



## SREE VIDYADHIRAJA N.S.S. COLLEGE

Theerdhapadapuram P O., Vazhoor, Kottayam Dist., Kerala - PIN 686505

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Affiliated to Mahatma Gandhi University, Kottayam - NAAC Accredited with B Grade

### Name of the Programme : **M Sc Mathematics**

#### 2012-18 Admissions

| Course Code       | Course Title                   | Course Outcomes |  |
|-------------------|--------------------------------|-----------------|--|
| <b>SEMESTER 1</b> |                                |                 |  |
| MT01C01           | Linear Algebra                 | CO1             | To generalize the concept of vectors to n-dimensional spaces                   |
|                   |                                | CO2             | To understand matrix as a linear transformation.                               |
|                   |                                | CO3             | Able to understand the concept of determinant functions                        |
|                   |                                | CO4             | Finding the eigen values and eigen vectors of linear transformations           |
|                   |                                | CO5             | Impart knowledge in Direct sum decompositions and projection operators.        |
| MT01C02           | Basic Topology                 | CO1             | Introducing topology as a generalization of metric spaces                      |
|                   |                                | CO2             | To introduce the familiar concept of continuity to arbitrary spaces            |
|                   |                                | CO3             | To introduce the concepts of compactness and connectedness in different spaces |
|                   |                                | CO4             | To get an idea about the hierarchy of separation axioms                        |
| MT01C03           | Measure Theory and Integration | CO1             | Introducing measure as generalization of length                                |
|                   |                                | CO2             | To introduce measure theoretic integration                                     |
|                   |                                | CO3             | To introduce signed measures and its applications                              |
|                   |                                | CO4             | To introduce product measures and the theorems of Fubini and Tonelli           |
| MT01C04           | Graph Theory                   | CO1             | Logical, systematic framework within which ordinary graphs can be generalized  |
|                   |                                | CO2             | To introduce graphs as a solution of practical problems                        |
|                   |                                | CO3             | To introduce connectivity, coloring and the concept of planarity               |
|                   |                                | CO4             | To introduce spectrum and spectral properties of graphs                        |
| MT01C05           | Complex Analysis               | CO1             | To introduce complex numbers as points on a sphere - Riemann Sphere            |
|                   |                                | CO2             | To study power series of complex functions                                     |

|                   |                                |     |  |
|-------------------|--------------------------------|-----|--|
|                   |                                | CO3 | Introduce complex integration to understand analytic functions in a better way.  |
|                   |                                | CO4 | Introduce Calculus of Residues & its applications  |
| <b>SEMESTER 2</b> |                                |     |  |
| MT02C06           | Abstract Algebra               | CO1 | To acquire knowledge about direct products and finitely generated abelian groups   |
|                   |                                | CO2 | To learn application of algebra on irreducible polynomials   |
|                   |                                | CO3 | To introduce field extensions  |
|                   |                                | CO4 | Apply Sylow's theorems in the study of simple groups   |
|                   |                                | CO5 | Get more idea about Splitting fields, separable extensions and Galois theory   |
| MT02C07           | Advanced Topology              | CO1 | To introduce the Urysohn Characterisation of normality –Tietze Characterisation of normality   |
|                   |                                | CO2 | To introduce products in arbitrary space   |
|                   |                                | CO3 | To make familiar with embedding and metrisation and different types of compactness   |
|                   |                                | CO4 | Introducing nets as a generalization of sequences  |
| MT02C08           | Advanced Complex Analysis      | CO1 | To study harmonic functions and its applications   |
|                   |                                | CO2 | To study Gamma functions and entire functions in detail  |
|                   |                                | CO3 | To introduce the product development and normal families   |
|                   |                                | CO4 | To introduce elliptic functions  |
| MT02C09           | Partial Differential Equations | CO1 | To introduce Partial differential equations for solving real life situations   |
|                   |                                | CO2 | To introduce Pfaffian differentials forms and equations  |
|                   |                                | CO3 | To study different methods of solution of PDE  |
|                   |                                | CO4 | To study non-linear equations and families of equipotential surfaces   |
| MT02C10           | Real Analysis                  | CO1 | Learn the theory of Riemann-Stieltjes integrals, to be acquainted with the ideas of the total variation and to be able to deal with functions of bounded variation.        |
|                   |                                | CO2 | Students should be able to illustrate the effect of uniform convergence on the limit function with respect to boundedness, continuity, differentiability and integrability |
|                   |                                | CO3 | The student will gain knowledge of special functions and study various properties of them  |
|                   |                                | CO4 | After completing the course, the student should be able to recognize, understand and apply concepts and methods in advanced real analysis                                  |

### SEMESTER 3

|         |   |     |  |
|---------|---|-----|--|
| MT03C11 | Multivariate Calculus and Integral Transforms | CO1 | Impart basic knowledge of differentiation and integration in n-dimensional Euclidean space   |
|         |   | CO2 | To discuss different types of integral transforms  |
|         |   | CO3 | Applications in Mathematics and also bring the confidence to handle real life problems   |
|         |   | CO4 | To introduce integration of differential forms   |
| MT03C12 | Functional Analysis                           | CO1 | On successful completion of this course, the students will be able to appreciate how functional analysis uses and unifies ideas from vector spaces and metric spaces           |
|         |   | CO2 | The learner will be able to identify various types of normed spaces such as Banach Spaces, Inner Product Spaces and Hilbert Spaces and derive various properties of them       |
|         |   | CO3 | The students will have the knowledge and skills to demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from functional analysis |
|         |   | CO4 | The learner will have the ability to pursue further studies in functional analysis and related areas   |
| MT03C13 | Differential Geometry                         | CO1 | To get an idea of application of real analysis in geometry   |
|         |   | CO2 | To study geodesics and parallel transport  |
|         |   | CO3 | To study Weingarten map and curvature of surfaces  |
|         |   | CO4 | To introduce parametrized surface and study its basic properties   |
| MT03C14 | Number theory and Cryptography                | CO1 | Familiar with Euclidean Algorithm  |
|         |   | CO2 | Student can understand about some applications of factorization.   |
|         |   | CO3 | Able to understand finite fields and quadratic residues  |
|         |   | CO4 | Get knowledge on Public key Cryptography which have  |
| MT04E13 | Algorithmic Graph Theory                      | CO3 | Introduction to networks, maximum flow-minimum cut theorem and its algorithm   |
|         |   | CO4 | To study matching and factorizations   |

### 2019 Admission Onwards

### SEMESTER 1

|          |                  |     |  |
|----------|------------------|-----|--|
| ME010101 | Abstract Algebra | CO1 | To acquire knowledge about direct products and finitely generated abelian groups |
|          |                  | CO2 | To learn application of algebra on irreducible polynomials                       |
|          |                  | CO3 | Apply Sylow's theorems in the study of simple groups                             |
|          |                  | CO4 | Application of Fermat's and Euler's theorems in Number Theory                    |

|                   |                           |     |  |
|-------------------|---------------------------|-----|--|
| ME010102          | Linear Algebra            | CO1 | To generalize the concept of vectors to n-dimensional spaces   |
|                   |                           | CO2 | To understand matrix as a linear transformation.   |
|                   |                           | CO3 | To introduce determinant functions   |
|                   |                           | CO4 | Finding the eigen values and eigen vectors of linear transformations   |
| ME010103          | Basic Topology            | CO1 | Introducing topology as a generalization of metric spaces  |
|                   |                           | CO2 | To introduce the familiar concept of continuity to arbitrary spaces  |
|                   |                           | CO3 | To introduce the concepts of compactness and connectedness in different spaces   |
|                   |                           | CO4 | To get an idea about the hierarchy of separation axioms  |
| ME010104          | Real Analysis             | CO1 | Learn the theory of Riemann-Stieltjes integrals, to be acquainted with the ideas of the total variation and to be able to deal with functions of bounded variation.        |
|                   |                           | CO2 | Students should be able to illustrate the effect of uniform convergence on the limit function with respect to boundedness, continuity, differentiability and integrability |
|                   |                           | CO3 | The student will gain knowledge of special functions and study various properties of them  |
|                   |                           | CO4 | After completing the course, the student should be able to recognize, understand and apply concepts and methods in advanced real analysis                                  |
| ME010105          | Graph Theory              | CO1 | Logical, systematic framework within which ordinary graphs can be generalized  |
|                   |                           | CO2 | To introduce graphs as a solution of practical problems  |
|                   |                           | CO3 | To introduce connectivity, coloring and the concept of planarity   |
|                   |                           | CO4 | To introduce spectrum and spectral properties of graphs  |
| <b>SEMESTER 2</b> |                           |     |  |
| ME010201          | Advanced Abstract Algebra | CO1 | Idea of geometric construction of numbers  |
|                   |                           | CO2 | To introduce field extensions  |
|                   |                           | CO3 | Application of algebra in finding the roots of polynomials   |
|                   |                           | CO4 | Discussion of Galois theory  |
| ME010202          | Advanced Topology         | CO1 | To introduce the Urysohn Characterisation of normality –Tietze Characterisation of normality   |
|                   |                           | CO2 | To introduce products in arbitrary space   |

|                   |                                |     |   |
|-------------------|--------------------------------|-----|---|
| ME010202          | Advanced Topology              | CO3 | To make familiar with embedding and metrisation and different types of compactness                  |
|                   |                                | CO4 | Introducing nets as a generalization of sequences   |
| ME010203          | Numerical Analysis with Python | CO1 | Learn basics of Python Programming  |
|                   |                                | CO2 | Make the student capable to do practical problems in more advanced area of Mathematics using Python |
|                   |                                | CO3 | Develop Problem solving skill using programming languages   |
| ME010204          | Complex Analysis               | CO1 | To introduce complex numbers as points on a sphere - Riemann Sphere                                 |
|                   |                                | CO2 | To study power series of complex functions  |
|                   |                                | CO3 | Introduce complex integration to understand analytic functions in a better way.                     |
|                   |                                | CO4 | Introduce Calculus of Residues & its applications   |
| ME010205          | Measure Theory and Integration | CO1 | Introducing measure as generalization of length   |
|                   |                                | CO2 | To introduce measure theoretic integration  |
|                   |                                | CO3 | To introduce signed measures and its applications   |
|                   |                                | CO4 | To introduce product measures and the theorems of Fubini and Tonelli                                |
| <b>SEMESTER 3</b> |                                |     |   |
| ME010301          | Advanced Complex Analysis      | CO1 | To study harmonic functions and its applications  |
|                   |                                | CO2 | To study Gamma functions and entire functions in detail   |
|                   |                                | CO3 | To introduce the product development and normal families  |
|                   |                                | CO4 | To introduce elliptic functions   |
| ME010302          | Partial Differential Equations | CO1 | To introduce Partial differential equations for solving real life situations                        |
|                   |                                | CO2 | To introduce Pfaffian differentials forms and equations   |
|                   |                                | CO3 | To study different methods of solution of PDE   |
|                   |                                | CO4 | To study non linear equations and families of equi-potential surfaces                               |
|                   |                                | CO1 | Impart basic knowledge of differentiation and integration in n-dimensional Euclidean space          |

|                   |   |     |  |
|-------------------|---|-----|--|
| ME010303          | Multivariate Calculus and Integral Transforms | CO2 | To discuss different types of integral transforms  |
|                   |   | CO3 | Applications in Mathematics and also bring the confidence to handle real life problems   |
|                   |   | CO4 | To introduce integration of differential forms   |
| ME010304          | Functional Analysis                           | CO1 | On successful completion of this course, the students will be able to appreciate how functional analysis uses and unifies ideas from vector spaces and metric spaces   |
|                   |   | CO2 | The learner will be able to identify various types of normed spaces such as Banach Spaces, Inner Product Spaces and Hilbert Spaces and derive various properties of them   |
|                   |   | CO3 | The students will have the knowledge and skills to demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from functional analysis                                   |
|                   |   | CO4 | The learner will have the ability to pursue further studies in functional analysis and related areas   |
| ME010305          | Optimization Techniques                       | CO1 | To introduce programming to handle real life situations  |
|                   |   | CO2 | Understand Integer Programming and learn different methods for solving such programming problems   |
|                   |   | CO3 | To introduce Goal programming and flow & potentials in networks  |
|                   |   | CO4 | To introduce non-linear programming  |
| <b>SEMESTER 4</b> |   |     |  |
| ME010401          | Spectral Theory                               | CO1 | The learners will be able to appreciate how functional analysis uses and unifies ideas from normed spaces and complex analysis   |
|                   |   | CO2 | To understand and apply fundamental theorems from the theory of normed spaces, including the Uniform Boundedness theorem, the open mapping theorem, the closed graph theorem, and the Banach Fixed Point theorem |
|                   |   | CO3 | Have a good grasp of the spectral properties of various operators such as Compact Linear Operators, Self-adjoint linear operators, Positive Operators and Projection Operators                                   |
|                   |   | CO4 | Understand and apply ideas from spectral theory to other mathematical contexts and related areas   |
| ME010402          | Analytic Number Theory                        | CO1 | To introduce arithmetic functions and its application  |
|                   |   | CO2 | To study prime number theorem and distribution of primes   |
|                   |   | CO3 | To study congruence in detail  |

|          |                          |     |  |
|----------|--------------------------|-----|--|
|          |                          | CO4 | To study the application of congruence and quadratic residues and primitive roots for solving numerical problems |
| ME800401 | Differential Geometry    | CO1 | To get an idea of application of real analysis in geometry   |
|          |                          | CO2 | To study geodesics and parallel transport  |
|          |                          | CO3 | To study Weingarten map and curvature of surfaces  |
|          |                          | CO4 | To introduce parametrized surface and study its basic properties   |
| ME800402 | Algorithmic Graph Theory | CO1 | Introducing Algorithms and its complexity  |
|          |                          | CO2 | Representation of graphs in computer   |
|          |                          | CO3 | Introduction to networks   |
|          |                          | CO4 | To study matching and factorizations   |
| ME800403 | Combinatorics            | CO1 | To use algebraic concepts to solve basic problems in real life   |
|          |                          | CO2 | To introduce Ramsey type problems and Ramsey numbers   |
|          |                          | CO3 | To introduce Integer solutions , shortest routes and Stirling Numbers  |
|          |                          | CO4 | To get an idea about generating functions and recurrence relations   |