

Proposed Curriculum Framework
Bachelor of Science (B.Sc.) in Computer Science
University of Engineering & Management (UEM), Jaipur

(NEP 2020 Aligned | AI-Driven | Industry Integrated | Research & Innovation Focused | Effective from Academic Session 2026–27)

Programme Duration: 4 Years (8 Semesters)

Total Credits: 160 Credits (20 Credits per Semester)

Eligibility: 10+2 with Mathematics/Computer Science (preferred)

Multiple Exit Options (NEP 2020)

- * After 1 Year: Certificate in Computer Science & Digital Technologies
- * After 2 Years: Diploma in Computer Applications & Programming
- * After 3 Years: B.Sc. Computer Science
- * After 4 Years: B.Sc. Computer Science (Honours/Research)

The curriculum is designed by benchmarking leading national and international undergraduate Computer Science programmes while incorporating Artificial Intelligence, Data Science, Cyber Security, Cloud Computing, IoT, DevOps, Blockchain, Full Stack Development, Quantum Computing, and Generative AI. It is aligned with the National Education Policy (NEP) 2020 and the evolving needs of Industry 5.0.

Programme Educational Objectives (PEOs)

Graduates will be able to:

- * Develop strong foundations in computer science and software engineering.
- * Design, develop, test, and deploy software systems.

- * Apply AI, machine learning, cloud computing, and data analytics to solve real-world problems.
 - * Demonstrate ethical, professional, and entrepreneurial competencies.
 - * Pursue higher education, research, innovation, and global careers in computing.
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Programme Outcomes (POs)

Graduates will be able to:

- * Analyze and solve complex computational problems.
 - * Design efficient algorithms and software systems.
 - * Develop secure, scalable, and intelligent computing solutions.
 - * Use modern programming languages and development frameworks.
 - * Apply research methods and innovation in computing.
 - * Work effectively in multidisciplinary teams.
 - * Demonstrate lifelong learning and professional ethics.
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Semester I (20 Credits)

Course	Credits
Programming Fundamentals using Python	4
Computer Organization & Digital Systems	4
Discrete Mathematics	4
Communication Skills	2
Programming Laboratory-I	4

Course Highlights

Programming Fundamentals

- * Problem Solving
- * Python Programming
- * Data Types
- * Operators
- * Functions
- * Modules
- * File Handling
- * Exception Handling
- * Object-Oriented Programming Basics

Computer Organization

- * Number Systems
- * Logic Gates
- * Boolean Algebra
- * Digital Circuits
- * CPU Architecture
- * Memory Organization
- * Input-Output Devices

Laboratory

- * Python Programming
 - * Git & GitHub
 - * Linux Basics
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Semester II (20 Credits)

Course	Credits
Data Structures using C++	4
Database Management Systems	4
Operating Systems	4
Web Technologies	3
Programming Laboratory-II	3
Community Engagement / Ability Enhancement Course	2

Topics

- * Arrays
- * Linked Lists
- * Trees
- * Graphs
- * Searching
- * Sorting

Database

- * ER Model
- * SQL
- * PL/SQL
- * Transactions
- * Normalization

Web

- * HTML5
- * CSS3
- * JavaScript
- * Bootstrap

Semester III (20 Credits)

Course	Credits
Object-Oriented Programming using Java	4
Computer Networks	4
Design & Analysis of Algorithms	4
Data Analytics using Python	3
Laboratory-III	2
Internship-I	3

Topics

- * Java Programming
- * TCP/IP
- * Routing
- * Network Security Basics
- * Divide & Conquer
- * Dynamic Programming
- * Greedy Algorithms
- * Data Visualization
- * NumPy
- * Pandas

Semester IV (20 Credits)

Course	Credits
Software Engineering	4
Artificial Intelligence	4
Full Stack Development	4
Research Methodology	2
Laboratory-IV	3
Minor Project	3

Topics

- * SDLC

- * Agile
 - * Scrum
 - * Testing
 - * Intelligent Agents
 - * Search Algorithms
 - * Knowledge Representation
 - * React.js
 - * Node.js
 - * Express.js
 - * MongoDB
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Semester V (20 Credits)

Course	Credits
Machine Learning	4
Cloud Computing	4
Cyber Security	4
Laboratory-V	2
Elective-I	3
Internship-II	3

Topics

- * Supervised Learning
- * Unsupervised Learning

- * AWS
- * Microsoft Azure
- * Docker
- * Kubernetes
- * Ethical Hacking
- * Cryptography
- * Network Security
- * Penetration Testing

Semester VI (20 Credits)

Course	Credits
Internet of Things (IoT)	4
Big Data Analytics	4
Mobile Application Development	4
Laboratory-VI	2
Elective-II	3
Industry Project	3

Topics

- * Arduino
- * Raspberry Pi
- * IoT Protocols
- * Hadoop

- * Spark
 - * Android Development
 - * Flutter
 - * Firebase
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Semester VII (20 Credits)

Course	Credits
Blockchain Technology	4
Generative AI & Large Language Models	4
DevOps & MLOps	4
Elective-III	2
Research Project-I	3
Industrial Internship	3

Topics

- * Blockchain Architecture
- * Smart Contracts
- * Ethereum
- * Prompt Engineering
- * Retrieval-Augmented Generation (RAG)
- * AI Agents
- * CI/CD
- * Jenkins

- * GitHub Actions
- * ML Model Deployment

Semester VIII (20 Credits)

Course	Credits
Quantum Computing Fundamentals	4
Emerging Technologies in Computer Science	4
Dissertation / Research Thesis / Startup Project	8
Seminar	2
Viva Voce	2

Suggested Electives

Artificial Intelligence

- * Deep Learning
- * Computer Vision
- * Natural Language Processing
- * Reinforcement Learning

Data Science

- * Business Intelligence
- * Time Series Analysis

- * Predictive Analytics

Cyber Security

- * Digital Forensics
- * Malware Analysis
- * Ethical Hacking
- * Cloud Security

Software Engineering

- * Microservices
- * Software Architecture
- * Enterprise Application Development

Cloud Computing

- * Serverless Computing
- * Cloud Security
- * Edge Computing

Emerging Technologies

- * Robotics
- * AR/VR
- * Digital Twins
- * Human-Computer Interaction

Laboratory Components

Students will complete extensive practical work in:

- * Python Programming
- * C++
- * Java
- * SQL & NoSQL Databases
- * Linux Administration
- * Web Development
- * React.js
- * Node.js
- * AI & Machine Learning
- * Cloud Deployment
- * IoT Applications
- * Mobile App Development
- * Blockchain
- * DevOps
- * Cyber Security
- * Quantum Computing Simulations

Software & Industry Tools

Students will gain hands-on experience with:

- * Python

- * C++
- * Java
- * JavaScript
- * SQL
- * MongoDB
- * React.js
- * Node.js
- * Docker
- * Kubernetes
- * Git & GitHub
- * VS Code
- * Jupyter Notebook
- * Google Colab
- * TensorFlow
- * PyTorch
- * OpenCV
- * Scikit-learn
- * Apache Spark
- * Hadoop
- * AWS Academy
- * Microsoft Azure
- * Firebase
- * Flutter
- * Power BI
- * Tableau
- * Linux
- * Jenkins
- * GitHub Actions
- * LangChain

- * Ollama
 - * Hugging Face
 - * OpenAI API (subject to licensing)
 - * PostgreSQL
 - * Redis
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Internship Structure

Semester III

4 Weeks: Programming & Web Development Internship

Semester V

6 Weeks: AI, Cloud, Data Analytics, or Software Development Internship

Semester VII

8–10 Weeks: Industrial Internship or Research Internship

Suggested Industry Collaborations

- * Google
- * Microsoft
- * Amazon Web Services (AWS)

- * IBM
- * Oracle
- * NVIDIA
- * Intel
- * Infosys
- * TCS
- * Wipro
- * Accenture
- * Cognizant
- * Capgemini
- * Deloitte
- * Red Hat
- * Cisco
- * Palo Alto Networks
- * GitHub Education
- * AI startups
- * FinTech companies
- * Cybersecurity firms

Skill Enhancement Certifications

Students should be encouraged to complete certifications in:

- * Python Programming
- * Java Programming
- * AWS Cloud Practitioner
- * Microsoft Azure Fundamentals

- * Google Cloud Fundamentals
- * TensorFlow Developer
- * AI & Machine Learning
- * Data Science
- * Ethical Hacking
- * Cisco CCNA
- * Docker & Kubernetes
- * DevOps
- * Flutter Development
- * Power BI
- * Tableau
- * Generative AI
- * Prompt Engineering
- * Git & GitHub
- * SQL
- * Linux Administration

Assessment Pattern

- * Continuous Internal Assessment: 40%
- * End Semester Examination: 60%

Evaluation will include:

- * Coding assignments
- * Laboratory performance
- * Hackathons

- * Mini-projects
 - * Industry case studies
 - * Technical presentations
 - * Research papers
 - * Internship reports
 - * Open-source contributions
 - * Capstone project
 - * Viva voce
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Career Opportunities

Graduates can pursue careers as:

- * Software Engineer
- * Full Stack Developer
- * AI Engineer
- * Machine Learning Engineer
- * Data Scientist
- * Cloud Engineer
- * DevOps Engineer
- * MLOps Engineer
- * Cyber Security Analyst
- * Ethical Hacker
- * Blockchain Developer
- * IoT Engineer
- * Mobile Application Developer
- * Data Engineer

- * Business Intelligence Analyst
- * Systems Analyst
- * Research Associate
- * AI Solutions Architect
- * Product Engineer
- * Technology Consultant
- * Entrepreneur

Graduates will also be well prepared for M.Sc. Computer Science, MCA, M.Tech., MBA (Business Analytics/IT), Integrated Ph.D., Ph.D., and competitive examinations such as GATE, UGC-NET, NIELIT, ISRO, DRDO, NIC, CDAC, and other government and private-sector recruitment.

Distinctive Features for UEM Jaipur

To establish the programme as a flagship undergraduate computing degree, UEM Jaipur should include:

- * Centre for Artificial Intelligence, Data Science and Emerging Technologies with GPU-enabled computing infrastructure.
- * Cyber Security and Digital Forensics Laboratory equipped with virtual cyber ranges.
- * Cloud Innovation Centre in collaboration with AWS Academy and Microsoft Learn for Students.
- * Innovation & Startup Incubation Hub to support student-led software products and AI startups.
- * Mandatory industry internship every academic year, integrated with credit-bearing live projects.
- * Annual UEM AI & Technology Summit, hackathons, coding competitions, and open-source contribution drives.

- * Integration of Generative AI, Large Language Models, AI agents, cloud-native development, DevOps, blockchain, IoT, and quantum computing throughout the curriculum.
- * Strong collaborations with leading technology companies, research laboratories, and academic institutions for internships, certifications, research projects, and placements.

This curriculum provides a balanced foundation in computer science while emphasizing modern computing technologies, experiential learning, research, innovation, entrepreneurship, and industry engagement, making graduates highly competitive for careers in India's rapidly growing digital economy and global technology sectors.