# Department of Applied Mathematics

School of Vocational Studies and Applied Science

Gautam Buddha University, Greater Noida

BACHELOR OF TECHNOLOGY (MATHEMATICS & COMPUTING)

*This program is running by the Department of Mathematics in collaboration with AI Center and Department of Computer Science*

## Program Objectives

1. **Mastery of Mathematical Concepts**: Develop a deep understanding of mathematical principles and theories, including calculus, algebra, discrete mathematics, and statistical methods.
2. **Computational Skills**: Acquire proficiency in computational techniques, algorithms, and programming languages essential for solving complex mathematical problems and developing computational models.
3. **Interdisciplinary Approach**: Integrate mathematics with computing disciplines to solve real-world problems in diverse fields such as engineering, finance, data science, and cryptography.
4. **Data Analysis and Visualization**: Learn techniques for data analysis, manipulation, and visualization using mathematical and computational tools, preparing students for roles in data analytics and business intelligence.
5. **Software Development**: Gain expertise in software development, including software engineering principles, software testing, and version control systems, to design and implement mathematical and computational solutions effectively.
6. **Research and Innovation**: Foster a culture of research and innovation by engaging students in projects, seminars, and internships that encourage exploration of advanced topics in mathematics, computing, and their applications.
7. **Ethical and Professional Practices**: Develop ethical and professional skills, including teamwork, communication, and ethical considerations in data handling and software development, to prepare graduates for responsible roles in the industry and academia.
8. **Adaptability and Lifelong Learning**: Cultivate adaptability and a lifelong learning mindset to stay updated with evolving technologies and continue professional growth in dynamic and competitive environments.

These objectives aim to blend theoretical knowledge with practical skills, preparing graduates to excel in a wide range of career opportunities in the intersection of mathematics and computing.

Tentative Course Structure (2024-2025)

(Each Semester has 20 Credits)

| SEM | S. No. | Subject Code | Course Title | | Credit | L | T | P |
|---|---|---|---|---|---|---|---|---|
| I | 1 | UMC101 | Engineering Mathematics - I | | 4 | 3 | 1 | 0 |
| | 2 | UMC102 | Engineering Physics | | 4 | 3 | 1 | 0 |
| | 3 | UMC103 | Programming Fundamentals | | 4 | 3 | 1 | 0 |
| | 4 | UMC104 | Basic Electronics Engineering | | 4 | 3 | 1 | 0 |
| | 5 | UMC105 | Engineering Physics Lab | | 1 | 0 | 0 | 2 |
| | 7 | UMC106 | Computer Programming Lab | | 1 | 0 | 0 | 2 |
| | 8 | UMC115 | Data Science Basics and MS Excel | | 1 | 0 | 0 | 2 |
| | 9 | UMC107 | Basic Electronics Engineering Lab | | 1 | 0 | 0 | 2 |
| II | 1 | UMC108 | Engineering Mathematics - II | | 4 | 3 | 1 | 0 |
| | 2 | UMC109 | Engineering Mechanics | | 4 | 3 | 0 | 0 |
| | 3 | UMC110 | Environmental Studies | | 4 | 3 | 0 | 0 |
| | 4 | UMC111 | Basic Electrical Engineering | | 4 | 4 | 0 | 0 |
| | 6 | UMC113 | Problem Solving (Python) Lab | | 1 | 0 | 0 | 2 |
| | 7 | UMC114 | Basic Electrical Engineering Lab | | 1 | 0 | 0 | 2 |
| | 8 | UMC116 | Biological Computations | | 2 | 0 | 0 | 2 |

| SEM | S. No. | Subject Code | Course Title | | Credit | L | T | P |
|---|---|---|---|---|---|---|---|---|
| III | 1 | UMC201 | Data Structure and Algorithms | | 4 | 3 | 0 | 2 |
| | 2 | UMC202 | Real and Complex Analysis | | 4 | 3 | 1 | 0 |
| | 3 | UMC203 | Discrete Structures | | 4 | 3 | 1 | 0 |
| | 4 | UMC204 | Probability and Applied Statistical Methods | | 4 | 3 | 0 | 2 |
| | 5 | UMC206 | Web Application Development (PHP/.NET/JAVA) | | 1 | 0 | 0 | 2 |
| | 6 | UMC207 | Fundamentals of Management | | 3 | 3 | 0 | 0 |
| IV | 1 | UMC208 | Algorithm Design & Analysis | | 4 | 3 | 1 | 0 |
| | 2 | UMC210 | Scientific Computing | | 4 | 3 | 0 | 2 |
| | 3 | UMC211 | Computer Organization and Architecture | | 4 | 3 | 0 | 0 |
| | 4 | UMC212 | Computational Linear Algebra | | 4 | 3 | 0 | 0 |
| | 5 | UMC213 | Computer Oriente Numerical Methods | | 4 | 3 | 0 | 1 |
| V | 1 | UMC301 | Operating System | | 4 | 3 | 0 | 2 |
| | 2 | UMC302 | Departmental Elective Course-1 | | 4 | 3 | 0/1 | 2/0 |
| | 3 | UMC303 | Departmental Elective Course- 2 | | 4 | 3 | 0/1 | 2/0 |
| | 4 | UMC304 | Open Elective Course | | 3 | 3 | 0 | 0 |
| | 5 | UMC305 | Open Elective Course | | 3 | 3 | 0 | 0 |
| | 6 | UMC306 | Mathematics of Machine Learning | | 2 | 3 | 0 | 0 |
| VI | 1 | UMC307 | Data Base Management System | | 4 | 3 | 0 | 2 |
| | 2 | UMC308 | Theory of Computation | | 4 | 3 | 1 | 0 |
| | 3 | UMC309 | Financial Engineering | | 4 | 3 | 1 | 0 |
| | 4 | UMC310 | Departmental Elective Course -3 | | 4 | 3 | 0/1 | 2/0 |
| | 5 | UMC311 | Departmental Elective Course -4 | | 4 | 3 | 0/1 | 2/0 |
| VII | 1 | UMC401 | B.Tech. Project-I | | 6 | | | |
| | 2 | UMC402 | Training Seminar (Summer Internship/EPICS) **(During Summer before this semester begins)** | | 2 | | | |
| | 4 | UMC403 | Cryptography & Security | | 4 | 3 | 0 | 1 |
| | 5 | UMC404 | Mathematical Modeling & Simulation | | 4 | 3 | 0 | 2 |
| | 6 | UMC405 | Departmental Elective Course-5 | | 4 | 3 | 0/1 | 2/0 |
| VIII | 1 | UMC406 | B.Tech. Project-II | | 8 | | | |
| | 2 | UMC407 | Internship | | 10 | | | |
| | 3 | UMC408 | Seminar | | 2 | | | |

List of Departmental Electives Courses

| S. No. | Course Code | Course Name | L | T | P | Credits | Types |
|---|---|---|---|---|---|---|---|
| 1 | MC301 | Operations Research | 3 | 1 | 0 | 4 | |
| 2 | MC302 | Object Oriented programming with JAVA | 3 | 1 | 0 | 4 | |
| 3 | MC303 | Number Theory | 3 | 1 | 0 | 4 | |
| 4 | MC304 | Modern Algebra | 3 | 1 | 0 | 4 | |
| 5 | MC305 | Numerical methods for ODE | 3 | 1 | 0 | 4 | |
| 6 | MC306 | Complex Analysis | 3 | 1 | 0 | 4 | |
| 7 | MC307 | Computer Networks | 3 | 1 | 0 | 4 | |
| 8 | MC308 | Software Engineering | 3 | 1 | 0 | 4 | |
| 9 | MC309 | Artificial Intelligence | 3 | 1 | 0 | 4 | |
| 10 | MC310 | Soft computing Techniques | 3 | 1 | 0 | 4 | |
| 11 | MC311 | Web Technology | 3 | 1 | 0 | 4 | |
| 12 | MC312 | Cluster & Grid Computing | 3 | 1 | 0 | 4 | |
| 13 | MC313 | Data Warehousing & Data Mining | 3 | 1 | 0 | 4 | |
| 14 | MC314 | Compiler Design | 3 | 1 | 0 | 4 | |
| 15 | MC315 | Wireless & Mobile Computing | 3 | 1 | 0 | 4 | |
| 16 | MC316 | Multimedia System | 3 | 1 | 0 | 4 | |
| 17 | MC317 | Matrix Computation with Python | 3 | 1 | 0 | 4 | |
| 18 | MC318 | Partial Differential Equations | 3 | 1 | 0 | 4 | |
| 19 | MC319 | Topology | 3 | 1 | 0 | 4 | |
| 20 | MC320 | Functional Analysis | 3 | 1 | 0 | 4 | |
| 21 | MC321 | Information Theory & Coding | 3 | 1 | 0 | 4 | |
| 22 | MC322 | Finite element methods | 3 | 1 | 0 | 4 | |
| 23 | MC323 | Game Theory | 3 | 1 | 0 | 4 | |
| 24 | MC324 | Differential Geometry | 3 | 1 | 0 | 4 | |
| 25 | MC325 | Fuzzy set & Fuzzy logic | 3 | 1 | 0 | 4 | |
| 26 | MC326 | Numerical Methods for PDE | 3 | 1 | 0 | 4 | |
| 27 | MC327 | Tensor Calculus | 3 | 1 | 0 | 4 | |
| 28 | MC328 | Statistical Inference | 3 | 1 | 0 | 4 | |
| 29 | MC329 | Fluid Dynamics | 3 | 1 | 0 | 4 | |
| 30 | MC330 | Algebraic Coding theory | 3 | 1 | 0 | 4 | |
| 31 | MC331 | Elliptic Curves | 3 | 1 | 0 | 4 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 32 | MC332 | Elements of Data Science | 3 | 1 | 0 | 4 | |
| 33 | MC333 | Finite Element Method | 3 | 1 | 0 | 4 | |
| 34 | MC334 | Reinforced Learning | 3 | 1 | 0 | 4 | |
| 35 | MC335 | Block Chain Technologies | 3 | 1 | 0 | 4 | |
| 36 | MC336 | Bio-Informatics | 3 | 1 | 0 | 4 | |
| 37 | MC337 | Real Time Systems | 3 | 1 | 0 | 4 | |
| 38 | MC338 | Algebraic Codes for Data Transmission and Storage | 3 | 1 | 0 | 4 | |
| 39 | MC339 | Computational Fluid Dynamics | 3 | 1 | 0 | 4 | |
| 40 | MC340 | Advanced Algorithms | 3 | 1 | 0 | 4 | |
| 41 | MC341 | Quantum Computing | 3 | 1 | 0 | 4 | |
| 42 | MC342 | Disasters and Risk Management | 3 | 1 | 0 | 4 | |
| 43 | MC343 | Fourier Series and Partial Differential Equations | 3 | 1 | 0 | 4 | |
| 44 | MC344 | Economics and Financial Analysis | 3 | 1 | 0 | 4 | |
| 45 | MC345 | Multivariate calculus and Measure Theory | 3 | 1 | 0 | 4 | |
| 46 | MC346 | Signals and Systems | 3 | 1 | 0 | 4 | |
| 47 | MC347 | Computational Number Theory | 3 | 1 | 0 | 4 | |
| 48 | MC348 | Deep Learning + Deep Learning Lab | 3 | 1 | 0 | 4 | |
| 49 | MC349 | High Performance Computing + Lab | 3 | 1 | 0 | 4 | |

List of Open Electives Courses (Offered from ICT)

| S. No. | Course Code | Course Name | L | T | P | Credits | Types |
|---|---|---|---|---|---|---|---|
| 1 | AI309 | Computer Graphics | 3 | 0 | 0 | 3 | E1 |
| 2 | AI311 | Introduction to Brain and Neuroscience | 3 | 0 | 0 | 3 | E1 |
| 3 | AI313 | Stochastic Processes | 3 | 0 | 0 | 3 | E1 |
| 4 | AI317 | Sequence Models | 3 | 0 | 0 | 3 | E1 |
| 5 | CC311 | Security Information & Event Management | 3 | 0 | 0 | 3 | E1 |
| 6 | CC313 | Deep Learning | 3 | 0 | 0 | 3 | E1 |
| 7 | CC313 | Intrusion Detection and Prevention System | 3 | 0 | 0 | 3 | E1 |
| 8 | CC315 | Data Science Life Cycle | 3 | 0 | 0 | 3 | E1 |
| 9 | CC317 | Biometric System and Security | 3 | 0 | 0 | 3 | E1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10 | CC317 | Data Storage Technologies and Networking | 3 | 0 | 0 | 3 | E1 |
| 11 | CC319 | Ethical Hacking | 3 | 0 | 0 | 3 | E1 |
| 12 | CM315 | Machine Learning Algorithms | 3 | 0 | 0 | 3 | E1 |
| 13 | CM317 | Decision Thinking and Algorithm Design | 3 | 0 | 0 | 3 | E1 |
| 14 | CM319 | Statistical Machine Learning | 3 | 0 | 0 | 3 | E1 |
| 15 | CS311 | Computer Organization & Architecture | 3 | 0 | 0 | 3 | E1 |
| 16 | CS313 | Android Operating System | 3 | 0 | 0 | 3 | E1 |
| 17 | CS317 | Data Mining | 3 | 0 | 0 | 3 | E1 |
| 18 | AI321 | Speech Analysis and Systems | 3 | 0 | 0 | 3 | E2 |
| 19 | AI323 | Graph Theory | 3 | 0 | 0 | 3 | E2 |
| 20 | AI325 | Distributed Database | 3 | 0 | 0 | 3 | E2 |
| 21 | AI327 | Embedded Systems | 3 | 0 | 0 | 3 | E2 |
| 22 | CC312 | Big Data Platforms | 3 | 0 | 0 | 3 | E2 |
| 23 | CC312 | Mobile Security | 3 | 0 | 0 | 3 | E2 |
| 24 | CC314 | Cloud Architecture and Security | 3 | 0 | 0 | 3 | E2 |
| 25 | CC314 | Research Techniques for Data Science | 3 | 0 | 0 | 3 | E2 |
| 26 | CC316 | High Performance Computing | 3 | 0 | 0 | 3 | E2 |
| 27 | CC316 | Principle of Secure Coding | 3 | 0 | 0 | 3 | E2 |
| 28 | CC318 | Information Warfare | 3 | 0 | 0 | 3 | E2 |
| 29 | CC320 | Social Network Security | 3 | 0 | 0 | 3 | E2 |
| 30 | CM312 | Artificial Neural Networks | 3 | 0 | 0 | 3 | E2 |
| 31 | CS319 | System Analysis & Design | 3 | 0 | 0 | 3 | E2 |
| 32 | CS321 | Software Project Management | 3 | 0 | 0 | 3 | E2 |
| 33 | CS323 | Information Retrieval System | 3 | 0 | 0 | 3 | E2 |
| 34 | AI310 | Digital Image Processing | 3 | 0 | 0 | 3 | E3 |
| 35 | AI312 | Gaming | 3 | 0 | 0 | 3 | E3 |
| 36 | AI314 | Knowledge Engineering | 3 | 0 | 0 | 3 | E3 |
| 37 | AI316 | Predictive Analysis | 3 | 0 | 0 | 3 | E3 |
| 38 | AI318 | Digital Fabrication | 3 | 0 | 0 | 3 | E3 |
| 39 | CC405 | Business Intelligence | 3 | 0 | 0 | 3 | E3 |
| 40 | CC405 | Physical Security of IT Infrastructure | 3 | 0 | 0 | 3 | E3 |
| 41 | CC407 | Computer Vision with Machine Learning | 3 | 0 | 0 | 3 | E3 |
| 42 | CC409 | Operating Systems Security | 3 | 0 | 0 | 3 | E3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 43 | CC411 | Mobile and Wireless Network Security | 3 | 0 | 0 | 3 | E3 |
| 44 | CC413 | Enterprise Security and Management | 3 | 0 | 0 | 3 | E3 |
| 45 | CM405 | Computational Neuroscience | 3 | 0 | 0 | 3 | E3 |
| 46 | CM407 | Intelligent Machining | 3 | 0 | 0 | 3 | E3 |
| 47 | CM413 | Internet of Things | 3 | 0 | 0 | 3 | E3 |
| 48 | CS312 | Ad-hoc & Sensor Networks | 3 | 0 | 0 | 3 | E3 |
| 49 | CS314 | Expert Systems | 3 | 0 | 0 | 3 | E3 |
| 50 | CS316 | Fault Tolerant System | 3 | 0 | 0 | 3 | E3 |
| 51 | CS318 | Mobile Computing | 3 | 0 | 0 | 3 | E3 |
| 52 | AI320 | AI Enabled Cyber Security | 3 | 0 | 0 | 3 | E4 |
| 53 | AI322 | Computational Intelligence | 3 | 0 | 0 | 3 | E4 |
| 54 | AI324 | Fuzzy logic | 3 | 0 | 0 | 3 | E4 |
| 55 | AI326 | Distributed Operating System | 3 | 0 | 0 | 3 | E4 |
| 56 | AI328 | Pattern Recognition | 3 | 0 | 0 | 3 | E4 |
| 57 | CC415 | Malware Analysis | 3 | 0 | 0 | 3 | E4 |
| 58 | CC417 | Android Security Design and Internals | 3 | 0 | 0 | 3 | E4 |
| 59 | CC417 | Biomedical Image and signal processing | 3 | 0 | 0 | 3 | E4 |
| 60 | CC419 | AI Enabled Data Science | 3 | 0 | 0 | 3 | E4 |
| 61 | CC419 | Data and Database Management Security | 3 | 0 | 0 | 3 | E4 |
| 62 | CC421 | Web Analytics | 3 | 0 | 0 | 3 | E4 |
| 63 | CC423 | Access Control and Identity Management Systems | 3 | 0 | 0 | 3 | E4 |
| 64 | CC423 | Social Media Analytics and Techniques | 3 | 0 | 0 | 3 | E4 |
| 65 | CM423 | Machine Intelligence for Medical Image Analysis | 3 | 0 | 0 | 3 | E4 |
| 66 | CS320 | Computer Security | 3 | 0 | 0 | 3 | E4 |
| 67 | CS322 | Management Information System | 3 | 0 | 0 | 3 | E4 |
| 68 | CS324 | Evolutionary Computation | 3 | 0 | 0 | 3 | E4 |
| 69 | AI407 | Automation and Robotics | 3 | 0 | 0 | 3 | E5 |
| 70 | AI411 | 3D Printing | 3 | 0 | 0 | 3 | E5 |
| 71 | AI413 | Parallel Distributed Systems | 3 | 0 | 0 | 3 | E5 |
| 72 | AI415 | Time Series Analysis and Applications | 3 | 0 | 0 | 3 | E5 |
| 73 | CS409 | Robotics | 3 | 0 | 0 | 3 | E5 |
| 74 | CS413 | Cloud Computing | 3 | 0 | 0 | 3 | E5 |
| 75 | CS415 | Big Data Analytics | 3 | 0 | 0 | 3 | E5 |

## Contact

Dr Amit K. Awasthi
Mobile: +91 96503 66665
Email: amitkawasthi@gbu.ac.in

Dr Pradeep Tomar
Mobile: +91 98998 74830
Email: pradeep.tomar@gbu.ac.in

## Prospective Resource Person:

Experts from various established industrial organizations