



## SREE VIDYADHIRAJA N.S.S. COLLEGE

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

### Name of the Programme : B Sc Mathematics

#### 2009-16 Admissions

Course Code	Course Title	Course Outcomes	
<b>Core Courses</b>			
<b>SEMESTER 1</b>			
MM1B0 1	Foundations of Mathematics	CO1	Conceive basic logic and develop mathematical logic methods of proofs.
		CO2	Analyze statements using truth tables
		CO3	Familiarize the fundamental ideas of sets, functions, relations and partial orderings.
		CO4	Introduce basic number theory.
<b>SEMESTER 2</b>			
MM2B0 1	Analytic geometry, trigonometry and Matrices	CO1	Find the equation to tangent, normal at a point on a conic
		CO2	Find the polar equation of a line, circle, tangent and normal to conics
		CO3	Familiarize real and imaginary parts of a circular and hyperbolic functions of a complex variable;
		CO4	The student will able to solve a system of linear equations using the inverse of a matrix.
		CO5	Familiarize characteristic roots and characteristic vectors.
		CO6	Finding inverse of a matrix by Cayley-Hamilton theorem
<b>SEMESTER 3</b>			
MM3B0 1	Calculus	CO1	The student will able to find higher order derivatives of the product of two functions
		CO2	Learn how to expand a function using Taylor's and Maclaurin's series
		CO3	Conceive the concept of asymptotes and obtain their equations
		CO4	Understand the theory of multiple integrals and able to find the area and volume by applying the techniques of double and triple integrals
		CO5	Learn about partial derivatives and its applications

### SEMESTER 4

MM4B0 1	Vector calculus, theory of equations and numerical methods	CO1	Acquaint with the concept of vector valued functions and its curvature, torsion, directional derivatives
		CO2	Able to apply the concepts of integral calculus to vector valued functions
		CO3	Acquire the knowledge of analytical methods for solving polynomial equations.
		CO4	Familiarize introductory methods of numerical solutions to find roots.

### SEMESTER 5

MM5B0 1	Mathematical analysis	CO1	The student will understand about the structure and properties of the real number system.
		CO2	Have the knowledge of the sequences and series of real numbers and their convergence.
		CO3	Understand the concept of limit of a function in detail and familiarize the evaluation techniques
		CO4	The student will be able to construct rigorous mathematical proofs of basic results in real analysis.
		CO5	Impart knowledge of basic algebraic properties of complex numbers
MM5B0 2	Differential Equations	CO1	Recognize and solve separable, exact, homogeneous and non-homogeneous ordinary differential equations
		CO2	Convert certain types of differential equations to exact form by using integrating factors
		CO3	Identify and obtain the solution of Clairaut's equation.
		CO4	Use power series method to solve differential equations
		CO5	Learn about the origin of partial differential equation and distinguish the integrals of first order linear partial differential equation into complete, general and singular integrals.
		CO6	Familiarize with Lagrange's method and able to solve the first order linear partial differential equation using this method.
MM5B0 3	Abstract Algebra	CO1	Understand basic algebraic concepts like binary operations, groups, cosets, rings, ideals etc.
		CO2	Know how to construct new groups by taking quotients and direct products
		CO3	Prove classical theorems like Lagrange's theorem and Cayley's theorem
		CO4	Learn how to relate different algebraic objects by homomorphisms and isomorphisms

MM5B0 4	Fuzzy Mathematics	CO1	Learn fuzzy set theory as a generalization of classical set theory
		CO2	Describe operations of fuzzy sets and fuzzy arithmetic
		CO3	Get knowledge in fuzzy relations and fuzzy logic
<b>SEMESTER 6</b>			
MM6B0 1	Real Analysis	CO1	Attain deep knowledge of real valued functions and continuity and differentiability of real functions.
		CO2	Determine the Riemann integrability of a bounded function and establish properties of integrable functions.
		CO3	Identify the difference between point-wise and uniform convergence of sequences and series of functions.
		CO4	Develop a higher level of mathematical maturity combined with the ability to think analytically.
MM6B0 2	Complex Analysis	CO1	Conceive the concept of analytic functions and will be familiar with the elementary complex functions and their properties.
		CO2	Familiar with the theory and techniques of Complex integration
		CO3	Identify and classify Singular points to use in Complex integrals
		CO4	Familiar with the theory and application of the power series expansion of analytic functions.
MM6B0 3	Discrete Mathematics	CO1	Understand precise and accurate mathematical definitions of objects in Graph theory
		CO2	Analyze different properties that depend on the connectivity of a graph
		CO3	Learn basics of Cryptography
		CO4	Get familiar with Lattice theory
MM6B0 4	Linear Algebra and Metric spaces	CO1	Enable the students to achieve the concept of Vector spaces
		CO2	Gain knowledge on linear transformations in vector spaces
		CO3	Familiar with metric spaces, open sets, closed sets and their properties
		CO4	Conceive the concepts of convergence, completeness and continuous mapping.
<b>Complementary Course Statistics</b>			
<b>SEMESTER 1</b>			
ST1CM T01	Basic statistics	CO1	Learn various measures of data namely measures of central tendency and measures of dispersion by which the student can analyse a data.
		CO2	Achieve statistical skills to collect empirical data.

		CO3	Statistical skills to calculate descriptive statistics of empirical data and to visually interpret empirical data.
		CO4	Study an important Economic barometer namely index number, which is a special type of average that measures the changes in the level of a phenomenon with respect to time, space, etc.
<b>SEMESTER 2</b>			
ST2CM T02	Theory of random variables	CO1	Attain basic knowledge in random variables such as 'Discrete' and 'Continuous'
		CO2	Attain Problem solving skill
		CO3	Methods to expectations and point distributions
		CO4	Understand the concepts correlation and regression so that the student can identify linear relationship between the variables and the nature of the linear relationship
<b>SEMESTER 3</b>			
ST2CM T03	Probability Distributions	CO1	Familiar with basic probability distributions which we can use in Reliability Analysis and Survival Analysis.
		CO2	Understand different models in modelling many real-life data sets especially Normal, Binomial, Poisson, etc.
		CO3	Develop Problem solving skill
		CO4	Conceive the concept of Central Limit Theorem so that the student can use it in most of the normal/symmetric/meso-kurtic real-life data sets
<b>SEMESTER 4</b>			
ST4CM T04	Statistical Inference	CO1	Learn the basics of estimation theory
		CO2	Understand the concepts of testing of Hypothesis so that the student can identify whether to accept or reject a hypothesis- extremely useful in many fields such as medical, industrial, etc.
		CO3	Improve Decision making skill
		CO4	Familiarize important properties of estimation namely unbiasedness, efficiency, consistency and sufficiency which are essentially required in day to day life as well as scientific analysis
<b>Complementary Courses for Physics and Chemistry</b>			
<b>SEMESTER 1</b>			
MP1C01	Differential calculus and Trigonometry	CO1	Learn basic ideas of limits and derivatives.
		CO2	Study applications of derivatives
		CO3	Introduce partial derivatives
		CO4	Acquaint with the concept of circular and hyperbolic functions of a complex variable.

**SEMESTER 2**

MP2C01	Integral calculus and matrices	CO1	Learn applications of Integral Calculus like finding area, volume and surface area of various geometrical objects, lengths of the curves, etc.
		CO2	Master the concepts of double integrals, triple integrals and its applications.
		CO3	Conceive the concepts of rank of a matrix, characteristic roots and characteristic vectors.

**SEMESTER 3**

MP3C01	Vector calculus, differential equations and analytic geometry	CO1	Understand the concept of vector valued functions and its curvature, directional derivatives.
		CO2	Study the basics of Vector fields, graphical representation and line integrals.
		CO3	Able to apply the idea of integral calculus to vector valued functions.
		CO4	Learn various properties of conic sections in Cartesian and polar coordinates
		CO5	To introduce ordinary differential equations and solution of first order differential equations

**SEMESTER 4**

MP4C01	Fourier series, Partial differential equations, numerical analysis, and abstract algebra	CO1	Learn special functions like Fourier series Legendre Polynomials, Bessel's functions and their properties
		CO2	To introduce partial differential equations
		CO3	Conceive analytical methods for solving polynomial equations.
		CO4	Develop ideas of binary operation on a set, groups, subgroups and cyclic groups.

**Open Course****SEMESTER 5**

MM5D02	Applicable Mathematics	CO1	Prepare students of all streams, particularly those with arts and commerce background for their higher studies.
		CO2	Prepare students of all streams to approach competitive examinations.
		CO3	Learn detailed explanation and shortcut method for solving problems.
		CO4	Acquire better understanding of concepts and problem solving skill.

**Choice Based Course****SEMESTER 6**

		CO1	Impart a broad outline of Euclidean Space, Vector Space and its basis
		CO2	Able to write a given LPP in standard form and in a canonical form

MM6D01	Operations Research	CO3	Understand Transportation problem and able to formulate it as an LPP and hence solve the problem.
		CO4	The student will be able to determine that an assignment problem is a special case of LPP and hence can solve by Hungarian method.
		CO5	Acquire the knowledge about queuing models.
<b>2017 Admission Onwards</b>			
<b>Core Courses</b>			
<b>SEMESTER 1</b>			
MM1CR T01	Foundations of Mathematics	CO1	Familiarize basic logic and develop mathematical logic methods of proofs.
		CO2	Conceive the fundamental ideas of sets, functions, relations and partial orderings.
		CO3	Learn analytical methods for solving polynomial equations.
<b>SEMESTER 2</b>			
MM2CR T01	Analytic Geometry, Trigonometry and Differential Calculus	CO1	Learn more about conics like finding the equation to tangent and normal at a point on a conic, chords in terms of given points, etc.
		CO2	Impart knowledge of polar coordinates and the student will be able to convert certain equations involving Cartesian coordinates into corresponding polar equations.
		CO3	Familiarize real and imaginary parts of a circular and hyperbolic functions of a complex variable.
		CO4	Acquaint with the successive differentiation and indeterminate forms.
<b>SEMESTER 3</b>			
MM3CR T01	Calculus	CO1	Learn about higher order derivatives, Leibnitz theorem and series expansions of functions using Maclaurin's theorem and Taylor's theorem.
		CO2	Able to apply derivatives in finding maxima, minima, point of inflection, curvature, etc.
		CO3	Conceive the concepts of convexity, envelopes and asymptotes.
		CO4	Learn about partial derivatives and its applications.
		CO5	Learn how to calculate volume and surface area of solids and length of the curves using integrals
		CO6	Conceive the knowledge of multiple integrals and its applications
<b>SEMESTER 4</b>			
	Vector Calculus	CO1	Familiarize with the concept of vector valued functions and its curvature, torsion, directional derivatives.
		CO2	Able to apply the tools of integral calculus to vector valued functions.

MM4CR T01	Vector Calculus, Theory of Numbers and Laplace Transform	CO3	Get familiar with the concepts of Greens Theorem, Stokes Theorem and Gauss divergence theorem and learn how to evaluate the line, surface and volume integrals using these theorems
		CO4	Have a brief idea of number system and related concepts.
		CO5	Understand about Laplace Transforms and related concepts and able to solve ordinary differential equations using these concepts
<b>SEMESTER 5</b>			
MM5CR T01	Mathematical Analysis	CO1	The student will understand about the structure and properties of the real number system.
		CO2	Learn the basic topological properties of the real numbers
		CO3	Impart knowledge of the sequence of real numbers and convergence.
		CO4	The student will be able to construct rigorous mathematical proofs of basic results in real analysis.
MM5CR T02	Differential Equations	CO1	Recognize and solve separable, exact, homogeneous and non-homogeneous ordinary differential equations.
		CO2	The student will be able to solve certain types of differential equations by converting it into exact form using integrating factors.
		CO3	Solve second order ordinary differential equations.
		CO4	Use power series method to solve differential equations.
		CO5	Learn about the origin of partial differential equation and distinguish the integrals of first order linear partial differential equation into complete, general and singular integrals.
		CO6	Familiarize with Lagrange's method and able to solve the first order linear partial differential equation using this method.
MM5CR T03	Abstract Algebra	CO1	Understand basic algebraic concepts like binary operations, groups, cosets, rings, ideals etc.
		CO2	Know how to construct new groups by taking quotients and direct products
		CO3	Prove classical theorems like Lagrange's theorem and Cayley's theorem.
		CO4	Learn how to relate different algebraic objects by homomorphisms and isomorphisms



MM5CR T08	Human Rights and Mathematics for Environmental Studies	CO1	To develop the sense of awareness among the students about the environment and its various problems and to help the students in realizing the inter-relationship between man and environment for protecting the nature and natural resources.
		CO2	Environmental education encourages students to research, investigate how and why things happen, and make their own decisions about complex environmental issues by developing and enhancing critical and creative thinking skills
		CO3	Helps to foster a new generation of informed consumers, workers, as well as policy or decision makers.
		CO3	Have a brief idea of Fibonacci numbers and Golden ratio
		CO4	Learn the idea of Human Rights and study its importance
<b>SEMESTER 6</b>			
MM6CR T01	Real Analysis	CO1	Conceive the knowledge of the series of real numbers and convergence.
		CO2	Determine the Riemann integrability of a bounded function and establish properties of integrable functions.
		CO3	Identify the difference between point-wise and uniform convergence of sequences and series of functions.
		CO4	Develop a higher level of mathematical maturity combined with the ability to think analytically.
MM6CR T02	Graph Theory and Metric Spaces	CO1	Write precise and accurate mathematical definitions of objects in Graph theory
		CO2	Realize applications of graphs
		CO3	Analyze different properties that depend on the connectivity of a graph
		CO4	Understand Euclidean distance and generalize that idea to arbitrary sets.
		CO5	Extend the concepts like convergence and limits of analysis to Metric spaces
MM6CR T03	Complex Analysis	CO1	Understand about Complex valued functions and determine whether a given function is differentiable
		CO2	Conceive the concept of analytic functions and will be familiar with the elementary complex functions and their properties.
		CO3	Familiar with the theory and techniques of Complex integration
		CO4	Identify and classify Singular points to use in Complex integrals



		CO5	Acquire better understanding of theory and application of the power series expansion of analytic functions.
MM6CR T04	Linear Algebra	CO1	To Solve systems of linear equations.
		CO2	Enable the students to achieve the concept of Vector spaces.
		CO3	Learn deeply about linear transformations and represent them in matrix form.
		CO4	Learn how to find eigenvalues of a given matrix and use it to diagonalize the given matrix.
<b>Complementary Courses Statistics</b>			
<b>Course Code</b>	<b>Course Title</b>	<b>Course Outcomes</b>	
<b>SEMESTER 1</b>			
ST1CM T01	Descriptive Statistics	CO1	Imparts the real spirit with which a beginner may approach the learning of any scientific stream, not alone Statistics.
		CO2	Attain statistical skills to collect empirical data and to calculate descriptive statistics of empirical data.
		CO3	Make the learner to understand the usefulness of various statistical tools in making their everyday life useful
		CO4	Gain statistical skills to visually interpret empirical data.
<b>SEMESTER 2</b>			
ST2CM T02	Probability Theory	CO1	Understand basic knowledge in probability theory
		CO2	The learner can understand that statistical conclusions are possible from everyday data from everybody's life.
		CO3	Problem solving skill
		CO4	Motivate the learner to understand the rationality behind every technique and in what way that rationality is used in their lives.
		CO5	Learn different methods to find probability
<b>SEMESTER 3</b>			
ST3CM T03	Probability Distribu- tions	CO1	Acquaint the students familiar with basic probability
		CO2	Acquaint the students familiar with their properties of
		CO3	Problem solving skill
		CO4	Equip the learner with the expertise in applying appropriate statistical tools in a given context and in arriving at valid and reasonable conclusions
		CO5	Student can understand the practical side of applying various statistical techniques over their proofs and derivations
<b>SEMESTER 4</b>			
ST4CM	Statistical Inference	CO1	Expected to learn the basics of estimation theory
		CO2	Make the student understand the concepts of testing of
		CO3	Develop decision making skill

T04	Statistical Inference	CO4	Motivates the freshers to the exciting world of Statistics where numbers are transformed into information
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### Complementary Courses -for Physics and Chemistry

#### SEMESTER 1

MM1CMT 01	Partial Differentiation, Matrices, Trigonometry and Numerical Methods	CO1	Acquaint with the concept of partial differentiation of functions of several variables.
		CO2	Solve systems of linear equations using different methods.
		CO3	Familiarize trigonometric and hyperbolic functions in detail.
		CO4	Learn how to solve equations using numerical methods.

#### SEMESTER 2

MM2C MT01	Integral Calculus and Differential Equations	CO1	Learn applications of Integral Calculus like finding area, volume and surface area of various geometrical objects, lengths of the curves, etc.
		CO2	Attain the knowledge of multiple integrals and its applications
		CO3	Identify and solve separable, exact, homogeneous and non-homogeneous ordinary differential equations
		CO4	Familiarize the concept of Ordinary Differential Equations and solution of first order differential equations.
		CO5	Learn how to solve partial differential equations.

#### SEMESTER 3

MM3C MT01	Vector Calculus, Analytic Geometry and Abstract Algebra	CO1	Understand the concept of vector valued functions and its curvature, directional derivatives.
		CO2	Able to apply the idea of integral calculus to vector valued functions.
		CO3	Learn various properties of conic sections in Cartesian and polar coordinates
		CO4	Understand basic algebraic concepts like binary operations, groups, cosets, rings, ideals

#### SEMESTER 4

MM4C MT01	Fourier Series, Laplace Transforms and Complex Analysis	CO1	Learn special functions like Fourier series Legendre Polynomials, Bessel's functions and their properties
		CO2	Solve differential equations using power series method
		CO3	Understand Laplace transforms
		CO4	Learn about Complex valued functions and determine whether a given function is differentiable
		CO5	Familiar with the theory and techniques of complex integration.

**Open Course****SEMESTER 5**

MM50PT0 2	Applicable Mathematics	CO1	Prepare students of all streams, particularly those with arts and commerce background for their higher studies.
		CO2	Prepare students of all streams to approach competitive examinations.
		CO3	Student will able to solve problems using different short cut methods.
		CO4	Acquire better understanding of concepts and problem solving skill

**Choice Based Course****SEMESTER 6**

MM6CBT 02	Basic Python Programming and Typesetting In LaTeX	CO1	Get the basic skills required for Python programming.
		CO2	Be able to solve Mathematical problems using Python programs.
		CO3	Learn to prepare a LaTeX document, article and a project report
		CO4	Able to include figures and tables in a LaTeX document.