CHRIST NAGAR COLLEGE

A CMI Educational Institution

Affiliated to the University of Kerala

MARANALLOOR, THIRUVANANTHAPURAM

PROGRAMME OUTCOMES

PROGRAMME SPECIFIC OUTCOMES

COURSE OUTCOMES

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UNDER GRADUATE – BA, BCOM, BSC, BBA, BCA

PROGRAMME OUTCOME (PO)

On completion of a UG Programme from Christ Nagar College, students should be able to demonstrate the **programme outcomes** listed below:

PO1: PROFESSIONALISM AND ETHICS- Demonstrate accountability and professionalism that is rooted in ethical, altruistic, moral, and humanistic principles.

PO2: LEADERSHIP AND SOCIAL ACUITY - Capable of taking responsibilities as a leader and demonstrate responsiveness to the regional and national environments developing abilities to manage challenges for nation building.

PO3: DIGITAL COMPETENCE: Able to use technology and skills to process information and data for the benefit of the society.

PO4: COMMUNICATION AND TEAM WORK- Interact effectively with stakeholders, fostering an environment of team work, mutual respect and shared decision making skills.

PO5: CRITICAL THINKING - Foster in students an inquisitive mind to analyze and develop capacity to become an active leaner through critical thinking.

PROGRAMME SPECIFIC OUTCOME (PSO)

BSC MATHEMATICS

PSO1: **Apply** mathematical concepts in the field of differential and integral calculus, algebra, analysis, number theory and differential equations, **establish** mathematical expressions using software and **interpret** statistical and physical fields using mathematical concepts. **(Apply)**

PSO2: **Integrate** edified communication skills and critical thinking to examine and solve various societal problems and **develop** skills in the field of document making, mathematical computation, and visualization using software. **(Create)**

PSO3: Develop the knowledge in statistical and physical fields to enhance mathematical applications career prospects and **adapt** to the changing scientific environment, uphold scientific integrity, manage environmental emergencies and objectivity in professional endeavours. **(Create)**

Department of Mathematics
Course Outcomes

Semester 1

COURSE CODE	COURSE NAME		COURSE OUTCOME
MM 1141	METHODS OF MATHEMATICS	CO1	**Recall** basic concepts and standard results of differentiation and integration. (**Remember**)
		CO2	**Illustrate** the rate of changes, absolute maximum and minimum and its geometrical interpretation. (**Understand**)
		CO3	**Compute** work done, centre of gravity, fluid force and other length related concepts like area and volume using integration. (**Apply**)
		CO4	**Establish** the relation between position - time, work and energy, density and mass of objects. (**Apply**)
		CO5	**Explain** Rolle's theorem, Mean value theorem, L'Hopital's rule, Pappus theorem and related problems and analyse hyperbolic function and improper integrals. (**Analyze**)
ST 1131.1	DESCRIPTIVE STATISTICS	CO1	**Explain** functions, Scopes and Limitations of Statistics & various scales of measurements. (**Understand**)
		CO2	**Apply** different statistical tools to collect, present and summarize data. (**Apply**)
		CO3	**Identify** the nature of a frequency distribution of a given data. (**Apply**)
		CO4	**Determine** descriptive statistical measures for data. (**Apply**)
		CO5	**Apply** statistical tools for prediction – Fitting, Correlation & regression. (**Apply**)
PY 1131.1	MECHANICS AND PROPERTIES OF MATTER	CO1	**Understand** and apply the dynamics of rigid bodies. (**Understand, Apply**)
		CO2	**Interpret** and **analyse** the concept and applications of oscillations in the classical field. (**Apply, Analyse**).
		CO3	**Apply** the concept of elasticity in explaining the bending of structures. (**Apply**)
		CO4	**Evaluate** the properties of fluids and illustrate their application. (**Apply**)

		CO5	**Understand** the concept and applications of viscosity **(Apply)**
EN 1111.1	**LANGUAGE SKILLS**	CO1	**Defining** the tenets of Soft skills and the four fold skills. **(Remember)**
		CO2	**Explain** elements of basic communication through micro and macro skills **(Understand)**
		CO3	**Developing** conversational skills through dialogue writings. **(Apply)**
		CO4	**Analyse** the students' ability as a critical reader and writer. **(Analyze)**
		CO5	**Create** expertise in business and professional writing to endorse employability. **(Create**
EN 1121	**WRITINGS ON CONTEMPORARY ISSUES**	CO1	**Observe** and discuss the major contemporary issues in the world. **(Understand)**
		CO2	**Identify** the pertinent social issues that might evolve in the future. **(Apply)**
		CO3	**Analyse** the motives and causes of the current social issues. **(Analyze)**
		CO4	**Evaluate** literary texts critically. **(Evaluate)**
		CO5	**Develop** an empathy towards the issue of the society. **(Create)**
ML 1111.1	**MALAYALAM KAVITHA**	CO1	**Describe** the characteristics of early stage Malayalam poetry w.r.t classic translation. **(Understand)**
		CO2	**Analyze** the different poetry genres in Malayalam. **(Analyze)**
		CO3	**Identify** major poets in Malayalam. **(Remember)**
		CO4	**Explain** the historical development of Malayalam poetry. **(Understand)**
		CO5	**Prepare** Poetry Review **(Evaluate)**
HN 1111.1	**HINDI KATHA SAHITYA**	CO1	**Recall** the main works of the prescribed fiction writers **(Remember)**
		CO2	**Observe** the craft of the fiction

			writers(**Understand**)
		CO3	**Research** how the resource language is used as a medium in creative writing (**Understand**)
		CO4	**Analyze** the character sketches in the prescribed works (**Analyze**)
		CO5	**Judge** the novel on the basis of subject and relevance among contemporary Hindi novels (**Understand**)

SEMESTER 2

COURSE CODE	COURSE NAME	COURSE OUTCOME	
EN 1211.1	**ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT**	CO1	**Identify** the wide range of issues in Environmental studies. **(Remember)**
		CO2	**Interpret** ideas in the literary texts to develop an aesthetic approach towards nature.**(Understand)**
		CO3	**Develop** a set of values for environmental protection and conservation. **(Apply)**
		CO4	**Analyze** natural disasters and other emergency situations. **(Analyze)**
		CO5	**Prepare** strategies to manage natural disasters and other emergency situations. **(Create)**
EN 1212.1	**ENGLISH GRAMMAR, USAGE AND WRITING**	CO1	**Identify** grammatical items and sentence structures of English grammar. **(Remember)**
		CO2	**Interpret** ideas in the literary texts to develop an aesthetic approach towards nature.**(Understand)**
		CO3	**Develop** a set of values for environmental protection and conservation. **(Apply)**
		CO4	**Analyze** natural disasters and other emergency situations. **(Analyze)**
		CO5	**Prepare** strategies to manage natural disasters and other emergency situations.**(Create)**

HN 1211.1	HINDI NIBANDH AURANYA GADYA VIDHAYEM	CO1	**Recall** the main works of the prescribed writers (**Remember**)
		CO2	**Relate** the contributions of prescribed writers(**Understand**)
		CO3	**Discuss** about the different types of prose. (**Understand**)
		CO4	**Analyse** the craft used in the prescribed prose forms (**Analyze**)
		CO5	**Create** a prose form and try to improve. (**Create**)
ML 1211.1	GADYASAHITHYAM	CO1	**Describe** the characteristics of renaissance age novels w.r.t prescribed novel (**Understand**)
		CO2	**Analyze** the different novel genres in Malayalam(**Analyze**)
		CO3	**Identify** major short story writers in Malayalam(**Remember**)
		CO4	**Explain** the historical development of Malayalam essays (**Understand**)
			Analyze social life through the study of personal history (**Analyse**)
MM 1221	FOUNDATIONS OF MATHEMATICS	CO1	**Describe** basic concepts of sets, relations, functions, parametric equations and basic operations on vectors. (**Remember**).
		CO2	**Identify** the way in which a mathematician formally makes statements and proves or disproves it. (**Understand**)
		CO3	**Illustrate** arc length of parametric curves, area, families of lines and curves, various quadric surfaces and projections of vectors. (**Apply**)
		CO4	**Explain** difference between polar, spherical and cylindrical coordinates, conics in standard and translated positions, reflections and rotation of conics. (**Apply**)
		CO5	**Analyze** various techniques of proof, methods for conversion between various coordinate systems**,** Kepler's laws. (**Analyze**)

ST 1231.1	PROBABILITY AND RANDOM VARIABLES	CO1	**Explain** random experiment and concept of probability in different perspectives. (**Understand**)
		CO2	**Compute** conditional probability and apply for finding posterior probabilities. (**Apply**)
		CO3	**Explain** random variables and their distribution functions(**Apply**)
		CO4	**Explain** transformation of random variables(**apply**)
		CO5	**Compute** expectations and write moment generating functions of random variables. (**Apply**)
PY1231.1	THERMAL PHYSICS AND STATISTICAL MECHANICS	CO1	**Understand** and analyse the fundamental concepts of heat transfer and discuss its applications in daily life. (**Understand, Analyse**)
		CO2	**Analyse** the quantum mechanical concepts on solving the blackbody spectrum and evaluating solar constant (**Understand, Apply**)
		CO3	**Discuss** basic concepts of thermodynamic systems and working of heat engines. (**Apply**)
		CO4	**Develop** a fundamental understanding of entropy in different processes. (**Analyse, Apply**)
		CO5	**Discuss** the concepts of statistical mechanics and describe Maxwell - Boltzmann distribution. (**Understand, Apply**)

SEMESTER 3

COURSE CODE	COURSE NAME	COURSE OUTCOME	
MM 1341	ELEMENTARY NUMBER THEORY AND CALCULUS I	CO1	**Describe** concepts involving divisibility, greatest common divisors, vector valued and multivariable functions. (**Remember**).
		CO2	**Identify** the way in which finding GCD by Euclidean algorithm,

			derivatives and integration of vector valued and multivariate functions. (**Understand**l)
		CO3	**Illustrate** division algorithm, local linear approximations, extrema of multivariate functions, Kepler's laws and related problems. (**Apply**)
		CO4	**Explain** chain rules - various versions, directional derivative, gradient and its applications. (**Apply**)
		CO5	**Analyze** techniques for finding solutions of linear Diophantine Equations by Euler's Method, the geometrical interpretation of curvature and motion of a particles and Lagrange multipliers for extremum problems with constraints (**Analyze**)
ST 1331.1	**STATISTICAL DISTRIBUTIONS**	CO1	**Explain** Discrete distributions - Uniform, binomial, Poisson and geometric, hypergeometric distribution. (**Apply**)
		CO2	**Explain** Uniform, exponential, gamma, Normal distribution. (**Apply**)
		CO3	**Explain** Normal distribution. (**Apply**)
		CO4	**Explain** Chebychev's inequality; Law of large numbers-BLLN , central limit theorem. (**Apply**)
		CO5	**Explain** Sampling distributions - Chi-square(χ^2), t and F distributions. (**Apply**)
PY1331.1	**OPTICS, MAGNETISM AND ELECTRICITY**	CO1	**Discuss** the phenomenon of interference of light, its real world examples and its applications. (**Apply**)
		CO2	**Discuss** the phenomenon of diffraction of light, its real world examples and its applications.(**Apply**)
		CO3	**Study** basics and applications of Polarisation and applications of lasers in communication. (**Apply**)
		CO4	**Understand** the fundamentals of magnetism and analyze problems and formulations from magnetism

			(Understand, Apply)
		CO5	**Explain** and illustrate alternating current and analyze AC circuits **(Apply)**
EN 1311.1	**ENGLISH FOR CAREER**	CO1	**Recall** the grammatical and syntactical rules by solving remedial exercises. **(Remember)**
		CO2	**Practice** the vocabulary essential for professional communication. **(Apply)**
		CO3	**Analyze** passages for comprehension using logical and critical thinking. **(Analyze)**
		CO4	**Test** vocabulary, grammar, comprehension, and Remedial English from the perspective of career-oriented tests. **(Evaluate)**
		CO5	**Construct** sentences without errors using remedial grammar. **(Create)**
HN1311.1	**HINDI NATAK, VYAKARAN TATHA ANUVAD**	CO1	**Recall** the main works of the prescribed playwright **(Understand)**
		CO2	**Discuss** about how to translate a passage from english to hindi and vice versa. **(Understand)**
		CO3	**Judge** the parts of speech and importance of translation **(Understand)**
		CO4	**Analyze** the craft and the relevance of the theme of the prescribed drama **(Apply** level**)**
		CO5	**Identify** the nouns, pronouns, verbs, tenses. **(Analyze** level**)**
ML 1311.1	ദൃശ്യകലാസാഹിത്യം	CO1	സാഹിത്യകൃത്ികള ും ദൃശ്യകലകള ും ത്മ്മിലുള്ള ബന്ധും മനസിലാക്കുന്ന
		CO2	കകരളീയ ദൃശ്യകലകൾ നിരീക്ഷിച്ച് സാജാത്യവൈജാത്യങ്ങൾ കണ്ടെത്താൻ സാധിക്കുന്ന
		CO3	സവന്തും കലാൈസന ഉണരുകയും സവയും പരിശ്ീലിച്ച് ്പകടിപ്പിക്കാൻ ക്ിപരണയ ൊക കയ ും

			ണ്ടൈയ ന്ന .
		CO4	എഴ ത്ത്,അഭിനയും,സുഖൈഡാനുംത് ടങ്ങിയ കലാപരമായ ഇടണ്ടപടല കളിൽ സന്നദ്ധത് ഒാക ന്ന .
		CO5	ആസവാദനകൾഷി രൈദ്ധിക്ക കയ ും കലാരൂപങ്ങള ൈമർ്ശ്ശാത്മകമായി ൈലയിര ത്ത കയ ും ണ്ടൈയ ന്ന

SEMESTER 4

COURSE CODE	COURSE NAME		COURSE OUTCOME
MM 1341–	ELEMENTARY NUMBER THEORY AND CALCULUS I	CO1	**Describe** concepts primes, divisibility, integrals and vector valued functions (**Remember**)
		CO2	**Identify** the way of congruence relation, double and triple integrals and vector fields and their graphical representation. (**Understand**)
		CO3	**Illustrate** linear congruences and existence of solutions, area using double integral and polar double integral, divergence and curl. (**Apply**)
		CO4	**Analyze** techniques of Pollard Rho factoring method, Chinese Remainder Theorem, Wilson's theorem, conversion between rectangular to polar integrals, Green's theorem and fundamental theorem of line integrals. (**Analyze**)
		CO5	**Explain** techniques of Pollard $p - 1$ factoring method, Jacobians in two variables, finding surface area of parametric surfaces, applications of the divergence theorem and Stoke's theorem. (**Apply**)
EN 1411.1	READINGS IN LITERATURE	CO1	**Identify** the style and literary devices

				employed in poetry. **(Remember)**
		CO2		**Develop** an appreciation of literary discourse. **(Apply)**
		CO3		**Analyze** literature as a cultural phenomenon.**(Analyze)**
		CO4		**Critique** the works prescribed for study. **(Evaluate)**
		CO5		**Develop** novel interpretations on literary texts using critical thinking. **(Create)**
ML 1411.1	**MALAYALAM, ASHAYAVINIMAYAM, SARGATHMAKARACHANA, BHASHAVABHODAM**	CO1		മലയാള ഭാഷയുടെ പ്രകയോഗരീത്തികണ്ടളക്കുറിച്ച് അറിച്ചിനൊ കനടന്ന (**Understand**)
		CO2		ഞത്തറ്റില്ലാത്ത രീത്തിയിൽ ഭാഷ പ്രകയോഗിക്കാൻ വനപ ണികനടന്ന (**Analyze**)
		CO3		ൈഐ ൈത്തന രനകൾ നടത്തി ൈഐലയിര ത്ത ന്ന (**Evaluate**)
		CO4		എഴ ്ത്ത കോര ണ്ടട സർഗജ്ജരീൈതഐത്ണ് ുത്ത ത്ഓരത്തമയാത്തമകമായി ൈഐലയിര ത്ത ന്ന (**Evaluate**)
		CO5		മലയാള ഭാഷയുടെ പ്രകയോഗരീത്തികണ്ടളക്കുറിച്ച് അറിച്ചിനൊ കനടന്ന (**Understand**)
HN1411.1	**HINDI KAVITA EVAM EKANKI**	CO1		**Recall** the works of the prescribed poets & one act playwrights. **(Remember)**
		CO2		**Discuss** about the difference between drama and one set play. **(Understand)**
		CO3		**Evaluate** the craft and relevance of subjects in the prescribed one-act plays. **(Analyze)**
		CO4		**Evaluate** the contribution of poets of Bhakthi period & of modern poets. **(Analyze)**
		CO5		**Develop** the creativity of students to prepare a poem. **(Create)**
ST1431.1	**STATISTICAL INFERENCE**	CO1		**Describe** basic concepts of estimation vectors. **(Understand)**

		CO2	**Explain** concepts of Testing of Hypothesis. (**Apply**)
		CO3	**Explain** Large sample tests (**Apply**)
		CO4	**Explain** small sample tests (**Apply**)
		CO5	**Explain** basic concepts of Design of Experiments (**Apply**)
PY1431.1	**MODERN PHYSICS & ELECTRONICS**	CO1	**Discuss** the basic features of atom model - Classical and Quantum mechanical approach (**Understand, Analyse**)
		CO2	**Discuss** the basic properties of nuclei, its radioactivity and its measurement (**Apply**)
		CO3	**Analyze** the fundamentals of Electronics in various electronic components – Diode and Zener diode (**Analyze**)
		CO4	**Explain** and analyse working of bipolar junction transistors and analyze transistor biasing circuits (**Apply**)
		CO5	**Analyze** various number systems, digital codes and their conversion also discuss different types of Gates - Simplifying the network by Boolean expression. (**Apply**)

SEMESTER 5

COURSE CODE	COURSE NAME	COURSE OUTCOME	
MM 1541	**REAL ANALYSIS I**	CO1	**Describe** the fundamental properties of Real Numbers that corroborate the formal development of Real Analysis. (**Understand**)
		CO2	**Establish** the theory of real sequences and series. (**Apply**)

		CO3	**Examine** the convergence or divergence of different sequences and series. (**Apply**)
		CO4	**Deduce** proofs of various theorems. (**Analyze**)
		CO5	**Analyze** the concepts related to the limit of functions. (**Analyze**)
MM 1542	**COMPLEX ANALYSIS I**	CO1	**Describe** the concept algebra of Complex Numbers, Point Representation of Complex Numbers, Vectors and Polar forms, The Complex Exponential, Powers and Roots, Planar Sets (**Understand**)
		CO2	**Discuss** the limits, continuity and differentiability of complex functions. (**Understanding**)
		CO3	**Examine** analytic functions and other elementary functions. (**Apply**)
		CO4	**Apply** contour integration, Cauchy's integral theorem and Cauchy's integral formula. (**Apply**)
		CO5	**Deduce** proofs of various theorems.(**Analyze**)
MM 1543	**ABSTRACT ALGEBRA**	CO1	**Describe** groups and related definitions. (**Understand**)
		CO2	**Apply** algebraic ways of thinking. (**Apply**)
		CO3	**Examine** abstractly about algebraic structures. (**Apply**)
		CO4	**Analyze** a given structure in detail. (**Analyze**)
		CO5	**Compare** algebraic structures. (**Evaluate**)
MM 1544	**DIFFERENTIAL EQUATION**	CO1	**Define** Direction field, Linear equations, Bernoulli equation, Exact equations, Orthogonal trajectories etc. (Remember & **Understandg**)
		CO2	**Analyze** and solve first order differential equations. (**Apply**)
		CO3	**Analyze** and solve Second order differential equations. (**Apply**)
		CO4	**State** existence and uniqueness of solutions of ODE. (**Remember**)
		CO5	**Apply** various application techniques of ODE. (**Apply**)
MM 1545	**MATHEMATICS SOFTWARE – LATEX & SAGEMATH**	CO1	**Develop** the basics of typesetting an article for a scientific publication. (**Apply**)

		CO2	**Compute** the basics of Vector Calculus, Basic Algebra and Matrix theory using SageMath (**Apply**)
		CO3	**Illustrate** different kind of graph plots using Sagemath (**Analyze**)
		CO4	**Explain** the typeset of mathematical expressions in a LATEX document.(**Apply**)
		CO5	**Test** the basics of making a slide-show presentation using Beamer.(**Evaluate**
MM 1551.3	**BASIC MATHEMATICS**	CO1	**Describe** the various number systems and learn the basic operations on these numbers. (**Understand**)
		CO2	**Apply** the use of ratio and proportion. (**Apply**)
		CO3	**Analyze** the basic statistical tools. (**Analyze**)
		CO4	**Apply** mathematical tools to formulate real life problems and thus solve them. (**Apply**)
		CO5	**Explain** the concepts and use of equations, formulae, mathematical expressions and relationships in a variety of contexts. (**Analyze**)

SEMESTER 6

COURSE CODE	COURSE NAME	COURSE OUTCOME	
MM 1641	**REAL ANALYSIS II**	CO1	**Apply** the concepts of continuity, differentiability and integrability. (**Apply**)
		CO2	**Generalize** the fundamental properties of continuous functions on intervals.(**Understand**)
		CO3	**Explain** the basic theory of derivatives. (**Apply**)
		CO4	**Classify** the theory underlying integration.(**Analyze**)
		CO5	**Test** the continuity and existence of Riemann Integrability (**Creating Level**)
MM 1642	**COMPLEX ANALYSIS II**	CO1	**Discuss** the concepts of Sequence and Series of complex functions and Conformal Mapping (**Understand**)
		CO2	**Apply** the concepts of Singular Points, Zeros of complex function, Cross-ratio, Linear Fractional Transformation and Residue Theory (**Apply**)

		CO3	**Analyze** Tayor's Series, Laurent Series and Taylor's theorem (**Analyze**)
		CO4	**Solve** problems using appropriate techniques.**(Apply)**
		CO5	**Establish** results and proofs of various theorems (**Apply**)
MM 1643	**ABSTRACT ALGEBRA – RING THEORY**	CO1	**Define** rings and related definitions. (**Understand**)
		CO2	**Establish** fundamental results and prove them. (**Apply**)
		CO3	**Solve** algebraic problems using appropriate techniques. (**Apply**)
		CO4	**Analyze** algebraic theories and focus insight into abstract algebra. (**Analyze**)
		CO5	**Develop** new structures based on given structures. (**Create**)
MM 1644	**LINEAR ALGEBRA**	CO1	**Describe** elementary concepts in vector space, subspace, linear transformation, eigenvalues and eigenvectors. (**Understand**)
		CO2	**Identify** the bases and dimension of a vector space. (Understand)
		CO3	**Develop** diagonalization of various types of matrices. (**Apply**)
		CO4	**Determine** inverse of a matrix using Gauss elimination method and solve the linear system of equations. (**Apply**)
		CO5	**Explain** the four fundamental subspaces of a vector space and evaluate them. (**Apply**)
MM 1645	**INTEGRAL TRANSFORMS**	CO1	**Categorize** and solve different integral equations using various techniques. (**Analyze**)
		CO2	**Apply** Laplace Transforms and inverse Laplace transforms to various industry related and applied problems. (**Apply**)
		CO3	**Analyze** the properties of certain functions using Fourier series. (**Analyze**)
		CO4	**Solve** differential equations using Laplace transforms method. (**Apply**)
		CO5	**Develop** the concepts of Laplace transformation and Fourier transformation with given boundary conditions which are helpful in all engineering and research work. (**Apply**)
MM 1661.1	**GRAPH THEORY**	CO1	**Discuss** the fundamental concepts of graph theory. (**Understand**)

		CO2	**Apply** the concepts and theorems that are treated in the course for problem-solving and proofs. (**Apply**)
		CO3	**Write** combinatorial proofs, including those using basic graph theory proof techniques such as minimal counterexamples, double counting, and Mathematical induction. (**Apply**)
		CO4	**Identify** various graphic concepts from the given figure. (**Analyze**)
		CO5	**Construct** a graph with the data given. (**Create**)