

INSTITUTE OF MATHEMATICS AND APPLICATIONS

COURSES OF STUDY

**M.A./M.Sc. IN MATHEMATICS WITH DATA SCIENCE
(w.e.f. 2022-23)**



UTKAL UNIVERSITY

BHUBANESWAR-751004

M.A./M.Sc. IN MATHEMATICS WITH DATA SCIENCE

Throughout Credit 4-0-4 shall mean a four credit theory paper in which class room instruction of 4 hours per week shall be imparted. Similarly Credit 3-2-4 shall be a 4 credit course comprising of a theory component for 70 marks having 3 hours of class room instruction per week and a lab component for 30 marks with 2 hours of lab work per week.

SEMESTER-I

Paper No.	Course Title	Category	Marks	Credits
MDC 101	Analysis	Core	100	4 (4-0-4)
MDC 102	Computational Linear Algebra	Core	100	4 (4-0-4)
MDC 103	Probability, Statistics, and Stochastic Processes with Lab	Core	100	5 (4-2-5)
MDC 104	Numerical Optimization with Lab	Core	100	3 (2-2-3)
MDAE 105	Computer Systems for Data Science	Allied Elective	100	3 (2-2-3)
MDC 106	Programming (Python for Data Science)	Core	100	4 (2-4-4)

SEMESTER-II

Paper No.	Course Title	Category	Marks	Credits
MDC 201	Abstract Algebra	Core	100	4 (4-0-4)
MDC 202	Topology	Core	100	4 (4-0-4)
MDC203	Machine Learning with Lab	Core	100	4 (3-2-4)
MDC 204	Numerical Analysis with Lab	Core	100	3 (2-2-3)
MDC 205	Multivariate Data Exploration and Analysis with Lab.	Core	100	4 (3-2-4)
MDC 206	Data Structures and Algorithms with Lab	Core	100	4 (3-2-4)

----- SUMMER INTERNSHIP -----

SEMESTER-III

Paper No.	Course Title	Category	Marks	Credits
MDC 301	Functional Analysis	Core	100	4 (4-0-4)
MDCE302	Complex Analysis	Core Elective	100	4 (4-0-4)
MDAE303	Differential and Integral Equations	Allied Elective	100	4 (4-0-4)
MDAE 304	Advanced Machine Learning with Lab	Allied Elective	100	4 (3-2-4)
MDFE 305	To be chosen from a group of elective papers	Free Elective	100	4 (4-0-4/ 3-2-4)
MDC 306	Data Visualisation	Core	50	2 (1-2-2)
MDSE 307	Internship Evaluation	Skill Development	50	2

SEMESTER-IV

Paper No.	Course Title	Category	Marks	Credits
MDCE 401	Deep Learning & Reinforcement Learning with Lab	Core Elective	100	4 (3-2-4)
MDCE402	Big Data Analytics with Lab	Core Elective	100	4 (3-2-4)
MDAE403	To be chosen from a group of elective papers	Allied Elective	100	4 (4-0-4/ 3-2-4)
MDAE 404	To be chosen from a group of elective papers	Allied Elective	100	4 (4-0-4/ 3-2-4)
MDC 405	Cap stone project	Core	200	6

MDFE 305

For the Free Elective paper a student can choose any one of the following courses depending on the availability

1	Computational Finance	5	Information and Coding Theory
2	Computational Modelling of Financial Derivatives	6	Numerical Solution of Partial Differential Equations
3	Computational Number Theory and Cryptography	7	Stochastic Calculus for Finance
4	Finite Field and Applications		

MDAE-403, MDAE-404

For Allied Elective papers a student can choose any two of the following courses depending on the availability

1	Advanced Complex Analysis	11	Discrete Dynamical Systems
2	Algebraic Number Theory	12	High performance Computing
3	Algebraic Topology	13	Internet of Things
4	Artificial Intelligence	14	Lie Algebras and Group Representations
5	Bioinformatics	15	Natural Language Processing
6	Causal Inference for Data Science	16	Probabilistic Graphical Models
7	Computational Fluid Dynamics	17	Quantum Computing
8	Computer Vision	18	Social Network Analysis
9	Cyber Security	19	Soft Computing
10	Differentiable Manifolds	20	Time Series Analysis