MongoDB Administrator Course Outline

Mode: Instructor-Led | **Hands-On:** 60% | **Audience:** DBAs, DevOps, Backend Engineers

---

Day 1 – MongoDB Foundations & Core Administration (8 Hours)

1. Introduction to MongoDB Ecosystem (1 hr)

- What is MongoDB?
- Document Database vs Relational Databases
- BSON & JSON structure
- Collections, Databases, and Clusters
- Where MongoDB fits in modern applications

---

2. MongoDB and the Document Model (1 hr)

- Embedded vs Referenced Documents
- Flexible Schema
- Sample document structures
- Lab: Explore sample documents using MongoDB Shell

---

3. MongoDB Data Modelling Introduction (1 hr)

- Data modelling patterns
- One-to-One, One-to-Many, Many-to-Many
- Polymorphic patterns
- Lab: Model a simple E-commerce schema

---

4. The MongoDB Shell (mongosh) (1 hr)

- Basic shell operations
- Connecting to standalone, replica set
- Shell queries and scripting basics

- Lab: Connect and explore collections

---

5. Connecting to a MongoDB Database (30 min)

- Connection string concepts
- Users, roles, authentication
- Connect using mongosh, Compass, and drivers

---

6. MongoDB CRUD Operations – Insert & Find (1 hr)

- insertOne(), insertMany()
- find(), findOne()
- Query filters, projections
- Lab: Perform CRUD queries on a sample dataset

---

7. MongoDB CRUD Operations – Replace & Delete (30 min)

- replaceOne()
- deleteOne(), deleteMany()
- Lab: Data cleanup operations

---

8. Modifying Query Results (1 hr)

- sort(), skip(), limit()
- Aggregation preview
- Query optimization basics
- Lab: Apply query modifiers for performance

End of Day Assignment

- CRUD tasks on sample collections
- Short quiz (MCQ + practical)

🔶 Day 2 – Indexing, Monitoring, Backup & Atlas (8 Hours)

1. MongoDB Indexes (1 hr)

- Why indexes matter
- Single-field indexes
- Query planner introduction
- Lab: Create and test index performance

---

2. MongoDB Indexes in Detail (1 hr 30 min)

- Compound indexes
- Multikey indexes
- Text indexes
- TTL indexes
- Partial & Sparse indexes
- Index performance monitoring
- Lab: Identify slow queries & fix them with indexes

---

3. MongoDB Logging Basics (1 hr)

- Log file structure
- Slow query logs
- Profiling levels
- Lab: Enable profiler and analyze logs

---

4. Getting Started with MongoDB Atlas (1 hr)

- Create free tier cluster
- Cluster deployment options
- Network & security configuration
- Lab: Deploy and connect to Atlas cluster

---

5. MongoDB Administrator Tools (1 hr)

- mongosh
- mongodump, mongorestore

- mongotop, mongostat
- Compass & Atlas Metrics
- Lab: Use admin tools on a dataset

---

6. Database Metrics & Monitoring (1 hr 30 min)

- Understanding MongoDB metrics
- WiredTiger cache
- IOPS, CPU, memory metrics
- Monitoring tools: Atlas, Cloud Manager, Prometheus, Grafana
- Lab: Live monitoring of workload

End of Day Assignment

- Create indexes and measure performance gain
- Generate and analyze profiler logs

🔶 Day 3 – Replication, Backup, Security, Maintenance (8 Hours)

1. Self-Managed Backup & Recovery (1 hr 30 min)

- Logical backups (mongodump/mongorestore)
- Physical backups (Filesystem snapshot)
- Hot vs cold backup
- PITR (Point-in-Time Recovery)
- Lab: Perform backup & restore

---

2. Upgrades & Maintenance (1 hr)

- Version compatibility
- Rolling upgrades
- FCV (Feature Compatibility Version)
- Compacting & cleaning up data
- Lab: Perform mock upgrade steps

3. Introduction to Replication in MongoDB (2 hrs)

- Replica set architecture
- Primary, Secondary, Arbiter
- Elections & failover
- Read preference & write concerns
- Lab: Set up a 3-node replica set locally
- Lab: Test failover + observe elections

---

4. MongoDB Self-Managed Security (1 hr 30 min)

- Authentication & Authorization
- Role-Based Access Control (RBAC)
- TLS/SSL configuration
- Network security
- Data at rest encryption
- Lab: Create users and enforce roles

---

5. Maintenance & Performance Optimization (1 hr)

- Common DBA tasks
- Query optimization techniques
- Cache handling
- Index lifecycle management
- Lab: Identify performance bottlenecks

---

6. Course Wrap-Up + MCQ Test (1 hr)

- Final assessment (40 MCQs)
- Practical DBA scenario questions
- Summary & best practices

🔧 LAB SETUP REQUIREMENTS

For Participants

- Laptop with **8 GB RAM minimum**
- Install:
  - Docker Desktop OR Local MongoDB Community Edition
  - mongosh
  - MongoDB Compass
- VS Code (optional)
- Sample datasets (provided by trainer)

Trainer Setup

- Preconfigured:
  - Replica set lab environment
  - Atlas project & cluster
  - Monitoring dashboards
  - Backup/restore scenarios

📘 Assignments for Practice

1. CRUD + Aggregation on sample data
2. Index optimization assignment
3. Backup & restore simulation
4. Replica set failover exercise
5. Security role creation exercise

📝 MCQ Test

- 40 questions
- Covers CRUD, Indexing, Replication, Security, Monitoring
