upGrad | iiit-b International Institute of Information Technology Bangalore

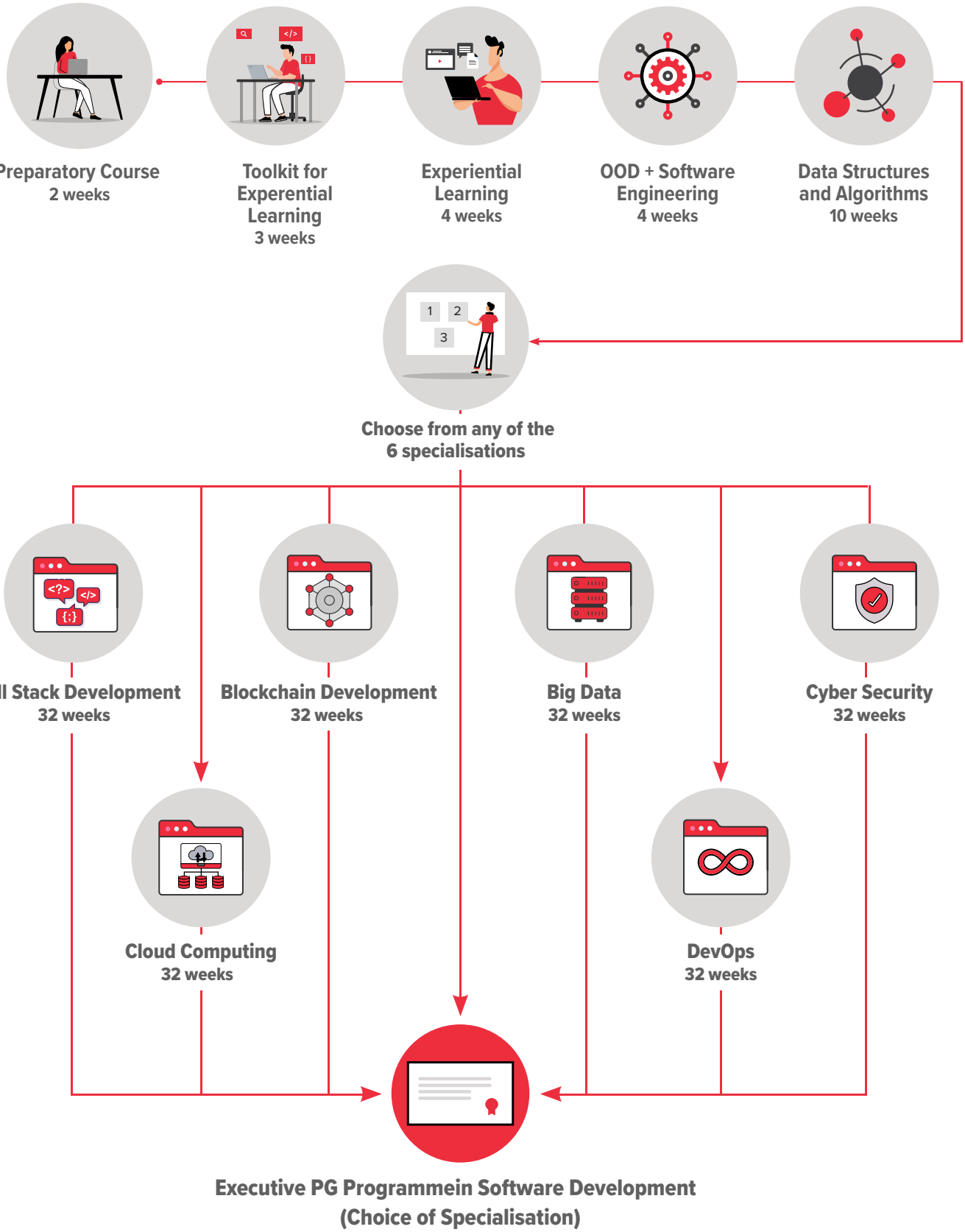
EXECUTIVE PG PROGRAMME IN SOFTWARE DEVELOPMENT

Six specialisations. One destination.

Detailed Curriculum

Table of Contents

Our Unique Learning Curve



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 EXPERENTIAL 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** — 1 WEEK
  Understand the requirements of a software product and think about the product's features & applications
- **ASSIGNMENT: REQUIREMENTS IDENTIFICATION**
  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 uing 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**
  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** — 1 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

- **SQL AND RELATIONAL DATABASE MANGEMENT SYSTEMS** — 1 WEEK
  Get introduced the Relational Database Management System and learn about the techniques to module relational databases. Use SQL to perform various DML and DDL queries on the relational database
- **HANDS-ON WITH NOSQL - MONGODB (OPTIONAL)** — 0 WEEK
  Understand the notion of NoSQL Database, take a hands-on approach and learn to model and query using MongoDB.
- **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
- **DESIGNING APPLICATIONS USING MICROSERVICES** — 1 WEEK
  Learn about Microsercies 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 technique
- **ASSIGNMENT/PROJECT - APPLICATION DEVELOPMENT** — 1 WEEK
  Use the concept learnt so far and work on a industry grade project

Exam Week: Exam	1 WEEK
Buffer Week	1 WEEK

C7. SOFTWARE ARCHITECTURE AND DEPLOYMENT

- **DISTRIBUTED SYSTEMS** — 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
- **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

- **INTRODUCTION TO DEVOPS** — 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, tunelling, 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

- **FUNDAMENTALS OF LINUX & SCRIPTING** — 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 (DELIVERED LIVE)

- **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 containerize applications at scale. Handling scalability issues with web applications by configuring load balancers, deciding server's geograpghical 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. Aslo, learn about Application Monitoring using Kibana/ELK cluster
- **INTRODUCTION TO CICD AND JENKINS** — 1 WEEK
  Learn about CICD pipleline 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 (DELIVERED LIVE)

- **CONTINOUS 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
- **CONTINOUS 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
- **ORCHESTRATION USING KUBERNETTES** — 2 WEEKS
  Learn the ways to orchestrate multiple docker containers using an orchestration tool like Kubernetes. Learn installation, component, architecutre, creating deployment, volumes, secret and creation of CICD pipeline involving Kubernettes
- **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 SPECIALISATION

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
- **CRYPTOGRAPHY AND ENCRYPTION** — 2 WEEKS
  Basic Information Protection: Data Secrecy/Confidentiality and Integrity - Requirements. Encryption as a Solution for Secrecy. Encryption vs Encryption as a computationallly difficult to invert function, Symmetric and Asymmetric encryption techniques. Encryption vs Encoding. Cryptography - Confusion and Diffusion Properties. Public Key and Private Key Encryption Techniques (RSA and AES as Examples). Password-baed Envcryption. HSM and PKI
- **CRYPTOGRAPHIC KEY MANAGEMENT, MESSAGE DIGESTS AND DIGITAL SIGNATURES** — 1 WEEK
  Key Management. Diffie Helman Key Exchange. Key Stores. Providers.
  Message Digests. Hashes and Signatures. Keyed Hashing. Digital Signatures. Digital Signuares 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 protocal and spoofing, SNMP and IGMP protocols
- **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** — 1 WEEK
  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
- **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 vulnerabilites
- **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 WEEKS
  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;
- **PENETRATION TESTING, FUZZING** — OPTIONAL
  Pentesting and tools, expoliting OWASP top 10 vulnerabilities in web aplication

- **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 & CLOUD DATABASES

- **INTRODUCTION TO DISTRIBUTED SYSTEMS** — 1 WEEK
  Understanding a distributed system: what it is, why it is needed its characteristics and a few industry examples Understanding challenges in implementing a distributed system and CAP theorem
- **INTRODUCTION TO CLOUD & AWS** — 1 WEEK
  Understanding the different cloud related concepts and terminologies and getting introduced to some of the services offered by AWS
- **SQL AND RELATIONAL DATABASE MANAGEMENT SYSTEMS** — 1 WEEK
  Get introduced the Relational Database Management System and learn about the techniques to module relational databases. Use SQL to perform various DML and DDL queries on the relational database
- **HANDS-ON WITH NOSQL - MONGODB** — 1 WEEK
  Understand the notion of NoSQL Database, take a hands-on approach and learn to model and query using MongoDB
- **ASSIGNMENT: DATABASES** — 1 WEEK
  Use the concept learnt so far and work on a industry grade project

C6. DESIGN & DEVELOPENT 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 ARCHITECTURES** — 1 WEEK
  Get introduced to web application the various types of software backend architectures and learn about their use-cases and challenges
- **DESIGNING APPLICATIONS USING MICROSERVICES** — 1 WEEK
  Create a High Level Design and decompose a given monolithic application to a microservice based architecture
- **REST & CONTROLLER LAYER** — 2 WEEKS
  Get introduced to REST and understand its various intricacies to develop REST APIs

- **AOP, EXCEPTION HANDLING AND APPLICATION SECURITY** — 1 WEEK
  Get introduced to Aspect-Oriented Programming. Learn about the various concepts of exception handling and application security
- **DISCOVERY AND COMMUNICATION BETWEEN MICROSERVICES** — 1 WEEK
  Establish synchronous communictaion between microservices, and manage these services for registry, discovery, load balancing and API gateway
- **ASYNCHRONOUS COMMUNICATION USING MESSAGING MODELS** — 1 WEEK
  Analyse various messaging patterns and deep dive into Kafka to establish asynchronous communication for a given use case
- **COURSE PROJECT: HOTEL ROOM BOOKING APPLICATION** — 2 WEEKS
  Create a microservice based application to evaluate the knowledge acquired throughout the course

Exam Week: Exam	1 WEEK
Buffer Week	1 WEEK

C7. SERVERLESS DEVELOPMENT AND DEPLOYMENT OF CLOUD-NATIVE APPLICATIONS

- **INTRODUCTION TO SERVERLESS ARCHITECTURE & AWS LAMBDA** — 1 WEEK
  Get introduced to serverless architecture and understand its pros-cons and indusry 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
- **MICROSERVCIES - DEBUGGING AND TRUOBLE SHOOTING** — 1 WEEK
  Learn and apply various strategies to debug a microservice-based application
- **SPRING CLOUD OFFERINGS FOR CLOUD-NATIVE APPLICATIONS** — 1 WEEK
  Get introduced to Spring Cloud and learn to deploy microservices-based applications using Spring Cloud
- **APPLICATION DEPLOYMENT USING DOCKER** — 1 WEEK
  Understand the notion of containers and their use cases. Learn about Docker and create Docker images of your application
- **DEPLOYING CONTAINERS AT SCALE USING KUBERNETES** — 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 WEEKS
  Learn about AWS BeanStack and deploy a web application using BeanStack

- **COURSE PROJECT: APPLICATION DEPLOYMENT USING DOCKER** — 1 WEEK
  Deploying an application on the Cloud

Exam Week: Exam	1 WEEK
Buffer Week	1 WEEK

C8. CAPSTONE

- **CAPSTONE PROJECT: BOOKMYCONSULTATION APPLICATION** — 4 WEEKS
  The capstone project will stitch all the concepts learnt during the program

BIG DATA SPECIALISATION

C5. BIG DATA FUNDAMENTALS AND PLATFORMS

- **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
- **RELATIONAL & DIMENSIONAL 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 lighting fast big data processing engine. Use Spark to create highly optimised large scale data processing applications
- **SPARK ASSIGNMENT** — 1 WEEK
  Solve an assignment to brush up the skills learnt so far

C6. BATCH DATA 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
  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

- **COURSE PROJECT: ETL 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

- **INTRODUCTION TO STREAMING ALGORITHMS** — 1 WEEK
  Understand the various core techniques to process real-time streams of data
- **REAL-TIME DATA STREAMING WITH APACHE KAFKA** — 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
- **APACHE 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
- **DESIGN & DEPLOYMENT - DATA PLATFORM** — 1 WEEK
  An industry demo to design, develop and deploy a big data platform
- **DESIGN & DEPLOYMENT - STREAMING APPLICATIONS** — 1 WEEK
  Use the tools and techniques learned in the course to solve an industry problem
- **COURSE PROJECT: RETAIL DATA ANALYSIS** — 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: DATA PLATFORM FOR CAB RIDING APPLICATION** — 4 WEEKS
  The capstone project will stich 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 decentralized 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
- **ETHEREUM FUNDAMENTALS** — 1 WEEKS
  As a part of this module, you will learn thebasics of ethereum, it's architecture and the different core concepts of it
- **SMART CONTRACT DEVELOPMENT IN ETHEREUM** — 2 WEEKS
  In this module, you will learn basics of smart contracts and how to write them using Solidity. 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 smart contract on a test network like Ropsten
- **DAPP DEVELOPMENT IN ETHEREUM** — 1 WEEK
  You will learn about tokens, wallet creation and how to construct a distributed appppplication on ethereum as part of this module
- **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 chaincdoe 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** — **2 WEEK**

  The project is on building a blockchain solution for the supply chain managent. 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**

C7. ARCHITECTING BLOCKCHAIN APPLICATIONS (DELIVERED LIVE)

- **UPSTAC COVID APP ARCHITECTING AND DEPLOYMENT** — **3 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 deployement, you will also be learning about Baas on AWS

- **ARCHITECTING A DEFI APPLICATION** — **2 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 WEEKS**
  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** — **4 WEEKS**
  Apply the concepts learnt till now in building an ICO/Crowdfunding platform

Program Details & Admission Process

PROGRAM DURATION AND FORMAT
13 months | Online

PROGRAM FEE
INR 2,99,000 (incl. Taxes)

PROGRAM START DATES
Please refer to the website for program start dates.

ELIGIBILITY
Bachelor's Degree with 50% or equivalent passing marks.
Prior knowledge or hands-on coding experience is recommended.

WEEKLY COMMITMENT (15 hours/week)

6-7 HOURS
Asynchronous learning time.

6-7 HOURS
Assignments and projects.

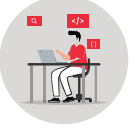
SELECTION PROCESS

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: Enrollment 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.

For further details, call us at **18002102020** or drop an email at : admissions@upgrad.com

upGrad

COMPANY INFORMATION
upGrad Education Private Limited
Nishuvi, 75, Dr. Annie Besant Road
Worli, Mumbai - 400018