Department of Mathematics
S.B.M.S.College,Sualkuchi
B.Sc. Honours & Regular Courses

The department of Mathematics, S.B.M.S. College,Sualkuchi is affiliated to Gauhati University. The department follows the course curriculum framed and designed by Gauhati University.

The CBCS Course curriculum introduced by Gauhati University is divided into two parts : one is Honours Course and other is Regular course. The honours Course help the students to enrich their Knowledge on the subject and the regular course help the students to make integration with other various courses.

PROGRAMME OUTCOMES:

- Students will be able to communicate mathematics effectively by oral, written, computational and graphic means.
- Create mathematical ideas from basic axioms.
- Utilize mathematics to solve theoretical and applied problems by critical understanding, analysis and synthesis.
- Create a mathematical sense and overall understanding of the subject.
- Will become familiar with the different aspects of mathematics with its various interpretations and with the requirement of lifelong learning through continued education and research.

PROGRAMME SPECIFIC OUTCOMES:

- Students will be able to apply critical thinking skills to solve problems that can be modelled mathematically.
- Able to learn algebra, abstract algebra, linear algebra and vector.
- Understand calculus and differential equations.
- Able to learn real, numerical and complex Analysis.
- Able to learn Group Theory, Ring Theory , Number Theory and Analytical Geometry.
- Able to learn and apply the Computer Programming in C
- Able to plot Graphs, Numerical Programmes, Solution of PDE's by using software.
- Able to undertake project work.

COURSE OUTCOMES: (Honours Course)

Semester	Course Code	Course Name	Course outcome
I	MAT-HC-1016	**Calculus**	After Completion of this course the Students will be known about: ➢ Learn to differentiate & integrate functions and apply the knowledge in solving problems in business, economics and life sciences. ➢ Sketch curves in a plane using its mathematical properties in different coordinate system ➢ Learn the Calculus of Vector functions and its uses to develop the basic

			principles of planetary motion. ➢ Learn to find the area of surface of revolution and volume of solid by integrating over cross sectional area.
	MAT-HC-1026	Algebra	The course enable the students to learn: ➢ About Functions, Relation, Equivalent Classes and Cardinality of a set. ➢ About De Moiver's Theorem to solve numerical problems. ➢ About the solution sets of linear system of equations using Matrix method and Crammer's rule which have different applications in physics.
II	MAT-HC-2016	Real Analysis	➢ Students are introduced to the concept of Real Analysis ➢ Understand many properties of real line R, including Completeness and Archimedean properties. ➢ Learn to define sequences in terms of functions from N to a subset of R. ➢ Learn about bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior and the limit of a bounded sequence. ➢ Learn about the ratio, root, alternating series and limit Comparison tests for convergence and absolute convergence of an infinite series of real numbers.
	MAT-HC-2026	Differential Equations	➢ Learn basics of Differential Equations ➢ Formulate differential equations for various mathematical models. ➢ Solve differential equations and apply the study of exponential decay model, exponential growth of population, drug assimilation into blood.
III	MAT-HC-3016	Theory of Real Functions	➢ Learn about Continuity and Uniform Continuity of functions defined on intervals, purely on mathematical point of view. ➢ Learn extensively about the concept of differentiability using limits, particularly L-Hospital rule help to better handle for difficult differentiation. ➢ Know about applications of mean Mean Value Theorem and Taylor's theorem.
	MAT-HC-3026	Group Theory-I	➢ Link the fundamental concepts of groups and symmetrical figures ➢ Learn about the significance of the notion of Cosets, normal subgroups and factor groups ➢ Learn about Lagrange's Theorem, Fermat's Little theorem, Group

			Homomorphism and Group Isomorphism
	MAT-HC-3036	Analytical Geometry	➢ Learn about the study of basic geometric structures such as parabola, hyperbola, Conic and their 3_dimensional analogues.
IV	MAT-HC-4016	Multivariate Calculus	The course enable students to: ➢ Know about the extension of one dimensional calculus to two and higher dimensions(i.e. from one variable to multivariable discussion) ➢ Understand the maximization and minimization of multivariable functions subject to the given constraints ➢ Learn about inter-relationship amongst the line integral, double and triple integral formulations ➢ Familiarize with Green's, Stoke's, and Gauss Divergence Theorem and know about their applications to several problems in Complex Analysis and Partial Differential Equations.
	MAT-HC-4026	Numerical Methods	➢ Learn some numerical methods to find the zeros of nonlinear functions of a single variable and solution of a system of linear equations, up to a certain given level of precision ➢ Know about methods to solve system of linear equations, such as False Position Method, Fixed Point Iteration Method, Newton's Method, Secant Method and L U Decomposition method ➢ Know about the Interpolation techniques to compute the values for a tabulated function at points not in the table. ➢ Know about the applications of Numerical Differentiation and Integration to convert differential equations into difference equations for numerical solutions
	MAT-HC-4036	Ring Theory	On completion of this course students will be able to: ➢ Learn about the fundamental concepts of Rings, Integral Domains and Fields ➢ Know about ring homomorphism and Isomorphism theorems of ring ➢ Learn about the polynomial rings over Commutative rings, integral domains, Euclidean domains and Unique Factorization domain(UFD)
V	MAT-HC 5016	Complex Analysis	Completion of the Course will enable the students to: ➢ Learn the significance of differentiability of Complex functions leading to the understanding of Cauchy-Riemann

			equations ➢ Learn some elementary functions and basic concepts to evaluate the Contour integrals ➢ Learn Cauchy-Goursat theorem and Cauchy's Integral Formula and their applications ➢ Learn to expand some simple functions in Taylor and Laurent series, classify the nature of singularities and to find residues
	MAT-HC 5026	Linear Algebra	The course will enable students to: ➢ Learn about the concept of linear independence of vectors over afield, and the dimension of a vector space ➢ Basic concepts of linear transformations, dimension theorem, matrix representation of linear transformation and the change of coordinate matrix ➢ Compute the characteristic polynomial, eigenvalues, eigenvectors, and Eigen spaces as well as well as the geometric and algebraic multiplicities of an eigenvalue and apply the basic diagonalization result ➢ Compute inner product and determine orthogonality on vector spaces, including Gram-Schmidt orthogonalization to obtain orthogonal basis ➢ Determine the adjoint, normal, unitary and orthogonal operators.
	MAT-HE-5016	Number Theory	The course will enable students to: ➢ Learn some properties of prime numbers, and some of the open problems in number theory, Viz. Goldbach Conjecture, linear congruences, Fermat's Little theorem etc. ➢ Know about number theoretic functions and modular arithmetic ➢ Solve linear, quadratic and system of linear congruence equations.
	MAT-HE 5066	Programming in C	The course will enable students to: ➢ Understand and apply the programming concepts of C which is important to mathematical investigation and problem solving. ➢ Learn about structured dada-types in C and learn about applications in factorization of an integer ➢ Use of containers and templates in Various applications in algebra ➢ Rpresent the outputs of programs visually in terms of well formatted text and plots

VI	MAT-HC-6016	Riemann Integration and Metric Spaces	The course will enable students to: ➢ Learn about some of the classes and properties of Riemann integrable functions, and the applications of the fundamental theorems of integration ➢ Know about improper integrals, including beta and gamma functions ➢ Learn about various natural and abstract formulations of distance on the sets of usual or unusual entities. Become aware on such formulations leading to metric spaces ➢ Know about Banach Fixed Point theorem, whose far-reaching consequences have resulted into an independent branch of study in analysis, known as fixed point theory ➢ Learn about the two important topological properties, namely connectedness and compactness of metric spaces
	MAT-HC-6026	Partial Differential Equations	The course will enable students to: ➢ Formulate, Classify and transform first order PDE's into Canonical form ➢ Learn about method of characteristic and separation of variables to solve first order PDE's ➢ Classify and solve second order linear PDE's ➢ Learn about Cauchy problem for second order PDE and homogeneous as well as nonhomogeneous wave equations ➢ Apply the method of separation of variables for solving second order PDEs
	MAT-HE-6066	Group Theory-II	The course will enable students to: ➢ Learn about automorphism for constructing new groups from the given group ➢ Learn about the fact that external direct product applies to data security and electric circuits ➢ Understand Fundamental theorem of finite abelian group ➢ Be familiar with group actions and conjugacy in s_n ➢ Understand Sylow's theorem and their applications in checking non-simplicity.
	MAT-HE-6086	Project Work	This paper focuses in imparting practical knowledge to students in researches. Project work is given to students as a Special course involving application of knowledge in solving, analysing and exploring difficult problems.

Regular Course

Semester	Course Code	Course Name	Course Outcome
I	MAT-RC-1016	Calculus	The Course enable the students to: • Learn about graphs of functions such as polynomial, trigonometric, inverse trigonometric functions, Exponential functions, etc. • Learn about limit and continuity test for functions • Learn about differentiability • Learn about partial differentiation of functions
	MAT-RC-2016	Algebra	The Course enable the students to: • Learn about Theory of equations, expansion of functions and De Moivre's Theorem & it's applications • Learn about matrices, determinant and it's applications in solving system of equations • Learn about group, ring and algebra of vector spaces and their applications
	MAT-RC-3016	Differential Equations	The Course enable the students to: • Learn about basics of differential equations • Formulate differential equations • Learn various method for solving differential equations
	MAT-RC-4016	Real Analysis	The Course enable the students to: • Learn about bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit and uniform continuity of functions • Learn about ratio, root, alternating series and limit comparison tests for convergence and absolute convergent of an infinite series of real numbers
	MAT-RE-5016	Number Theory	The Course enable the students to: • Learn about properties of prime numbers • Learn about some of the open problems in number theory, viz. Goldbach conjecture etc. • Learn about the number theoretic functions and some properties of Euler's phi-function
	MAT-RE-5026	Discrete Mathematics	The Course enable the students to: • Learn about the notion of ordered sets and maps between ordered sets • Become familiar with Boolean algrbra, Boolean homomorphism, switching circuits and their applications
	MAT-RE-6016	Numerical Analysis	The Course enable the students to: • Learn some numerical methods to find the zeros of nonlinear functions of a single variable and solution of a system of linear equations • Learn about iterative and non-iterative

			methods to solve system of linear equations • Learn to find numerical differentiation of functional values

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