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100% Placement or Full fee refund.”***

“ IITians-Founded Coder Pathshala ”

Expert **Data Analytics** career support with IIT alumni and top professionals from **Google, Reliance-Jio, IISc-Bangalore** & leading research institutes.

Programming in C (Semester 1)

Module 1: Introduction to Programming & C Basics

- Problem-solving techniques
- Algorithms and flowcharts
- Structure of a C program
- Compilation and execution process

Module 2: Data Types & Operators

- Variables and constants
- Data types and type conversion
- Arithmetic, relational, logical operators
- Expressions and precedence

Module 3: Control Structures

- Conditional statements
- Looping constructs
- Nested loops
- Break and continue

Module 4: Arrays & Strings

- One-dimensional and two-dimensional arrays
- Character arrays and string functions
- Array applications

Module 5: Functions & Pointers

- Function declaration and definition
- Call by value and call by reference
- Pointer basics and pointer arithmetic
- Dynamic memory allocation

Module 6: Structures & File Handling

- Structures and unions
- File operations
- Command-line arguments
- Simple applications

Python Programming (Semester 1)

Module 1: Python Fundamentals

- Introduction to Python
- Syntax and indentation
- Variables and input/output

Module 2: Control Flow & Functions

- Conditional statements
- Loops
- Functions and parameters

Module 3: Python Data Structures

- Lists and tuples
- Sets and dictionaries
- Data manipulation techniques

Module 4: Strings, Files & Exceptions

- String operations and formatting
- File read/write
- Exception handling

Module 5: Modules & Libraries

- Importing modules
- Standard libraries
- Introduction to NumPy

Module 6: Problem Solving with Python

- Algorithmic thinking
- Logical problem solving
- Mini-project using Python

Object Oriented Programming using C++ (Semester 2)

Module 1: C++ Fundamentals

- C vs C++
- Program structure
- Input/output streams

Module 2: Classes & Objects

- Class definition
- Objects and access specifiers
- Constructors and destructors

Module 3: Inheritance

- Types of inheritance
- Method overriding
- Virtual base classes

Module 4: Polymorphism

- Function overloading
- Operator overloading
- Virtual functions

Module 5: Templates & STL

- Function and class templates
- STL containers
- Iterators and algorithms

Module 6: Exception & File Handling

- Exception handling mechanism
- File input/output
- Applications

Programming in Java (Semester 2)

Module 1: Java Basics & JVM

- Java features
- JVM, JDK, JRE
- Java program structure

Module 2: OOP Concepts in Java

- Classes and objects
- Constructors
- Inheritance

Module 3: Polymorphism & Abstraction

- Method overriding
- Abstract classes
- Interfaces

Module 4: Packages & Exception Handling

- Built-in packages
- User-defined packages
- Exception hierarchy

Module 5: Multithreading

- Thread lifecycle
- Synchronization
- Inter-thread communication

Module 6: File Handling & Collections

- File I/O streams
- Serialization
- Java Collection Framework

Semester 3 – Data Analytics Foundations with Python

Module 1: Introduction to Data Analytics

- Data analytics overview
- Analytics lifecycle
- Types of analytics
- Real-world use cases
- Tools ecosystem

Module 2: Python Basics

- Python syntax
- Variables & data types
- Control flow
- Functions
- Basic problem solving

Module 3: Python Data Structures

- Lists & tuples
- Dictionaries & sets
- String operations
- Comprehensions
- Data handling basics

Module 4: NumPy Fundamentals

- NumPy arrays
- Indexing & slicing
- Vectorized operations
- Mathematical functions
- Performance benefits

Module 5: Pandas for Data Handling

- DataFrames & Series
- Reading datasets
- Filtering & selection
- Data inspection
- Basic transformations

Module 6: Data Cleaning & Preparation

- Handling missing values
- Removing duplicates
- Outlier treatment
- Data transformation
- Feature preparation

Module 7: Data Visualization

- Matplotlib basics
- Seaborn plots
- Distribution analysis
- Correlation heatmaps
- Visual storytelling

Module 8: Exploratory Data Analysis (EDA)

- Univariate analysis
- Bivariate analysis
- Pattern discovery
- Insights generation
- EDA reporting

Semester 4 – Applied Statistics & Data Wrangling

Module 9: Advanced Python for Data

- Lambda functions
- Map, filter, reduce
- Generators
- Error handling
- Efficient coding

Module 10: Working with Dates & APIs

- Datetime handling
- Time-series basics
- File formats
- API consumption
- JSON data processing

Module 11: Statistics Fundamentals

- Mean & median
- Variance & standard deviation
- Percentiles & z-scores
- Data distributions
- Statistical summaries

Module 12: Probability Theory

- Probability concepts
- Random variables
- Normal distribution
- Binomial & Poisson
- Law of large numbers

Module 13: Hypothesis Testing

- Null & alternative hypothesis
- p-values
- t-test
- Chi-square test
- ANOVA basics

Module 14: Correlation & Regression

- Pearson & Spearman
- Linear regression
- Multiple regression
- Residual analysis
- Model interpretation

Module 15: Feature Engineering

- Scaling & normalization
- Encoding techniques
- Handling skewness
- Feature selection
- Data preparation

Module 16: Data Wrangling & Statistical Visualization

- Merging & joins
- GroupBy & pivot tables
- Statistical plots
- Regression visuals
- Insight reporting

Semester 5 – SQL, Machine Learning & Predictive Analytics

Module 17: SQL for Data Analytics

- SELECT queries
- Filtering & sorting
- Aggregations
- Joins
- Window functions

Module 18: Advanced Data Visualization

- Time-series plots
- Multi-axis charts
- Advanced Seaborn
- Correlation visuals
- Insight dashboards

Module 19: Introduction to Machine Learning

- ML concepts
- Supervised vs unsupervised
- ML workflow
- Train-test split
- Evaluation metrics

Module 20: Regression Models

- Linear regression
- Polynomial regression
- Overfitting concepts
- Model evaluation
- Predictive modeling

Module 21: Classification Models

- Logistic regression
- Confusion matrix
- Precision & recall
- ROC curve
- Classification use cases

Module 22: Decision Trees

- Tree structure
- Gini & entropy
- Tree overfitting
- Model tuning
- Interpretability

Module 23: Clustering Techniques

- K-Means clustering
- Choosing optimal K
- Customer segmentation
- Cluster evaluation
- Unsupervised insights

Module 24: Dimensionality Reduction

- PCA fundamentals
- Variance explained
- Visualization with PCA
- Feature reduction
- High-dimensional data

Semester 6 – Advanced ML, Big Data & Capstone

Module 25: Ensemble Learning

- Bagging techniques
- Random Forest
- Boosting concepts
- XGBoost
- Model tuning

Module 26: Model Evaluation & Validation

- Cross-validation
- Bias-variance tradeoff
- F1-score & AUC
- Model comparison
- Performance reporting

Module 27: Time Series Analysis

- Trend & seasonality
- Stationarity
- ARIMA models
- Forecasting techniques
- Time-based insights

Module 28: Natural Language Processing

- Text preprocessing
- Bag-of-Words
- TF-IDF
- Sentiment analysis
- Text features

Module 29: Big Data Analytics

- Big Data concepts
- Hadoop ecosystem
- Spark fundamentals
- PySpark DataFrames
- Large-scale analytics

Module 30: BI Tools & Model Deployment

- Power BI / Tableau
- Dashboard creation
- ML deployment basics
- API-based models
- Capstone delivery