

Kalinga University

Science

Master Of Science (Mathematics)

PO

S. No.	Program Outcome (PO) Description
1	Knowledge domain: Demonstrate an understanding of the basic concepts in mathematics, statistics, operations research and their importance in the solution of some real- world problems.
2	Problem Solving Skills: This program also offers training in problem solving skills.
3	Analytical & Logical thinking: The student will be able to develop logical reasoning techniques and Techniques for analyzing the situation.
4	Presentation and Interpretation of Data: Demonstrate the ability to manipulate and visualize data and to compute standard statistical summaries.
5	Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources and computing tool such as Excel, MATLAB, MATHEMATICA, SPSS etc with an understanding of the limitations.
6	Ethics: Analyze relevant academic, professional and research ethical problems and commit to professional ethics and responsibilities with applicable norms of the data analysis and research practices.
7	Communication: Effectively communicate about their field of expertise on their activities, with their peer and society at large. Such as, being able to comprehend and write effective reports and design documentation, make effective presentations.
8	Project Management: Apply Knowledge and understanding of principles of mathematics and statistics effectively as an individual, and as a member or leader in diverse teams to manage projects in multidisciplinary environment.

9	Research Proposal: Define, design and deliver a significant piece of research work that is clear and concise. Demonstrate the necessary skills and knowledge of deeper understanding of their chosen research area. Understand the philosophy of research in mathematical sciences and appreciate the value of its development.
10	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.
11	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.
12	Getting Abilities : Demonstrate the ability to conduct research independently and pursue higher studies towards Ph.D. degree in mathematics.

PSO

S. No.	Program Specific Outcome (PSO) Description
1	The designed program will help students to enhance their views about fundamental and applied mathematics, so that they can differentiate between them.
2	To develop the idea to recognize the difference between pure and Applied mathematics.
3	The program enables students to develop the mathematical skills and its application process in the applied fields.
4	To encourage the combined knowledge and the application of mathematics in real world system, the program will help to the students.
5	Program enhance the curiosity for the mathematics in the students and help them to build up their research future.

CO

S.No.	Course Code	Course Name	Course Outcome (CO's) - Description
1	MSMH101	Real Analysis	CO1: Gains Knowledge of Riemann integrable functions, Countable and Uncountable set.
			CO2: Demonstrate an understanding of the theory of sequences and series, continuity, differentiation and integration.
			CO3: Examine the different types of differentiation and partial differentiations.
			CO4: Examine Measurable sets and series integration briefly.
			CO5: Apply the theory in the course to solve a variety of problems at an appropriate level of difficulty.
2	MSMH102	Complex Analysis	CO1: Understand the concept of Analytic functions and harmonic functions.
			CO2: Express the Cauchy's Derivative formulas and concept of Cauchy-Goursat Integral Theorem.
			CO3: Gain the knowledge of simple and multiple connected domains and also Express Morera's Theorem, etc.
			CO4: Understand concepts of zeros of complex functions and Residue Theorem, classify singularities, Express the Residue Theorem.
			CO5: Able to do Transformation and mapping, Jacobian of a transformation, Some elementary transformation.
3	MSMH103	Advanced Abstract Algebra	CO1: Understand the ring theory and, Express the concept of domain and fields.
			CO2: Give the knowledge of extension fields and its applications.
			CO3: Understand Galois Theory and concept of polynomial of radicals.
			CO4: Understand application of modules over rings G.
			CO5: Explain Uniqueness of Decomposition Generated Jordan form over any field.
4	MSMH104	Ordinary and Partial Differential Equation	CO1: Students will have a working knowledge of important mathematical concepts in Ordinary and Differential Equations.
			CO2: Comprehend the Euler equations, the Bessel equation and Regular singular points at Infinity.
			CO3: Understand the concepts of surfaces and curves in three-dimension space.
			CO4: Understand how to Analyze the origin of first order partial differential equations and solving them using Charpit's method.
			CO5: Gain the knowledge of separation of variable method.
			CO1: Students will understand a general definition of research design.

5	MSMH105A	Research Methodology	CO2: Students will know why educational research is undertaken, and the audiences that profit from research studies. CO3: Students will be able to identify the overall process of designing a research study from its inception to its report. CO4: Students will be familiar with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research.
6	MSMH105B	Science Journalism	CO1: They will appreciate the digital landscape within which science journalism exists today by learning: blogging in science journalism (honing your craft, developing a voice); how to get work (pitching and staying relevant); the value of social networks for science journalism (sharing stories, finding stories, joining discussions and finding sources); digital strategies employed by major news organizations (data visualization, multimedia, community building). CO2: Students will analyze and learn about the structure of several types of data including numbers, texts and documents. Students will learn the skills to examine, evaluate, and critique those data, extract patterns, summarize features, create visualizations, and provide insights, while learning to be sensitive to ethical concerns associated.
7	MSMH201	General Topology	CO1: Understand Open bases and open sub bases, Weak topologies, the function algebras $C(X, R)$ and $C(X, C)$. CO2: Gains the knowledge of Tychonoff's theorem and its applications. CO3: Distinguish Urysohn's lemma and the Tietze extension theorem. CO4: Discuss connected spaces, the components of a space and totally disconnected spaces. CO5: Study the Projection maps. Separation axioms and product spaces and Stone-Weierstrass theorems and its applications.
8	MSMH202	Discrete Mathematics and Its Application	CO1: Study Congruence relation and quotient semigroups, Lattices. CO2: Understand the concepts finite automata, Moore and mealy machines. CO3: Gain the knowledge of Boolean algebra as lattices and its applications. CO4: Gain the knowledge the Graph and its types. CO5: Discuss the various algorithms for shortest route.
9	MSMH203	Operations Research	CO1: Understand the concept of LPP by Simplex method, dual simplex method, Big M method and its different applications. CO2: Understand how to Analyze Transportation problem and Assignment Problems: Hungarian Method for solution. Traveling-Salesman problems and different application in real life. CO3: Gains knowledge to solve the problems - Games Theory and Queuing Theory: Poison queuing system.

			CO4: Understand Integer Programming, Goal Programming, Dynamic Programming and its importance in optimization process. CO5: Discuss the Non-Linear Programming and its applications.
10	MSMH204	Functional Analysis	CO1: Gain the knowledge of Continuous linear transformations and the Hahn-Banach theorem. CO2: Understand the, normed linear spaces of bounded linear transformations. CO3: Understand the Orthogonal complements, Orthonormal sets and conjugate space. CO4: Understand the Complete Orthonormal sets and Parseval's identity, Structure of Hilbert spaces. CO5: Understand the concepts of Jordon Decomposition theorem its applications.
11	MSMH205B	INTELLECTUAL PROPERTY RIGHTS	CO1: The students once they complete their academic projects, shall get an adequate knowledge on patent and copyright for their innovative research works during their research career, information in patent documents provide useful insight on novelty of their idea from state-of-the art search. CO2: This course provides further way for developing their idea or innovations. CO3: To Pave the way for the students to catch up Intellectual Property (IP) as a career option a. R&D IP Counsel b. Government Jobs – Patent Examiner c. Private Jobs d. Patent agent and Trademark agent e. Entrepreneur.
12	MSMH301	Set theory Logic and probability Theory	CO1: Understand the concepts of Propositions and Theorems, Methods of proof. CO2: Gain knowledge of advance set theory. CO3: Express the Principle of Mathematical Induction, maximal ideals and to bases of vector spaces. CO4: Understand the Permutations and its applications. CO5: Explain the Pigeon-hole principle in advance.
13	MSMH302	Fuzzy Set and their Application	CO1: Understand the basic knowledge of concept of Fuzzy sets. CO2: Express operations on fuzzy sets. CO3: Apply Relation between fuzzy sets and its compositions. CO4: State Fuzzy graphs. CO5: Express the Fuzzy measures.
14	MSMH303A	Differential Geometry	CO1: Understand Curves in space and arc length, reparameterization. CO2: Able to understand how Analyze involutes and evolutes, 3 R surfaces of revolution. CO3: Understand Normal fields and orientability of surfaces. CO4: Apply the concept of curvature. CO5: Gain knowledge of geodesics on a surface of revolution its applications.

15	MSMH303B	Mathematical Modelling	CO1: Understand the basic knowledge of features of mathematical modelling.
			CO2: Apply the mathematical modeling using ODE of first order.
			CO3: Explain the discrete model and its applications.
			CO4: Get the application of continuous and spatial models.
			CO5: Gain the knowledge of modeling using graph theory.
16	MSMH303C	Fluid Dynamics	CO1: Understand the basic concepts of Kinematics and its applications.
			CO2: Analyze motion in two-dimensions, Equation of motion of a sphere.
			CO3: Understand Vortex motion and its elementary properties.
			CO4: Apply Relations between rectangular components of stress.
			CO5: Explain the concept of Boundary layer equations, Separations of boundary layer flow.
17	MSMH304A	Probability and statistics	CO1: Understand Descriptive statistics and discrete probability.
			CO2: Study Random variables and distribution function and applications.
			CO3: Apply the standard discrete and continuous univariate distribution.
			CO4: Study the Tests of hypothesis, Analysis of discrete data and chi-square test.
			CO5: Understand Multivariate normal distribution, partial and multiple correlation coefficients and related tests.
18	MSMH304B	MEASURE THEORY	CO1: Understand the basic concepts of measure and integration theory.
			CO2: Learn some standard inequalities useful solve various boundness problems in science and engineering.
			CO3: Understand signed measure and Radon Nikodyn derivatives which is useful for theoretical foundation of some applicable measures.
			CO4: Understand the concept of product measure with their applications.
			CO5: Express the Fuzzy measures.
19	MSMH304C	Number Theory & Cryptography	CO1: Understand the concepts of divisibility and Primes.
			CO2: Understand the key concepts of congruences.
			CO3: Describe Gauss's Lemma, Quadratic reciprocity law.
			CO4: Discuss Cryptography and its applications.
			CO5: Study the various cryptanalysis.
20	MSMH401	Integral Equation and COV	CO1: Understand Conversion of IVP and BVP to integral equation.
			CO2: Express, successive substituting method for Fredholm integral equation.
			CO3: Describe Eigen value and Eigen function of integral equation.
			CO4: Discuss fundamental lemma of calculus of variation and examples.

			CO5: Study transforming the Euler's equation into canonical forms.
21	MSMH402A	Advance Optimization Technique and Control Theory	CO1: Understand how solve various industrial and managerial problems as linear programming problems.
			CO2: Gain the knowledge of various transportation and assignment problems.
			CO3: Apply the principles of game theory and network scheduling methods to solve problems that arise in business and industry.
			CO4: Gain the knowledge of how to develop queuing models for solving congestion problems.
			CO5: Understand the concept of optimal control problems and its applications.
22	MSMH402B	Advance Coding Theory	CO1: Understand the concept of Maximum-Likelihood Decoding and SyndromeDecoding.
			CO2: Analyze Double Error-Correcting B.C.H. code and Finite Fields Polynomials.
			CO3: Understand Cyclic Codes.
			CO4: Apply Quadratic Residue (Q.R.) Codes and find its applications.
			CO5: Study the concept of Bose-Chaudhuri-Hocquenghem (B.C.H.) Codes and Weightdistributions.
23	MSMH402C	Fluid Mechanics	CO1: Understand D Alembert's Principle and simple applications of the Lagrangian Formulation.
			CO2: Analyze the Derivation of Lagrange's Equations from Hamilton's Principle and Extension of Hamilton's Principle to Non-holonomic Systems.
			CO3: Study the concept of the Equations of Motion and the Equivalent One-Dimensional Problems.
			CO4: Understand the Kepler Problem and Inverse-Square Law of Force.
			CO5: Distinguish the concept of the Hamilton Equations of Motion and the Principle of Least Action.
24	MSMH403A	Numerical Solutions of ODE/PDE	CO1: Understand how to obtain the solutions of Higher Order Derivatives numerically.
			CO2: Express the System of equations and higher Order Equation.
			CO3: Apply The Shooting Method, The alternating direction Implicit Method.
			CO4: Gain the knowledge of Types of partial differential equations.
			CO5: Express the elements of ordinary differential equations.
25	MSMH403B	Computer C++ and MATLAB	CO1: Understand the basic concept of Tokens, Expressions and Control Structures-Functions in C++.
			CO2: Gain knowledge of Analyze Classes and Objects.
			CO3: Understand Constructors and Destructors.
			CO4: Explore the concept of Extending Classes-Pointers, Virtual Functions and Polymorphism.
			CO5: Understand how to build Elementary MATH Built.

26	MSMH403C	Computer Applications- Theory & Programming in C (ANSI features)-I	CO1: Understand the Programming language and its Classification.
			CO2: Express the various types of operators.
			CO3: Describe various types of loop functions.
			CO4: Discuss Computer organization.
			CO5: Study the various Constants and variables.



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