



Data Science — Complete Course Content

WC Skills • World Class Skills Institute

Duration	16 Weeks
Target Audience	Analysts, graduates and professionals entering data science
Prerequisites	Basic Python and statistics helpful.

What this document contains

A module-wise training roadmap covering concepts, hands-on labs, project work, assessment checkpoints and interview preparation. The syllabus is designed as a structured course plan for classroom or live-online delivery.

Course Objectives & Learning Outcomes

By the end of this course, learners should be able to explain the core concepts, perform the practical tasks listed in the labs, troubleshoot common scenarios, document their work and complete the capstone with a professional implementation approach.

- Understand the architecture, terminology and end-to-end workflow of the subject.
- Perform guided hands-on exercises using the relevant tools and development/administration environment.
- Apply troubleshooting, testing, documentation and best-practice techniques.
- Build a portfolio-ready capstone demonstrating practical competency.
- Prepare for technical interviews with scenario-based questions and implementation discussions.

Detailed Module-wise Curriculum

Module 1: Python for Data Science

- NumPy
- Pandas
- Jupyter
- Data types
- Reusable analysis code

Hands-on Lab: Lab: clean and profile a real-world dataset.

Module 2: Statistics

- Descriptive statistics
- Probability
- Distributions
- Sampling
- Hypothesis testing

Hands-on Lab: Lab: test a business hypothesis.

Module 3: Data Cleaning & EDA

- Missing values
- Outliers
- Encoding
- Feature relationships
- EDA storytelling

Hands-on Lab: Lab: produce an exploratory analysis report.

Module 4: Visualization

- Matplotlib
- Chart selection
- Dashboards
- Annotation
- Communication

Hands-on Lab: Lab: build an executive-ready data story.

Module 5: SQL & Data Engineering Basics

- Relational concepts
- Joins
- Aggregations
- Window functions
- Data pipelines awareness

Hands-on Lab: Lab: answer business questions using SQL.

Module 6: Machine Learning Foundations

- Train/test split
- Regression
- Classification
- Metrics
- Cross-validation

Hands-on Lab: Lab: train baseline predictive models.

Module 7: Advanced ML

- Feature engineering
- Tree models
- Ensembles
- Clustering
- Dimensionality reduction

Hands-on Lab: Lab: compare multiple models.

Module 8: Model Explainability & Deployment

- Feature importance
- Model cards
- Serialization
- API deployment awareness
- Monitoring

Hands-on Lab: Lab: package a model for inference.

Module 9: Special Topics

- Time series
- NLP awareness
- Recommendation concepts
- Imbalanced data
- Experiment tracking

Hands-on Lab: Lab: select an appropriate approach for a business case.

Module 10: Capstone

- Problem definition
- Data preparation
- Modeling
- Evaluation
- Presentation

Hands-on Lab: Lab: deliver an end-to-end data science project.

Practical Delivery Plan

Phase	Focus	Expected Evidence
1	Concept + demonstration	Notes, diagrams and guided exercises
2	Hands-on practice	Working configuration/code and screenshots/logs
3	Troubleshooting	Issue reproduction, diagnosis and resolution notes
4	Mini project	Functional solution with test cases
5	Capstone	End-to-end project, documentation and presentation

Assessment & Certification Readiness

Recommended assessment pattern: module quizzes (20%), practical labs (30%), mini project (20%), capstone (20%) and interview/viva (10%). Completion certificates, placement support and any certification claims should follow the institute's current published policy and the relevant vendor's certification rules.

Capstone Requirements

- Problem statement and scope
- Architecture/process diagram
- Implementation or configuration
- Test cases and results
- Troubleshooting notes
- User/technical documentation
- Final presentation and interview questions

Interview Preparation Topics

Learners should be able to answer architecture questions, explain the difference between key concepts, troubleshoot a real scenario, justify design choices, discuss performance/security considerations and walk through the capstone from requirement to deployment/support.

Recommended Learning Resources

Use official product documentation and current vendor guidance for version-specific commands, configuration steps and certification requirements. Validate training examples in a non-production environment before applying them to customer systems.