

Subject Code	Subject Name	Credits
26CS507	BIG DATA SECURITY	4

Course Objectives:

1. To introduce students to the basic concepts of Big Data technologies, architecture, and security challenges.
2. To develop understanding of data privacy, encryption, authentication, and access control in Big Data systems.
3. To enable students to identify and manage security risks, threats, and vulnerabilities in Big Data environments.

Learning Objectives:

After completion of the course the students will be able to:

1. Understand the fundamentals of Big Data architecture and security mechanisms.
2. Implement basic data protection, encryption, and privacy-preserving techniques in Big Data systems.
3. Analyze and solve security issues in Big Data platforms such as Hadoop and cloud-based systems.

Unit I - Introduction to Big Data and security (12 Hrs.)

Characteristics of Big Data - Big data management architecture. Big Data Types - structured, semi-structured, and unstructured data. Basic concepts of information security: confidentiality, integrity, and availability. Security challenges in Big Data environments

Unit II - Big Data Architecture and Security Issues (12 Hrs.)

Big Data architecture and components. Hadoop ecosystem: HDFS, MapReduce, and YARN. Security issues in Big Data systems. Authentication and authorization in Big Data platforms. Access control and user management.

Unit III - Data Privacy and Protection (12 Hrs.)

Importance of data privacy in Big Data. Privacy-preserving techniques. Data encryption methods. Data masking and anonymization. Secure data storage and backup techniques

UNIT IV - Network and Application Security in Big Data (12 Hrs.)

Network security basics in Big Data environments. Secure communication protocols. Firewalls and intrusion detection systems. Application security issues in Big Data analytics. Monitoring and logging in Big Data systems.

UNIT V - Emerging Trends and Case Studies (12 Hrs.)

Cloud security in Big Data platforms. Introduction to blockchain for data security. Security in Big Data analytics and machine learning. Legal and ethical issues in Big Data security. Case studies of real-world Big Data security implementations.

Reference Books:

1. Big Data Security and Privacy Handbook – Fei Hu.
2. Hadoop Security – Ben Spivey and Joey Echeverria.
3. Big Data: Principles and Best Practices of Scalable Realtime Data Systems – Nathan Marz and James Warren.
4. Security and Privacy in Big Data – Fei Hu.
5. Big Data Fundamentals: Concepts, Drivers and Techniques – Thomas Erl, Wajid Khattak, and Paul Buhler.