use case on Ethereum network. You will learn about some adhoc concepts like Network interoperability, ZKP, Light weight clients, etc
- **OTHER BLOCKCHAIN FRAMEWORKS AND THEIR USE CASES** **1 WEEK**
As a part of this module, you will be learning about a few more blockchain frameworks other than Ethereum and Hyperledger. You will have an introduction to networks like R3 Corda, Ripple, Iota, etc
- **ASSIGNMENT/PROJECT** **1 WEEK**
Course Assignment/Project

Exam Week: Exam	1 WEEK
Buffer Week	1 WEEK

C8. CAPSTONE

- **CAPSTONE PROJECT (GROUP)** **4 WEEKS**
Apply the concepts learnt till now in building an ICO/Crowdfunding platform

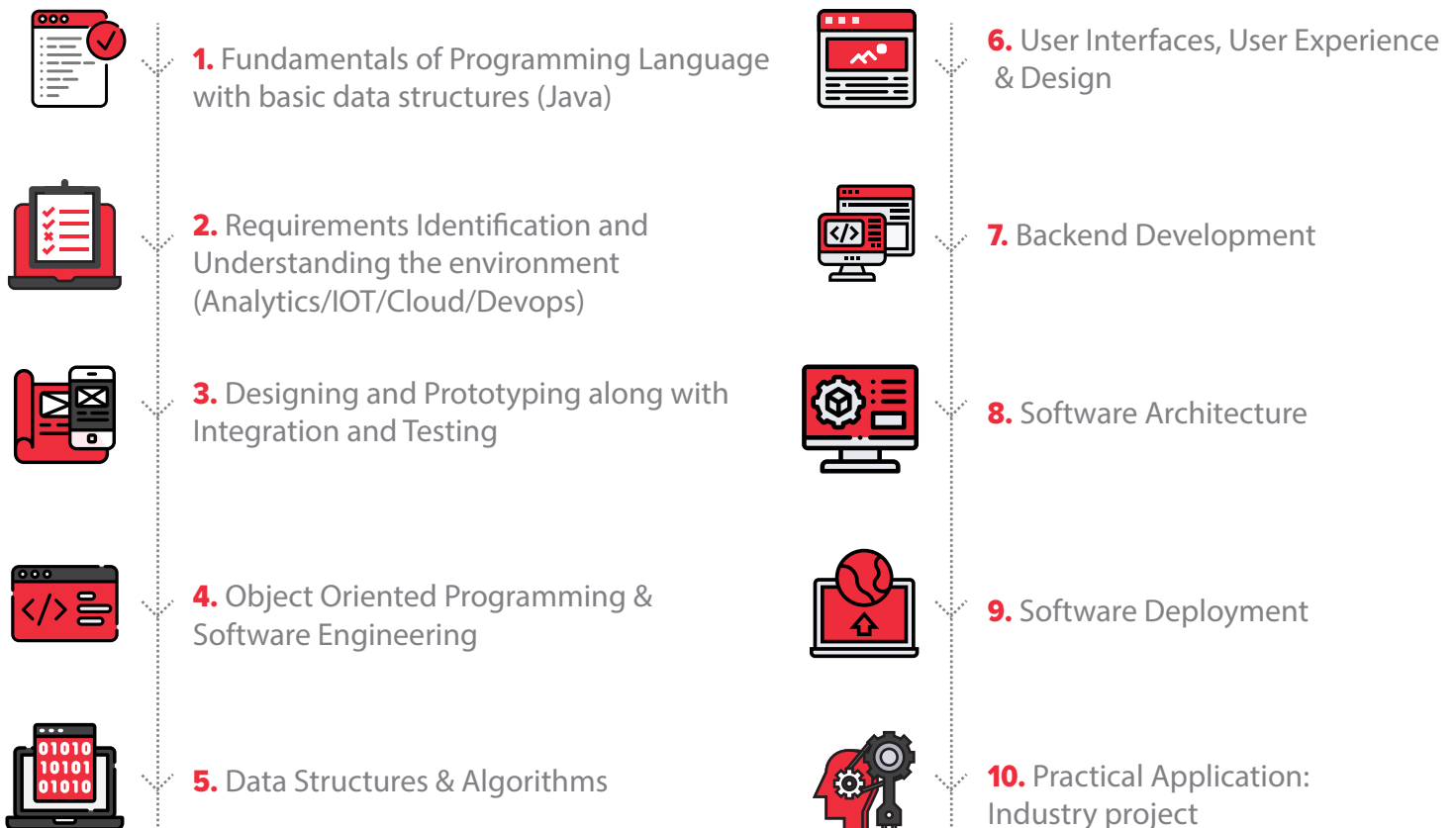
Full Stack Development

Specialization

Who is this for?

- Highly driven and ambitious software development professionals working as backend developers, front end developers, IT Professionals, etc across various industries and who wish to acquire expertise in Full Stack Development.
- Professional working in quality analyst and testing profiles who wish to make a shift into development roles.
- Professionals who are working in industries like IT/ITES, Consulting and many more at senior levels and who need core development skills and cross-functional knowledge to elevate to CTO Role.
- People who are working in non-technical roles and who want to kick-start their career in software development as a Full Stack Developer.

Learning Path



Blockchain

Specialisation

Who is this for?

- Highly driven and ambitious software development professionals working as backend developers, front end developers, IT Professionals, etc across various industries and who wish to acquire expertise in this new age technology Blockchain.
- Professional working in quality analyst and testing profiles who wish to make a shift into development roles of Blockchain Technology.
- Professionals who are working in industries like IT/ITES, Consulting and many more at senior levels and who need core development skills and cross-functional knowledge to elevate to CTO Role.
- People who are working in non-technical roles and who want to kick-start their career in software development with specialised knowledge in Blockchain.

Learning Path



1. Fundamentals of Programming Language with basic data structures (Java)



2. Requirements Identification and Understanding the environment (Analytics/IOT/Cloud/Devops)



3. Designing and Prototyping along with Integration and Testing



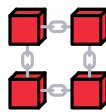
4. Object Oriented Programming & Software Engineering



5. Data Structures & Algorithms



6. Introduction to Javascripts and Node JS



7. Blockchain Basics & Applications



8. Building a Blockchain Application



9. Architecting Blockchain Applications (Delivered Live)



10. Practical Application: Industry project

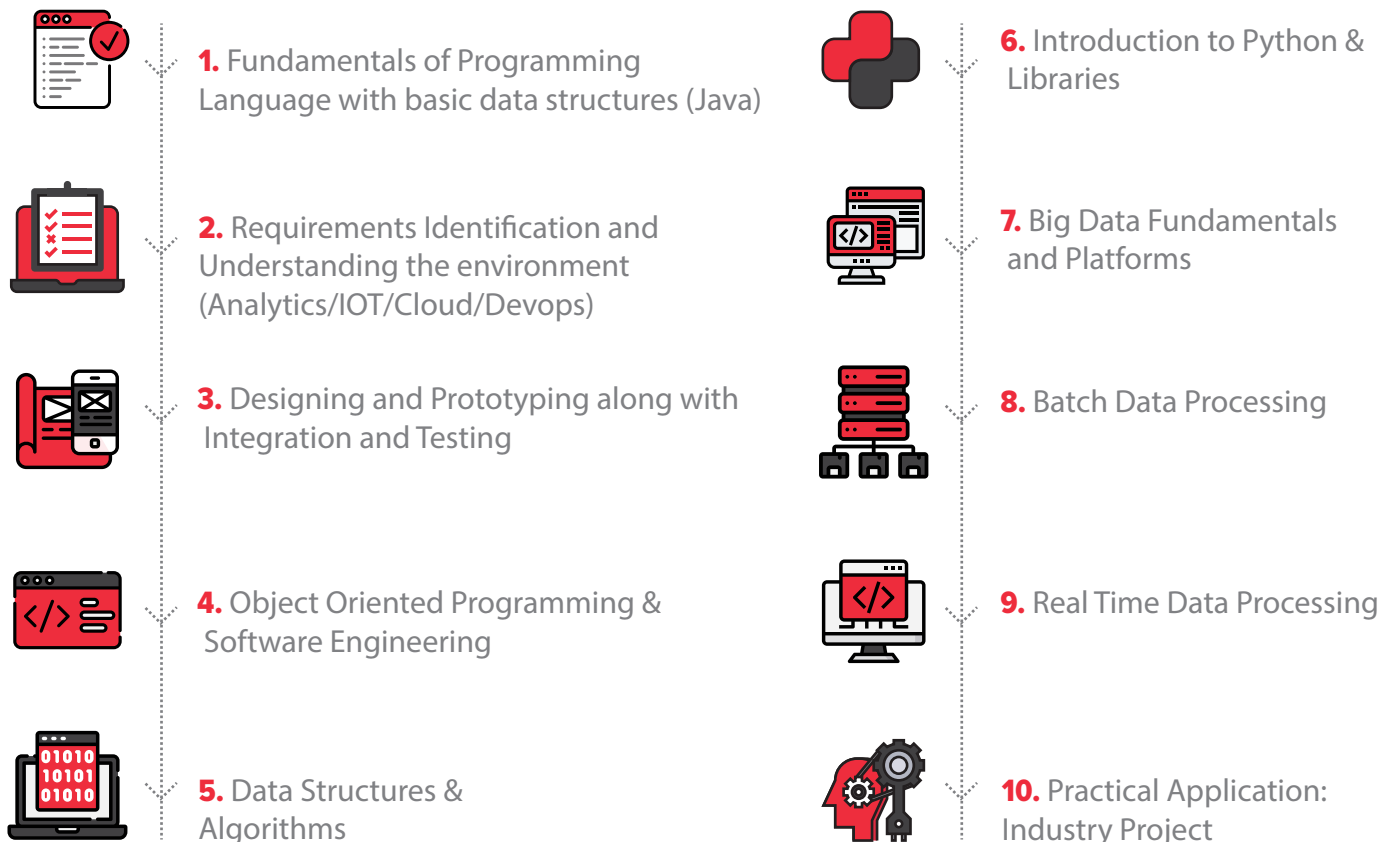
Big Data

Specialisation

Who is this for?

- Highly driven and ambitious software development professionals working as backend developers, front end developers, IT Professionals, testers etc across various industries and who wish to acquire expertise in Big Data.
- Professional working in data centric roles like data analysts, data scientists who wish to make a shift into big data profiles.
- Professionals who are working in industries like IT/ITES, Consulting and many more at senior levels and who need core development skills and cross-functional knowledge to run big data projects and lead teams.
- People who are working in non-technical roles and who want to kick-start their career in software development with specialised knowledge in Big Data.

Learning Path



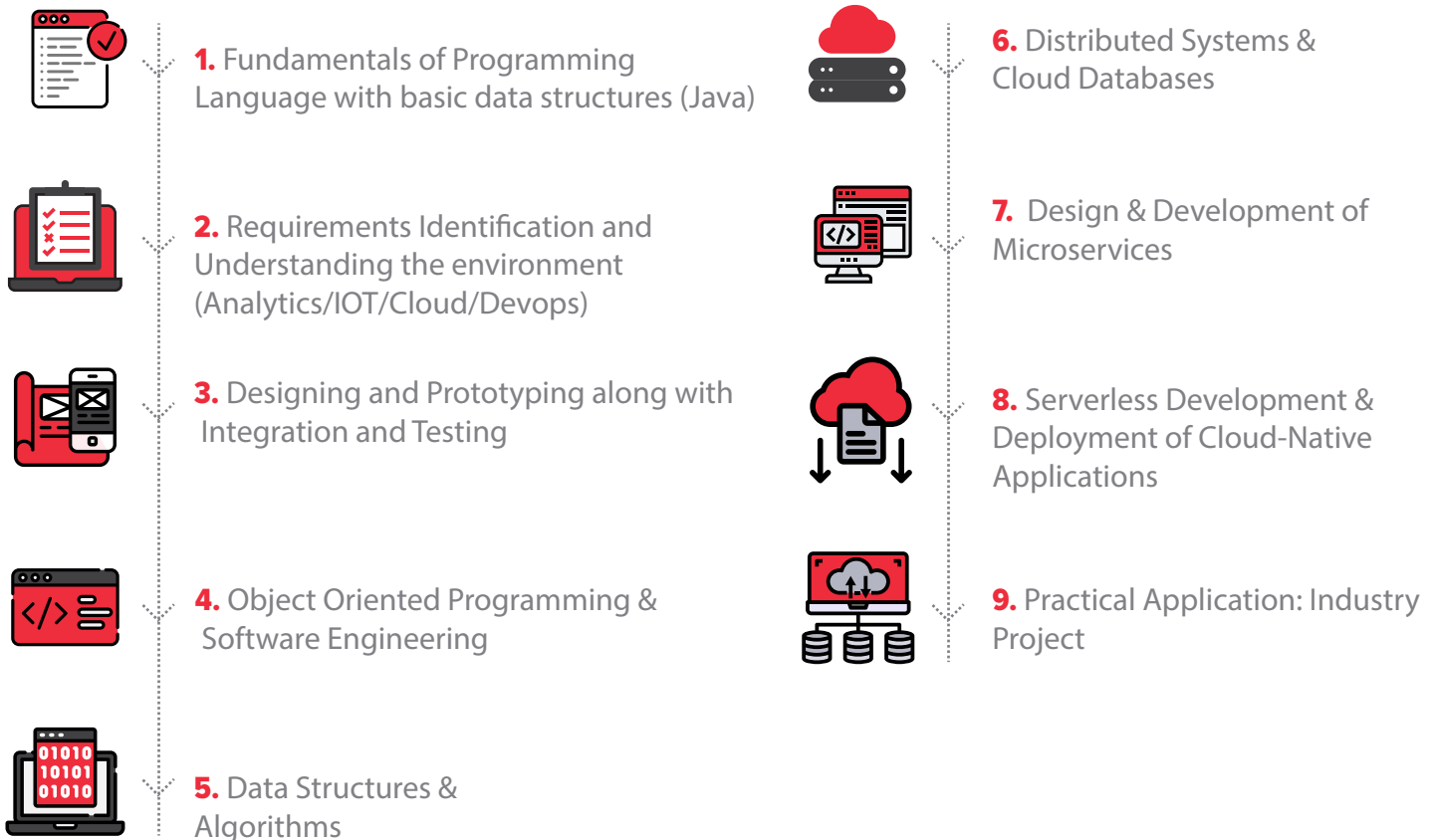
Cloud Computing

Specialization

Who is this for?

- Highly driven and ambitious software development professionals working as backend developers, front end developers, IT Professionals, etc across various industries and who wish to acquire expertise in Cloud Computing.
- Professional working in quality analyst and testing profiles who wish to make a shift into development/engineering roles in Cloud Computing.
- Professionals who are working in industries like IT/ITES, Consulting and many more at senior levels and who need core development skills and cross-functional knowledge to run cloud computing projects and lead teams.
- People who are working in non-technical roles and who want to kick-start their career in software development with specialised knowledge in Cloud Computing.

Learning Path



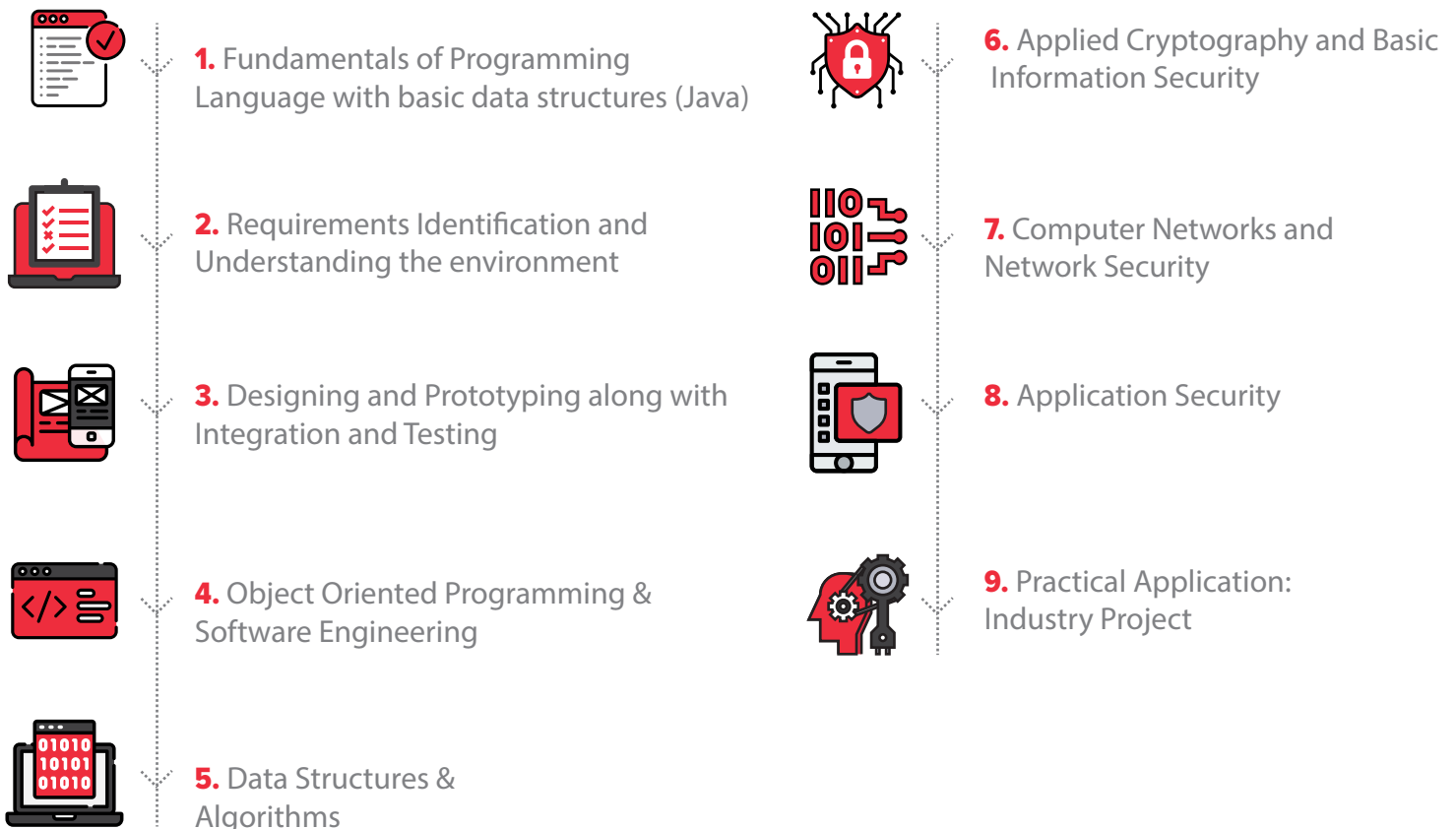
Cyber Security

Specialization

Who is this for?

- Highly driven and ambitious software development professionals working as backend developers, front end developers, IT Professionals, etc across various industries and who wish to acquire expertise in Cyber Security.
- Professional working in quality analyst and testing profiles who wish to make a shift into development/engineering roles of Cyber Security.
- Professionals who are working in industries like IT/ITES, Consulting and many more at senior levels and who need core development skills and cross-functional knowledge to elevate to CTO Role.
- People who are working in non-technical roles and who want to kick-start their career in software development with specialised knowledge in Cyber Security.

Learning Path



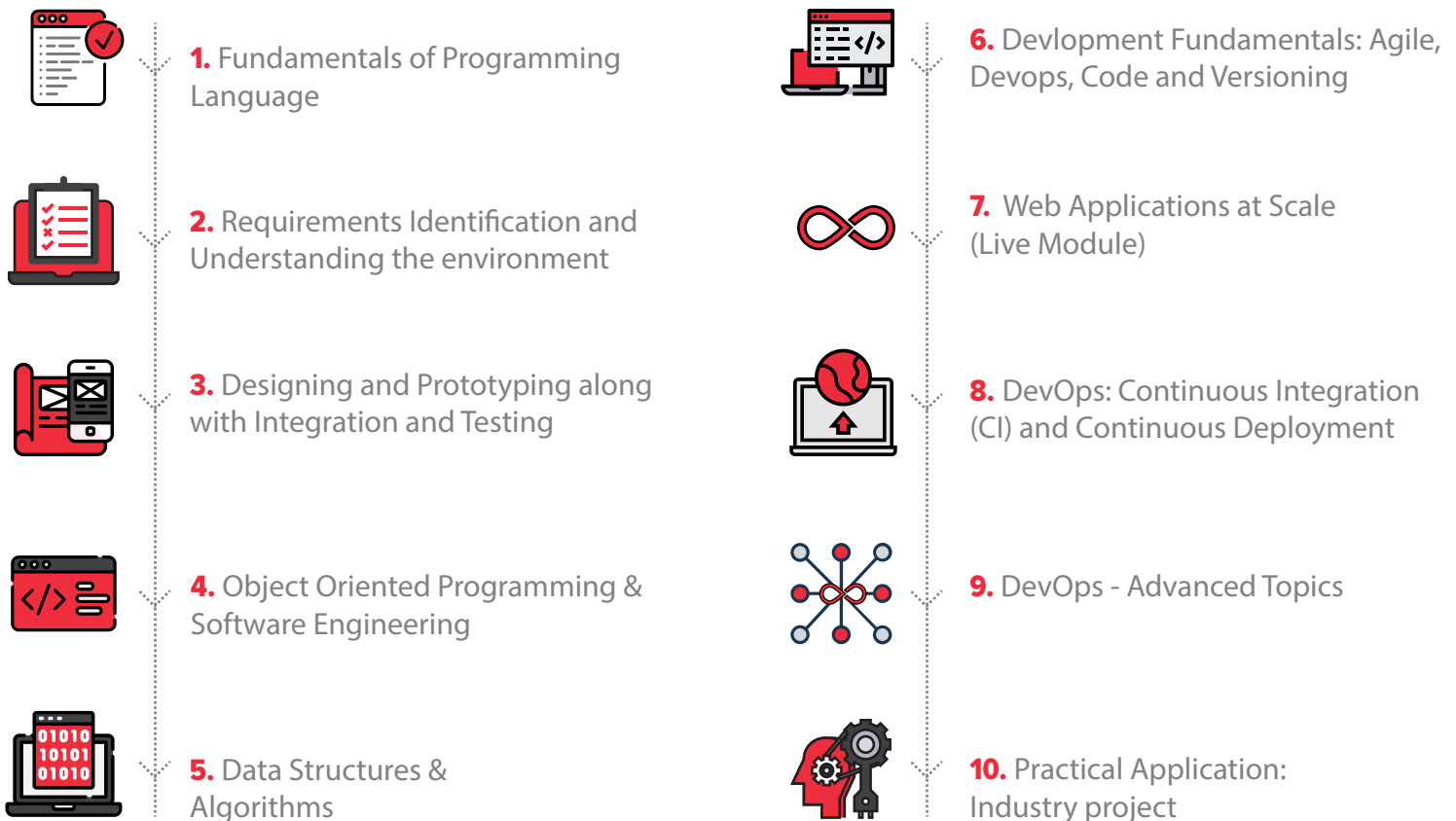
DevOps

Specialisation

Who is this for?

- Highly driven and ambitious software development professionals working as backend developers, front end developers, IT Professionals, etc across various industries and who wish to acquire expertise in DevOps.
- Professional working in quality analyst and testing profiles who wish to make a shift into development/engineering roles of DevOps.
- Professionals who are working in industries like IT/ITES, Consulting and many more at senior levels and who need core development skills and cross-functional knowledge to elevate to CTO Role.

Learning Path

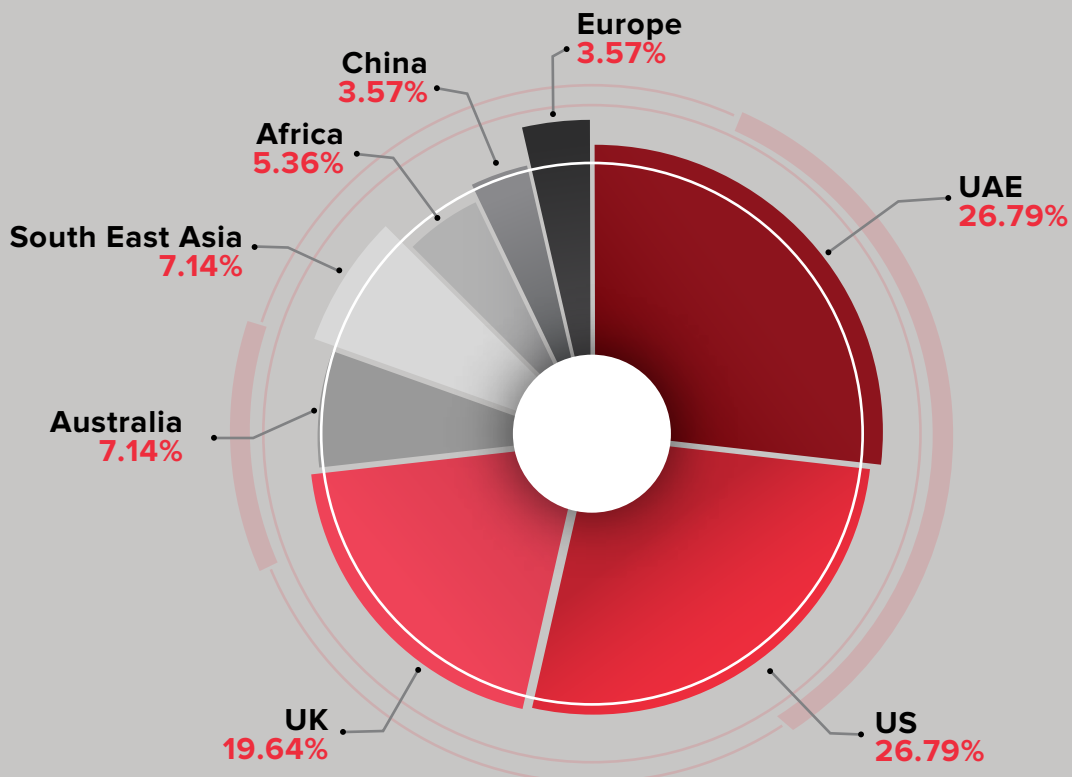


Meet the

Class



Opportunity to network with our international learners



Hear from our learners



“ **Joel Varghese**
Software Engineer,
Zoreum Blockchain Labs

The program has been very useful and my experience with upGrad and the student mentors at upGrad has been very good. The content taught is very relatable and the method of delivery is also convenient for working professionals like us ”



“ **Kriti Jain**
Software Engineer,
Ministry of Defence

upGrad teaches complex topics in a very simple manner. The case studies are easily understandable and have added value to my resume and helped me bag a 125% salary hike. The curriculum is very relevant to today’s market scenario and the upGrad team has done a good job in bringing education right at our palms ”



“ **Akshay Mathur**
Software Technologist,
Philips

“The program has taught me a lot and the case studies have been very useful. The student mentors are very helpful and have helped me solve any and every problem that I have faced. It has been a great experience for me, I would definitely recommend the program to my friends. ”



“ **Kumar Shubham**
SDET - II,
Blackbuck

“With upGrad, my experience has been wonderful. Managing work and studying has been the best decision of my life, thanks to upGrad. While it seemed difficult in the beginning, my student mentor helped me plan my schedule and manage time to maintain a work-life-study balance, which truly saved me! upGrad helped me gain a 60% salary hike. ”

Program Details & Admission Process

PROGRAM DURATION AND FORMAT

13 months | Online

PROGRAM FEE

Please refer to the website for program fee

PROGRAM START DATES

Please refer to the website for program start dates.

ELIGIBILITY

Bachelor's Degree with 50% or equivalent passing marks.
No coding experience required.

WEEKLY COMMITMENT (12-15 hours/week)



6-7 HOURS

Asynchronous learning time.



6-7 HOURS

Assignments and projects.

SELECTION PROCESS



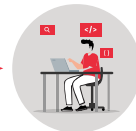
STEP 1: Selection Test

Fill out an application and take a short 20-minute online test with questions



STEP 2: Review and Shortlisting of Suitable Candidates

Our faculty will review all applications, consider the educational and professional background of an applicant and review the test scores wherever applicable. Following this, offer letters will be rolled out so you are assured a great peer group to learn and network with.



STEP 3: Enrolment for Access to Prep Content

Make a quick block payment with assistance from our loan partners where required, receive immediate access to the prep content and begin your upGrad journey.

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