

Rammohan College

Department of Mathematics

UNDERGRADUATE SECTION

Model Reference: University of Calcutta, Syllabus for Mathematics (Honours)

CBCS

Programme Outcomes Nos.	Programme Outcomes (PO)
PO. 1	To prepare the students for a successful career in teaching or other professions as well as to motivate them for higher education and to take research as a career.
PO.2	To provide strong foundation in basic sciences and mathematics.
PO.3	To identify, formulate and analyse complex scientific problems reaching substantiated conclusions.
PO.4	To develop individual and team work by functioning effectively as an individual or as a member in a group in computer laboratory classes.
PO.5	To develop computational , logical and analytical ability in solving different problems of Mathematics
PO.6	To develop communicating ability, prepare effective presentations, and give and receive clear instructions
PO.7	To develop the ability to engage in independent and life-long learning in the current context of technological change
PO.8	To inculcate scientific temperament in the young minds and outside the scientific community. This helps to develop skills for employment, internships and social activities.

Programme Specific Outcomes Nos.	Programme Specific Outcomes (PSO)
PSO.1	Understand the fundamental concepts in mathematics and develop ideas based on them. Have a strong foundation in algebra, analysis and calculus leading to pursuing postgraduate studies in mathematics, theoretical physics, statistics etc.
PSO.2	To develop leadership and managerial skills and understanding the need for lifelong learning to be a competent professional.
PSO.3	Be motivated towards research in mathematics and related fields.
PSO.4	Possess advanced knowledge on topics in pure mathematics, empowering her/him to pursue higher degrees at reputed academic institutions. Where in future they can work as Research Assistants, data analysts, Subordinate Statistical Service cadre under the ministry of Statistics and programme implementations, GOI.
PSO.5	Eligible for teaching in primary and secondary schools.
PSO.6	Demonstrate problem-solving skills, innovative thinking, creativity and programming capability in C++.
PSO.7	Enhance their employability for Government jobs like banking, Insurance and Investment sectors (both in public and private enterprises).

1st Semester Honours.

NO.	PAPER	Course Outcome
CO.1	Core Course-1 Calculus, Geometry & Vector Analysis	After successful completion of the course, students learn the techniques to compute limits, derivatives and integrals of a function and also the applications of vector algebra in real life problems. The knowledge of Geometry (2 Dimension and 3 Dimension) will help the students to compare 2D shapes and 3D objects of our real environments
CO.2	Core Course-2 Algebra	Learning algebra helps to develop one's logical thinking's, abstract problem solving, pattern recognition , reasoning and networking

2nd Semester Honours.

NO.	PAPER	Course Outcome
CO.3	Core Course-3 Real Analysis	Learn the fundamental properties of the real numbers that underpin the formal development of real analysis. Also get an idea of the theory of sequence, series & continuity
CO.4	Core Course-4 Group Theory-I	Students learn to extend group structure to finite permutation groups and also to generate groups under given specific conditions. It's also help to study LS space and String theory.

3rd Semester Honours.

NO.	PAPER	Course Outcome
CO.5	Core Course-5 Theory of Real Functions	The subjects enable students to acquire knowledge about how to compute and analyze limits, continuity & differentiability of functions.
CO.6	Core Course-6 Ring Theory & Linear Algebra-I	On successful completion of this course, the students will be able to analyse ring theory and to use the axioms that define a ring and also to know the basic properties of rings arising from these axioms. They learn to compute and use eigenvectors and eigen values & also Cayley-Hamilton theorem and its use in finding the inverse of a matrix.

NO.	PAPER	Course Outcome
CO.7	Core Course-7 ODE & Multivariate Calculus-I	From this course students will learn to classify ODEs and able to visualize and manipulate ODEs in numerical, and symbolic form. Students will understand the concepts of existence and uniqueness of solutions. Students get the idea on maximal and normal property of the gradient, tangent planes, optimization problems and also to help them to develop the ability to solve problems using multivariate calculus.
CO.8	Skill Enhancement Course-A C Programming Language	Students get the complete knowledge of C\C++ language and using numerical methods they will be able to write programmes in C.

4th Semester Honours.

NO.	PAPER	Course Outcome
CO.9	Core Course-8 Riemann Integration & Series of Functions	They learn about theory and applications of Riemann Integration of bounded real valued functions, integrability of sum, scalar multiple, product, quotient, modulus of Riemann integrable functions and properties. They also get knowledge on convergence of improper integrals, power series & its convergence and sum of Fourier series. It builds idea over Fundamental theorem of calculus.
CO.10	Core Course-9 PDE & Multivariate Calculus-II	Learn to formulate physical problems as PDEs and understand analogies between mathematical descriptions of different (wave) phenomena in physics and engineering. Learn the concept of upper sum, lower sum, upper integral, lower-integral, the double integral and also the computational techniques to determine volume and surface area by multiple integrals which helps in volume calculation in various dimensions.

CO.11	Core Course-10 Mechanics	After completion of this course students can solve various problems of engineering worlds like mechanical, civil eng. & also space science related problems. Here students get the knowledge on the motion of mechanical systems and their degrees of freedom. They study the interaction of forces between solids in mechanical systems, Centre of mass and inertia of mechanical systems
CO.12	Skill Enhancement Course-B Scientific computing with SageMath/ R	After completion of the course students are able to install and read data files in R/ SageMath. They will also learn to perform various operations and apply the common functions to manipulate and analyze data using basic R/SageMath. It's also develop better understanding for graphical visualisation.

5th Semestar Honours.

Sl. No.	Paper	Course Out Come
CO.13	Core Course-11 Probability & Statistics	They will be able to calculate probabilities using Conditional probability, rule of total probability and Bayes' theorem, concept of random variable, probability distributions and to analyze statistical data.
CO.14	Core Course 12 Group Theory -II & Linear Algebra-II	Learn the applications of factor groups to automorphism groups, external direct product and its properties, Inner product spaces, dual spaces and diagonalization of symmetric matrices.
CO.15	Discipline Specific Elective- A (1) Bio Mathematics	Here our students should have an enhanced knowledge and understanding of mathematical modeling and statistical methods in the analysis of biological systems, be better able to assess biological inferences that rest on mathematical and statistical arguments.
CO.16	Discipline Specific Elective-B (1) Linear Programming & Game Theory	After successful completion of this course Students will learn the techniques for modeling and solving many real-world operational problems. Here they studied the inequalities and convex sets, primal simplex method & duality, integer programming and the two-person zero sum problems/ matrix games. This also provides knowledge over developing computer games in future.

6th Semestar Honours.

Sl.No.	Paper	Course Out Come
CO.17	Core Course-13 Metric Space & Complex Analysis	They will learn the concept of a metric space and be able to recognize standard examples, fundamental notions of continuity, convergence and compactness. Here they can identify curves and regions in the complex plane defined by simple expressions, basic properties of complex integration. They also learn when a function is analytic.

CO.18	Core Course-14 Numerical Methods	Students learn to derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
CO.19	Core Course-14 Practical Numerical Methods Lab	In this course the students interact with computer & learn to compute the values of any mathematical task with the help of the numerical methods like, interpolation, differentiation, integration, the solution of linear and nonlinear equations and the solution of differential equations with the help of computer software programming.
CO.20	Discipline Specific Elective- A (2) Mathematical Modeling	The course provides rigorous instruction in fundamental mathematical concepts and skills presented in the context of real-world applications like mathematical logic, networking, operation research.
CO.21	Discipline Specific Elective- B (2) Point Set Topology	Here they learn about Topological spaces, basis and sub-basis for a topology, countability, connected spaces and the concept of compactness in metric space.

Mapping of CO and PO

COURSE DURATION	COURSE DETAIL	PROGRAMME OUTCOME							
		PO-							
		1	2	3	4	5	6	7	8
Semester I	CO-1 Calculus, Geometry & Vector Analysis	√	√	√		√	√		√
	CO-2 Algebra	√	√	√		√	√		√

COURSE DURATION	COURSE DETAIL	PROGRAMME OUTCOME							
		PO-							
		1	2	3	4	5	6	7	8
Semester II	CO-3 Real Analysis	√	√	√		√		√	√
	CO-4 Group Theory-I	√	√	√				√	√

COURSE DURATION	COURSE DETAIL	PROGRAMME OUTCOME							
		PO-							
		1	2	3	4	5	6	7	8
Semester III	CO-5 Theory of Real Functions	√	√	√		√			√
	CO-6 Ring Theory & Linear Algebra-I	√	√	√		√		√	√
	CO-7 Ordinary Differential Equation & Multivariate Calculus-I	√	√	√				√	√
	CO-8 C Programming Language	√		√	√	√	√	√	√

COURSE DURATION	COURSE DETAIL	PROGRAMME OUTCOME							
		PO-							
		1	2	3	4	5	6	7	8
Semester IV	CO-9 Riemann Integration & Series of Functions	√	√	√		√			√
	CO-10 Partial differential equation & Multivariate Calculus-II	√	√	√				√	√
	CO-11 Mechanics	√	√	√				√	√
	CO-12 Scientific computing with SageMath& R	√		√	√	√	√	√	√

COURSE DURATION	COURSE DETAIL	PROGRAMME OUTCOME							
		PO-							
		1	2	3	4	5	6	7	8
Semester V	CO-13 Probability & Statistics	√	√	√		√	√	√	√
	CO-14 Group Theory-II & Linear Algebra-II	√	√	√		√		√	√
	CO-15 Advanced Algebra	√	√	√		√		√	√
	CO-16 Linear Programming & Game Theory	√	√	√		√		√	√

COURSE DURATION	COURSE DETAIL	PROGRAMME OUTCOME							
		PO-							
		1	2	3	4	5	6	7	8
Semester VI	CO-17 Metric Space & Complex Analysis	√	√	√		√	√	√	√
	CO-18 Numerical Methods	√			√	√	√	√	√
	CO-19 (Practical) Numerical Methods Lab	√		√	√	√	√	√	√
	CO-20 Differential Geometry	√	√	√		√		√	√
	CO-21 Point Set Topology	√	√	√		√	√	√	√