छत्रपति शाहू जी महाराज विश्वविद्यालय, कानपुर



CHHATRAPATI SHAHU JI MAHRAJ UNIVERSITY, KANPUR

(पूर्ववर्ती कानपुर विश्वविद्यालय कानपुर) Formerly Kanpur University, Kanpur – 208024

A Documentary Support

For Matric No. – 1.1.1

Programme Outcomes & Course Outcomes

Under the Criteria - I (Curriculum Design and Development) Key Indicator - 1.1

Matric No. – 1.1.1

M.Sc. Applied Mathematics

dinator

Internal Quality Assurance Cell CSJM University, Kanpur



Department of Mathematics School of Basic Sciences, CSJM University Campus, Kanpur

VISION

To develop logical, analytical and Mathematical thinking power in the minds of students in order to cater the Mathematical needs of the society

MISSION

M.Sc. Mathematics the M.Sc. Mathematics programme, offered by the Department of Mathematics, blends of pure mathematics, applied mathematics and basic computer science. This programme covers theoretical, computational and practical aspects of mathematics. In the curriculum, the core mathematics courses are designed to build a strong foundation in the subject, the laboratory based courses provide the exposure and training in application-oriented practical subjects

M.Sc. in Applied Mathematics

(2 year duration)

Department of Mathematics, School of sciences CSJM University, Kanpur

Objective of the Programme:

The M.Sc. Mathematics programme aims to prepare students with a deep understanding of mathematical concepts, research oriented attitude and skill of application of mathematical and computational tools and techniques in formulation and solution of real world problem. It is specially designed to prepare students for a successful career in academic institution, research institution and industry. Programme Outcome: By the end of 2-year M.Sc. Mathematics programme, students will be able to communicate mathematical ideas with clarity and coherence, both written and verbally. They will be able to conduct independent research in specialized areas of mathematics, teach courses in mathematics or subjects with high mathematical content at school and college level, and work in industry involving applications of mathematic

Program Outcomes of M.Sc. (Mathematics), School of Sciences:

PO1: Mathematical Knowledge

Various branches of Mathematics are so selected and designed for M.Sc Mathematics course aiming at mathematical reasoning, sophistication in thing and acquaintance with enough number of subjects including application oriented ones to suit the present needs of various allied branches in Engineering and Science as well as provision of opportunities to pursue research in higher mathematics.

PO2: Problem Solving Skills

This programme also offers training in problem solving skills.

PO3: Analytical & Logical thinking

The student will be able to develop logical reasoning techniques and Techniques for analyzing the situation.

PO4: Analysis:

The student shall get an insight in the behavior of curves defined on a closed and bounded interval and some important properties of continuous, monotonic, and differentiable functions defined on a closed and bounded interval and also their metric space analogues.

PO5: Numerical Techniques

The student will be able to learn some useful approximation and interpolation techniques inMathematics.

PO6: Learning Number theoretical concepts

Student will learn some important concepts in Number theory that are useful in Cryptography related to the advanced area of research namely Network security.

PO7: Understanding Ability

Student will develop ability for generation of mathematical model to a given real life situation as well as learning new areas of mathematics in future either for teaching or for research.

PO8: Getting Abilities

Demonstrate the ability to conduct research independently and pursue higher studies towards Ph.D. degree in mathematics

PO9: Evaluating capability

The student shall acquire capability to evaluate hypothesis, methods and evidence within their proper contexts in any situation.

PO10: Application of knowledge

The student shall able to apply the knowledge acquired in mathematics in Science, technology as well as research and its extensions.

Program Specific Outcomes:

Understanding of the fundamental axioms in mathematics and capability of developing ideas based on them.

- Inculcate mathematical reasoning.
- To develop one's own learning capacity.
- Prepare and motivate students for research studies in mathematics and related fields. Develop abstract mathematical thinking.
- Assimilate complex mathematical ideas and arguments.

Course Outcomes		
Semester I		
Course Title:	1. Find rank, nullity of linear transformation and its row space and	
Linear Algebra	column space.	
Course code: AM- 101	2. Understand notion of dual space and dual of dual space.	
	3. Understand concepts of bilinear forms, adjoint operators and spectral theorem.	
	4. Find geometric and algebraic multiplicity of Eigen values and its	
	relation with diagonalization of matrix.	
	5. Apply the above concepts to other disciplines.	
Course Title:	1. Describe the fundamental properties of the real numbers that	
RealAnalyais	underpin the formal development of real analysis	
Course code: AM - 102	2. Demonstrate an understanding of the theory of sequences and series,	
	continuity, differentiation and integration	
	3. Demonstrate skills in constructing rigorous mathematical arguments	
	4. Apply the theory in the course to solve a variety of problems at an	
	appropriate level of difficulty.	
	5. Demonstrate skills in communicating mathematics.	

Course Title:	1. Recognize differential equations that can be solved by each of the	
Ordinary Differential	three methods – direct integration, separation of variables and	
Equations	integrating factor method and use the appropriate method to solve	
Course code: AM - 103	them	
	2. Use an initial condition to find a particular solution of a differential	
	equation, given a general solution	
	3. Check a solution of a differential equation in explicit or implicit form,	
	by substituting it into the differential equation	
	4 Understand the various terms used in of population models and	
	radioactivity	
Course Title:		
Computer Programming	1. Understand syntax of Programming language.	
Course Code: M- 105	2. Convert mathematical problem in programming code	
Course Couc.An- 105	3. Express proficiency in handling of strings and functions.	
	4. Develop programs on topics learnt in M.Sc. program, like Newton	
	Raphson method, transportation problems etc.	
	5. Articulate the Object-Oriented Programming concepts such	
	encapsulation and inheritance.	
Semester II		
	Semester II	
Course Title:	Semester II 1. Students will be able to perform computations involving divisibility of	
Course Title: AbstractAlgebra	Semester II 1. Students will be able to perform computations involving divisibility of integers.	
Course Title: AbstractAlgebra Course code: AM- 201	Semester II 1. Students will be able to perform computations involving divisibility of integers. 2. Students will be asked to identify ring-theoretic and group-theoretic	
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Course Title: AbstractAlgebra Course code: AM- 201 Course Title: ComplexAnalysis	Semester II 1. Students will be able to perform computations involving divisibility of integers. 2. Students will be asked to identify ring-theoretic and group-theoretic properties and identify these properties in familiar rings and groups. 3. Students will provide proofs to simple assertions of ring- and group-theoretic principles. 1. Apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on Harmonic and entire functions	
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Course Title:	1. Solve transcendental, non-linear equations and system of non-linear	
NumericalMethod	equations, error analysis and its importance.	
Course code: AM - 203	2. Interpolate and extrapolate the data's using various interpolating	
	methods, like, cubic spline, newton's divided difference etc.	
	3. Integrate and differentiate functions using newtons cotes and Gaussian	
	quadrature formula.	
	4. Solve ODE and boundary value problems using numerical methods.	
Course Title:	1 Use knowledge of partial differential equations (PDEs) modeling the	
Partial Differential	general structure of solutions and analytic and numerical methods for	
Equations	solutions.	
Course code: AM - 204	2. Formulate physical problems as PDEs using conservation laws.	
	3. Understand analogies between mathematical descriptions of different (wave) phenomena in physics and engineering.	
	4. Solve practical PDE problems with finite difference methods,	
	implemented in code, and analyze the consistency, stability and	
	convergence properties of such numerical methods.	
	5. Interpret solutions in a physical context, such as identifying travelling	
	waves, standing waves, and shock waves.	
Course Title:	1. Organize, manage and present data. Analyze statistical data using	
Probabilty and	measures of central tendency, dispersion and location.	
Statisctics	2. Translate real-world problems into probability models.	
Course code: AM - 205	3. Derive the probability density function of transformation of random	
	variables.	
	4. Calculate probabilities, and derive the marginal and conditional	
	distributions of bivariate random variables.	
Semester III		
Course Title:	1. Formulate and solve the LPP including those that lead to cycling and	
Operation Research	degeneracy.	
Course code: AM - 302	2. Apply integer programming to the LPP's where integer solution is	
	sought.	
	3. Solve transportation and assignment problems and their importance.	
	4. Apply the above concepts to real life problems.	

Course Title:	1. Central concepts from functional analysis, including the Hahn-Banach
Functional Analysis	theorem, the open mapping and closed graph theorems.
Course code: AM -303	2. Banach-Steinhaus theorem, dual spaces, weak convergence, the
	Banach Analogue theorem, and the spectral theorem for compact self-
	adjoint operators.
	3. The student is able to apply his or her knowledge of functional
	analysis to solve mathematical problems
	Semester IV
Course Title:	1 Describe the physical properties of a fluid
Eluid Dynamics	
Fluid Dynamics	2. Calculate the pressure distribution for incompressible fluids.
Course code: AM - 401	3. Describe the principles of motion for fluids.
	4. Identify derivation of basic equations of fluid mechanics
	5. Identify how to derive basic equations and know the related
	assumptions.
	6. Apply the equation of the conservation of mass, momentum and
	energy, make dimensional analysis and derive the dimensionless
	numbers.
Course Title:	1. Have the knowledge of Fibonacci sequence, linear recurrence
Discrete Mathematics	relations with constant coefficients.
Course code: AM - 402	2. Construct generating function and study its application to counting
	and in solving recurrence relations.
	3. Simplify logic and Boolean circuits using K-maps.
	4. Find principle disjunctive & conjunctive normal forms and application
	of inference theory.
	5. Grasp the concepts of relations, posets and lattices and understand the
	relation between Lettices and Declean clashes
	relation between Lattices and Boolean algebra.
Course Title:	
Project & Seminar	The student does a project on the one of the topics which he/she has
Course code: AM -405	learned in M.Sc. program.