

Proposed Curriculum Framework

Bachelor of Science (B.Sc.) in Mathematics

University of Engineering & Management (UEM), Jaipur

(NEP 2020 Aligned | Research, Computing & Industry Integrated | Effective from Academic Session 2026–27)

Programme Duration: 4 Years (8 Semesters)

Total Credits: 160 Credits (20 Credits/Semester)

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

Multiple Exit Options (NEP 2020)

- * After 1 Year: Certificate in Mathematical Sciences
- * After 2 Years: Diploma in Applied Mathematics
- * After 3 Years: B.Sc. Mathematics
- * After 4 Years: B.Sc. Mathematics (Honours/Research)

The curriculum is designed by benchmarking NEP-aligned undergraduate mathematics programmes while incorporating modern areas such as computational mathematics, data science, artificial intelligence, financial mathematics, cryptography, optimization, and mathematical modelling to enhance employability and research readiness.

Programme Educational Objectives (PEOs)

Graduates will be able to:

- * Develop rigorous mathematical reasoning and proof-writing skills.
 - * Apply mathematics to engineering, finance, artificial intelligence, and scientific computing.
 - * Build strong computational and programming capabilities.
 - * Solve industrial and research problems using mathematical modelling.
 - * Pursue higher studies (M.Sc., Ph.D.), competitive examinations (IIT-JAM, GATE, CSIR-NET), and careers in academia, analytics, finance, software, and research.
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Semester I (20 Credits)

Course	Credits
Algebra-I	4
Differential Calculus	4
Mathematical Computing using Python	3
Mathematical Communication & Scientific Writing	2
Minor Course	3
Environmental Science / Value Added Course	2
Yoga & Wellness	2

Course Outline

Algebra-I

- * Sets and Relations
- * Functions
- * Complex Numbers
- * Matrices
- * Determinants
- * Systems of Linear Equations

Differential Calculus

- * Limits
- * Continuity
- * Differentiability
- * Mean Value Theorems
- * Applications of Derivatives
- * Curve Sketching

Programming

- * Python Basics
- * NumPy
- * SymPy
- * Mathematical Algorithms
- * Plotting

Semester II (20 Credits)

Course	Credits
Integral Calculus & Vector Calculus	4
Linear Algebra	4
Probability & Statistics-I	4
Programming Laboratory	2
Ability Enhancement Course	2
Community Engagement	2
Minor Course	2

Topics

- * Multiple Integrals
 - * Vector Differentiation
 - * Vector Integration
 - * Eigenvalues
 - * Eigenvectors
 - * Vector Spaces
 - * Probability Models
 - * Random Variables
 - * Descriptive Statistics
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Semester III (20 Credits)

Course	Credits
Real Analysis-I	4
Differential Equations	4
Numerical Methods	4
Computational Mathematics Laboratory	2
Skill Enhancement Course	3
Internship-I	3

Topics

- * Sequences
- * Series
- * Metric Spaces
- * Ordinary Differential Equations
- * Numerical Integration
- * Numerical Differentiation
- * Root Finding
- * Error Analysis

Semester IV (20 Credits)

Course	Credits
Abstract Algebra	4
Real Analysis-II	4
Operations Research	4
Mathematical Modelling	2
Research Methodology	3
Minor Project	3

Topics

- * Groups
- * Rings
- * Fields
- * Homomorphism
- * Linear Programming
- * Transportation Models
- * Assignment Problems
- * Queueing Theory
- * Inventory Models

Semester V (20 Credits)

Course	Credits
Complex Analysis	4

Topology 4
Probability & Statistics-II 4
Mathematical Software Laboratory 2
Elective-I 3
Internship-II 3

Topics

- * Complex Functions
- * Analytic Functions
- * Residue Theory
- * Metric Topology
- * Compactness
- * Connectedness
- * Statistical Inference
- * Regression Analysis

Semester VI (20 Credits)

Course	Credits
Functional Analysis	4
Graph Theory	4
Cryptography & Number Theory	4
Data Analytics using R/Python	2

Elective-II 3

Industry Project 3

Topics

- * Normed Spaces
- * Banach Spaces
- * Hilbert Spaces
- * Graph Algorithms
- * Trees
- * Networks
- * Prime Numbers
- * Modular Arithmetic
- * RSA Cryptography
- * Blockchain Mathematics

Semester VII (20 Credits)

Course	Credits
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Partial Differential Equations	4
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Machine Learning for Mathematics	4
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Financial Mathematics	4
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Elective-III	2
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Research Project-I	3
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Industrial Internship 3

Topics

- * Fourier Series
- * Heat Equation
- * Wave Equation
- * Black-Scholes Model
- * Stochastic Processes
- * Machine Learning
- * Optimization Algorithms
- * Mathematical Finance

Semester VIII (20 Credits)

Course	Credits
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Advanced Mathematical Modelling	4
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Optimization Techniques	4
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Dissertation / Research Thesis	8
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Seminar	2
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Viva Voce	2
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Suggested Electives

Pure Mathematics

- * Advanced Number Theory
- * Algebraic Geometry
- * Measure Theory

Applied Mathematics

- * Fluid Dynamics
- * Elasticity
- * Mathematical Biology

Computing

- * Artificial Intelligence
- * Deep Learning
- * Scientific Computing

Finance

- * Actuarial Mathematics
- * Risk Analysis
- * Quantitative Finance

Data Science

- * Big Data Analytics
- * Time Series Analysis
- * Data Mining

Interdisciplinary Mathematics

- * Bioinformatics
- * Climate Modelling
- * Computational Physics

Laboratory & Computational Courses

Students will complete practical training in:

- * Python Programming
- * R Programming
- * MATLAB
- * Mathematica
- * SageMath
- * GeoGebra
- * Scilab
- * SQL for Data Analytics

- * Mathematical Modelling
 - * Optimization Software
 - * Data Visualization
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Software Training

Students will receive hands-on exposure to:

- * Python
 - * R
 - * MATLAB
 - * Mathematica
 - * Maple
 - * SageMath
 - * Scilab
 - * LaTeX
 - * Jupyter Notebook
 - * Git & GitHub
 - * TensorFlow (Introduction)
 - * Power BI
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Internship Structure

- * Semester III: Academic/School/EdTech Internship (4 Weeks)
- * Semester V: Industry/Research Internship (6 Weeks)
- * Semester VII: Industrial/Research Internship (8–10 Weeks)

Suggested Collaborations

- * IITs
- * IISERs
- * ISI Kolkata
- * TIFR
- * DRDO
- * ISRO
- * CSIR Laboratories
- * National Institute of Technology (NITs)
- * Banks and Financial Institutions
- * Insurance Companies
- * FinTech Companies
- * Data Analytics Companies
- * IT Companies (Infosys, TCS, Wipro, Accenture)

Skill Enhancement Certifications

Students should complete certifications in:

- * Python Programming
 - * R Programming
 - * Data Analytics
 - * Artificial Intelligence
 - * Machine Learning
 - * Financial Mathematics
 - * MATLAB
 - * Scientific Computing
 - * SQL
 - * Mathematical Modelling
 - * LaTeX for Scientific Documentation
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Assessment Pattern

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

Evaluation methods include:

- * Problem-solving assignments
- * Programming exercises
- * Mathematical proofs
- * Computational laboratory work

- * Case studies
- * Industry projects
- * Research papers
- * Presentations
- * Seminar participation
- * Internship reports
- * Dissertation and viva voce

Career Opportunities

Graduates will be prepared for roles such as:

- * Data Scientist
- * Machine Learning Engineer
- * Quantitative Analyst (Quant)
- * Actuarial Analyst
- * Financial Risk Analyst
- * Operations Research Analyst
- * Statistician
- * AI Research Associate
- * Cryptography Specialist
- * Software Developer
- * Mathematical Modeller
- * Business Analyst

- * Research Assistant
- * Lecturer / Educator
- * Scientific Programmer

The programme also provides an excellent foundation for M.Sc. Mathematics, Applied Mathematics, Statistics, Data Science, Artificial Intelligence, Operations Research, and competitive examinations including IIT-JAM, GATE Mathematics, CSIR-UGC NET, SET, UPSC, RBI, ISRO, DRDO, and Indian Statistical Service (ISS).

Distinctive Features for UEM Jaipur

To establish UEM Jaipur as a leading destination for undergraduate mathematical sciences, the programme should include:

- * Centre for Computational Mathematics, AI and Data Science with high-performance computing facilities.
- * Mathematical Innovation & Analytics Laboratory for modelling and optimization projects.
- * Integration of Python, R, MATLAB, AI, machine learning, and cloud computing from the first year.
- * Annual UEM Mathematics and Data Science Conclave featuring experts from academia and industry.
- * Mandatory internships each academic year with research laboratories, financial institutions, analytics firms, and technology companies.
- * Undergraduate research through mathematical modelling competitions, hackathons, and interdisciplinary projects.
- * Collaboration with premier institutes such as IITs, IISERs, ISI Kolkata, TIFR, NITs, ISRO, DRDO, and CSIR laboratories, along with industry partners in analytics, fintech, and software.

This curriculum combines rigorous foundations in pure mathematics with modern computational methods and interdisciplinary applications, positioning graduates for successful careers in research, technology, finance, analytics, and higher education while remaining aligned with the objectives of the National Education Policy 2020.