			COS of B.sc Mathematics Gujarat University	
Semester	Course	Name	Course Objective	Expected Outcome
1	EC 101	Mathematics Basics and Quantitative Skills	This course is designed to enable students to acquire basic understanding and recall the basic concept of Trigonometry, co-ordinate Geometry & vectors, limit & differentiation integration also their applications.	Students will be able to understand trigonometric functions, their limits. Also, student will be able to find differentiation and integration of some usual functions. Using derivative student will be able to find optimum values of functions. Also, student will be able to understand simple co-ordinate Geometry and vectors.
1	MAT101	Calculus and Matrix Algebra	This course is designed to learn basic concept of calculus, matrix algebra and its application	Students will learn Derivatives and Higher Derivative and will be able to find higher derivative of many functions and product of functions, students will be able to check convergence of series and sequences. Also, student will be able to use mean value theorems for many functions. In matrix algebra student will be able to understand nature of particular Matrix. Also, students will be able to solve system of linear equation using matrices.
1	MAT102	Practical (Based on MAT101)	This course is designed to enable students the application-based problem-solving using curve tracing, differentiation, mean value theorems, RRE form of matrices, and its applications.	Student will be able to convert and solve real problems in respective mathematical problem of solving system of linear equation, optimization using derivative etc…
2	MAT103	Differential Equations and Co-ordinate Geometry	This course is designed to learn basic concepts of differential equations of different types, solving various standard forms of differential equations, co-ordinate geometry especially sphere, cone and cylinders.	Student will be able to solve various differential equations using standard approaches, also student will acquire the knowledge of sphere, cone and cylinder in space.

2	MAT104	Practical (Based on MAT103)	This course is designed to understand practical problem solving based on differential equations, co-ordinate geometry, sphere, cone and cylinder, also it involves line integral, surface integral, and volume integral, various reduction formulas of trigonometric functions.	Students will be able to solve problems based on reduction formulas for integration, line, surface and volume integrals, also students will learn to solve geometrical problems on cone, cylinder and sphere.
3	MAT201	Advanced Calculus - I	This course is next step for calculus course done in previous semesters, it is designed to understand further concept of limit, continuity , differentiability, for functions with several variables it involves concepts of partial derivatives and their application too.	With this course student will be able to extend the idea of limit, continuity, differentiability, and integrability for function with more than one variables. And they will be able to solve problems based on that.
3	MAT202	Linear Algebra - I	This course is designed to understand one of the basic algebraic structure known as vector space, and to serve pure mathematical ideas regarding vector space, their basis, dimensions etc.. It will also involve linear transformations, and connection of linear transformation with matrices.	Students will be able to understand the basic idea of vector space and will observe this kind of abstract structures in real, students will be able to find dimension and basis of this vector space structures,
3	MAT203	Practical (Based on MAT201, MAT202 and Numerical Methods - I)	This course is designed to acquire knowledge of numerical methods as well as examples based on numerical solutions. Curve tracing and some problems based on advanced calculus -1 and linear algebra-1	Student will be able to distinguish different types or errors, finding missing terms from given values, also will come to learn concept of factorial polynomials, students will be able to interpolate and inverse interpolate values for given data, student will be able to learn methods for solving system of linear equations, and will be able to solve problems based on continuity, differentiation, integration, and problem based on vector space, and linear transformations etc.
4	MAT204	Advanced Calculus - II	This course is designed for introducing concept of multiple integrals , line, surface and volume integrals, also one will acquire	Student will be able to learn multiple integrals and will be able to calculate multiple integrals , line integral , volume integral, surface integrals.

			knowledge of beta, gamma functions and their applications , and it also involve partial differential equations.	Student will be able to solve problems based on beta, gamma functions, and problems based on partial differential equations.
4	MAT205	Abstract Algebra - I	This course is designed to understand another basic algebraic structure known group, and to serve pure mathematical ideas regarding groups, their generators etc.. It will also involve homomorphism and isomorphism of group. It also involve permutations groups, subgroups and lattice diagrams.	Student will be able to understand abstract mathematical structure of groups and subgroups. Student will able to solve problems based on lattice diagrams, permutations, and problem based on isomorphism and homomorphisms.
4	MAT206	Practical (Based on MAT204, MAT205 and Numerical Methods - II)	This course is designed to acquire knowledge of numerical methods as well as examples based on numerical solutions, it involves problems based on solving polynomial equation using different numerical method, it also involves numerical methods to solve IVP and find numerical differentiations, it also involves problems based on advanced calculus -II, and abstract algebra-I	Student will be able to solve problems based on finding roots of different equations using numerical methods, student will be able to solve ivps and numerical differentiations using numerical methods. Student will be able to solve problems based on advanced calculus-II and abstract algebra-I.
5	MAT301	Linear Algebra - II	This course is designed to enable students to acquire the knowledge and next level understanding of linear maps, dual spaces , annihilators, inner product spaces. It also involves core knowledge of determinants and eigen values and eigen vectors of various matrices.	Students will be able to solve problems based on linear maps , dual spaces, inner product spaces. Student will learn core knowledge of determinant function , eigen values and eigen vectors and quadratic forms.
5	MAT302	Analysis - I	This course is designed to enable students to acquire the pure knowledge of sets, functions, limits , continuity and differentiations. Also it involves sequences and properties of sequences and properties of functions.	Students will be able to solve problems based on algebraic properties of real numbers system, student will be able to solve problems on functions and continuity. Student will be able to solve problems on sequences and derivatives.

5	MAT303	Complex Variables and Fourier Series	This course is designed to introduce core knowledge of complex numbers , different forms of complex numbers, function, continuity and derivatives of functions on complex variables, it also introduce basic transformations, and Fourier series.	Student will be able to acquire knowledge of complex numbers and various properties of complex number systems like finding roots, and sequences and series. Student will be able to learn functions on complex variables their continuity and derivatives. Student will able to solve problems on Fourier series.
5	MAT304	Mathematical Programming	This course is designed to enable students to acquire knowledge on real world problems on linear programming problems, transportation problems and assignment problems.	Student will be able to sole various lpp using different methods. Student will be able to solve problems based on assignment problems and transportation problem.
5	MAT305E	Discrete Mathematics	The course aims to provide a compreh- ensive understanding of relation, lattices and Boolean algebra. Students will learn to analyze and apply these mathematical structures developing problem solving skills.	Graduates of this program will possess. a strong foundation in binary relations, lattices and Boolean algebra. Effective communication and critical thinking abilities prepare them for successful. careers, encouraging ongoing exploration of advanced mathematical topics in their professional pursuits.
5	MAT306	Practical - I (Based on MAT301, MAT302)	It involves problems Based on MAT301, MAT302	Student will be able to solve problems Based on MAT301, MAT302
5		Practical - II (Based on MAT303, MAT304)	It involves problems Based on MAT303, MAT304	Students will be able to solve problems Based on MAT303, MAT304
6	MAT307	Abstract Algebra - II	This course is designed to enable students to acquire core knowledge of two algebraic structures Rings and Fields and problems related to that.	Student will be able to understand the Ring structure and Field structure and will be able to solve problems based on that. Using polynomial rings student will be able to solve problems related with polynomials and reducibility of them.

6	MAT308	Analysis - II	This course is designed to enable students to acquire core knowledge of Riemann integral, limit sup and limit inf of sequences, various convergence, concepts on power series, and related problems	Student will be able to understand the process of integration they already doing in previous semester as core idea. And student will be able to verify integrability for any functions using definition. Student will be able to solve problems based on power series.
6	MAT309	Analysis - III	This course is designed to enable students to acquire core knowledge of topological structure on set, as metric spaces. Student will able to understand concept of functions, continuity and other properties of sets like connectedness, compactness, etc using pure basic concepts. Course also introduce uniform convergence of power series and application of it.	Student will be able to understand real structure as topological structure and will be able to solve problems related to metric space structure, continuity, compactness, connected ness, uniform convergence and their applications.
6	MAT310	Graph Theory	As graph theory is one of the emerging field of mathematics, this course is introduced to enable students to understand concept of graphs and their basic properties. This course also introduces different types of graphs and their applications.	Student will be able to understand new concept of graph other than cartesian co-ordinates graph of functions and will be able to distinguish between these concepts. Student will be able to convert some real world problems as graph theoretic problems and using techniques they will be able to solve the problems.
6	MAT311E	Operations Research	This course is designed to introduce applied mathematical theory like inventory theory, PERT & CPM, and Game Theory.	Students will be able to understand and convert inventory based real problem in to mathematical model and using different method will be able to solve it. Student will also be able to convert and solve real problems to PERT & CPM theory based problems and Game theory based problems.
6	MAT312	Practical - I (Based on MAT307, MAT308)	It involves problems Based on MAT307, MAT308	Student will be able to solve problems Based on MAT307, MAT308

6		Practical - II (Based on MAT309, MAT310)	It involves problems Based on MAT309, MAT310	Students will be able to solve problems Based on MAT309, MAT310