NITK SURATHKAL

Department of Mathematical And Computational Sciences

B. TECH.
COMPUTATIONAL AND DATA SCIENCE

OBJECTIVES

✓ To build a strong foundation, both theoretical and practical, needed for a deep understanding and application of Data Science and Scientific Computing, Mathematical and Statistical Modelling.

✓ To produce competent professionals catering to the needs of academia, research and development organizations, industries, financial institutions among others.

✓ To create opportunities for the prospective students to study on the lines of the principles featured in NEP-2020.

PROGRAM OVERVIEW

Sl. No.	Course Type	Credits
1.	Foundation Courses	38
2.	Programme Core	70
3.	Elective Courses	30
4.	Major Project	06
5.	Mandatory Learning Courses	16
	TOTAL	160

CAREER OPTIONS

Data Scientist/Analyst/Architect/Engineer
Business Intelligence Developer
Applications/Infrastructure Architect
Database Designer
Database Administrator

NUMBER OF SEATS
30

EXPECTED OUTCOMES

• To understand the role of Mathematics in Scientific Computing, Analysis of Data and Data Science.

• To obtain a strong foundation in Mathematics that is both relevant and contemporary.

• To apply such acquired knowledge to solve real-world problems in computing, gain proficiency and efficiency in the analysis and application of Data Science.

• To provide opportunities for students to customize their studies in line with **NEP-2020**.

• To sync with the needs of the industry.

• To create scope for higher studies and research.

CURRICULUM OF B.TECH. (COMPUTATIONAL AND DATA SCIENCE)

Foundation Courses

Basic Science Core (BSC)

MA110	Engineering Mathematics – I	(3-0-0)	3
MA111	Engineering Mathematics – II	(3-0-0)	3
PH110	Physics	(3-1-0)	4
PH111	Physics Laboratory	(0-0-2)	1
CY110	Chemistry	(3-0-0)	3
CY111	Chemistry Laboratory	(0-0-3)	2

Engineering Science Core (ESC)

AM110	Engineering Mechanics	(3-0-0)	3
ME111	Engineering Graphics	(1-0-3)	3
CS100	Python Programming	(3-0-0)	3
CS101	Python Programming Lab	(0-0-3)	2
EC100	Elements of Electronics and Communication Engineering	(2-0-0)	2

Humanities and Social Science Core (HSC)

SM110	Professional Communication	(3-0-0)	3
SM300	Engineering Economics	(3-0-0)	3
SM302	Principles of Management	(3-0-0)	3

Program Core (PC)

MA112	Digital System Design	(4-0-0)	4
MA113	Linear Algebra	(4-0-0)	4
MA202	Discrete Mathematical Structures	(3-0-0)	3
MA207	Numerical Methods	(3-0-0)	3
MA208	Probability Theory and Applications	(3-0-0)	3
MA221	Data Structures	(3-0-0)	3
MA222	Computational Linear Algebra	(3-0-0)	3
MA223	Computer Org & Arch	(3-0-0)	3
MA224	DS Lab	(0-0-3)	2
MA225	COA Lab	(0-0-3)	2
MA226	Operating Systems	(3-0-0)	3
MA227	Database Systems	(3-0-0)	3
MA228	Operating Systems Lab	(0-0-3)	2
MA229	Database Systems Lab	(0-0-3)	2
MA302	Data Analysis, Time Series Analysis And Non-Parametric Methods	(3-0-0)	3
MA303	Integral Transforms and Applications	(3-0-0)	3
MA321	Fundamentals of Data Science	(3-0-0)	3
MA322	Design & Analysis of Algorithms	(3-0-0)	3
MA323	Statistical Methods Lab	(0-0-3)	2
MA324	DAA Lab	(0-0-3)	2
MA325	Machine Learning	(3-0-0)	3
MA326	Theory of Finite Automata, Formal Languages and Computation	(3-0-0)	3
MA327	Scientific Computing Lab	(0-0-3)	2
MA406	Statistical Design and Analysis of Experiments	(3-0-0)	3
MA421	Financial Mathematics	(3-0-0)	3

Program Specific Electives (PSE)

MA206	Number Theory and Cryptography	(3-0-0)	3
MA405	Reliability Theory and Applications	(3-0-0)	3
MA500	Capstone Project		4
MA506	Quadratic Forms and Linear Algebra	(3-0-0)	3
MA507	Image Processing	(3-0-0)	3
MA508	Soft Computing	(3-0-0)	3
MA509	Combinatorial Optimization	(3-0-0)	3
MA514	Pattern Recognition	(3-0-0)	3
MA515	Statistical Techniques for Data Mining	(3-0-0)	3
MA516	Software Engineering	(3-0-0)	3
MA517	Algorithmic Combinatorics	(3-0-0)	3
MA518	Selected Topics in Graph Theory	(3-0-0)	3
MA519	Systems Modelling and Simulation	(3-0-0)	3
MA520	Selected Topics in Computer Algorithms	(3-0-0)	3
MA521	Mobile Computing	(3-0-0)	3
MA523	Computer Networks	(3-0-0)	3
MA527	Network Security	(3-0-0)	3
MA529	Advanced Data Science	(3-0-0)	3
MA531	Statistical Quality Control	(3-0-0)	3
MA533	Wavelets in Data Science	(3-0-0)	3
MA534	Cloud Computing	(3-0-0)	3
MA535	Distributed Computing Systems	(3-0-0)	3
MA536	Advanced Database Systems	(3-0-0)	3
MA537	Optimization Techniques	(3-0-0)	3

Open Electives (OE)

MA201	Concrete Mathematics	(3-0-0)	3
MA401	Computational Fluid Dynamics	(3-0-0)	3
MA403	Mathematical Modelling	(3-0-0)	3
MA408	Stochastic Analysis and Applications	(3-0-0)	3
MA512	Numerical Solutions of Differential Equations	(3-0-0)	3
MA513	Modern Algebra	(3-0-0)	3
MA525	Computational Number Theory	(3-0-0)	3
MA526	Game Theory	(3-0-0)	3
MA528	Introduction to Parallel Programming	(3-0-0)	3
MA532	Big data Analytics	(3-0-0)	3
MA538	Artificial Intelligence	(3-0-0)	3

Program Major Project (PMP)

MA498	Major Project phase 1	(0-0-3)	2
MA499	Major Project phase 2	(0-0-6)	4

Mandatory Learning Courses (MLC)

CV110	Environmental Studies	(1-0-0)	1
SM111	Professional Ethics and Human Values	(1-0-0)	1
MA490	Practical Training		1
MA491	Seminar		1
ME100	Introduction to Design Thinking	(2-0-0)	2
SA401	Liberal arts courses/ cocurricular / extracurricular activities		10