List of Mathematics Courses

Course No.	Course Title	Grade	School	Instructor	Textbook(s)
MATH F111	MATHEMATICS-I	B	BITS Goa	Dr. Alpesh Dhorajia	Thomas' Calculus; Weir, Hass, Giordano

A first course in multivariable calculus: It focused on functions of two and three variables and using calculus to analyze the geometry of curves and surfaces in three-dimensional space. Topics covered: parametric equations and polar co-ordinates, vectors in two- and three-dimensional Euclidean space, partial derivatives, vector calculus, multiple integrals, theorems of Green, Gauss and Stokes and introductory sequences and series. ***(Aug-Dec 2015)***

MATH F111	PROBABILITY & STATISTICS	B-	BITS Goa	Dr. Bijil Prakash	Intro to Probability & Statistics 'Principles and applications for engineering and the computing sciences'; Milton, Arnold

Introduction of probabilistic models and study of discrete and continuous distributions. Topics covered: Probability distribution, (Discrete: binomial, hypergeometric, geometric and Poisson. Continuous: uniform, exponential, normal, gamma, chi-squared) probability mass function, cumulative distribution function, moment generating function, expectation and variance for discrete and continuous distributions. Joint distributions, simulations, transformation of variables and finally relating probability theory with statistical inference. ***(Aug-Dec 2015)***

MATH F111	MATHEMATICS-II	A-	BITS Goa	Dr. Manoj Kumar Pandey	Elementary Linear Algebra; Hecker, Andrilli Complex Variables & Applications; Brown, Churchill

Introduction to Linear Algebra and Complex variables. Topics covered: Solution of linear systems by Gauss elimination and Gauss-Jordan, vector spaces, eigenvalues and diagonalization, linear transformations, matrix of linear transformation, orthogonality. Limit, continuity and derivative of functions of complex variables, Cauchy-Reimann eq., analytic functions, contour integrals, Cauchy-Goursat theorem, residues and poles, evaluation of improper real integrals, Laurent series. ***(Jan-May 2016)***

Course No.	Course Title	Grade	School	Instructor	Textbook(s)
MATH F111	MATHEMATICS-III	B-	BITS Goa	Dr. Manoj Kumar Pandey	Differential Eq. with App. & Hist. Notes, G.F Simmons

Introduction of analytic solutions and classical methods to solve boundary value problems. Topics covered: Solution of first and second order differential equations, reduction of order, systems of equations, power series to find solution of second order equations (series, hypergeometric, Legendre, Bessel), Laplace and Fourier transforms, one dimensional wave and heat equations. ***(Aug-Dec 2016)***

MATH F111	Complex Analysis	A-	BITS Goa	Dr. Prasanna Kumar N.	Complex Analysis; L.V. Ahlfors

Topics covered: analytic functions, theory of power series, conformality, linear and bilinear transforms, complex integration, Cauchy's theorem, calculus of residues, theory of location of zeros and critical points of complex polynomials. ***(Jan-May 2017)***

MATH F111	Number Theory	B	BITS Goa	Dr. Himadri Mukherjee	Elementary Number Theory with Applications; T. Koshy

Topics covered: Peano axioms, induction, division algorithm, GCD, Euclidean algorithm, primes, congruences, Fermat's theorem, Wilson's theorem, Chinese remainder theorem, number theoretic functions, quadratic residues and quadratic reciprocity, sums of squares, Fibonacci numbers and continued fractions. ***(Jan-May 2017)***

MATH F111	Introduction to TOPLOGY	A-	BITS Goa	Dr. Prasanna Kumar N.	Topology; J. Munkres

Point set topology. Topics covered: Topological spaces, subspaces, limit points, closed sets, continuity, homeomorphism, product topology, metric topology, connectedness, compactness, countability and separation axioms, normal spaces. ***(Aug-Dec 2017)***

MATH F111	Optimization	B	BITS Goa	Dr. Manoj Kumar Pandey	Operations Research: An Introduction; Taha

Topics Covered: Developing and solving of linear programing models, simplex method, generalized simplex in matrix form, duality, dual simplex method, post optimal analysis, transportation algorithm, assignment model, branch and bound method, goal programming, unconstrained problems, Karush-Kuhn-Tucker conditions, quadratic programming, penalty function, Fibonacci method. ***(Aug-Dec 2017)***

Course No.	Course Title	Grade	School	Instructor	Textbook(s)
MATH F111	Mathematical Methods	B	BITS Goa	Dr. Manoj Kumar Pandey	1. Adv Topics in App. Math for Engineering & the Physical Science; Nair 2. Methods of App Math; Hildebrand

Fourier Analysis, Calculus of Variation and Integral equation. Topics covered: Fourier series, Fourier transform, Fourier integral theorem, cosine and sine transforms, solving of boundary value problems and partial differential equations using Fourier. Natural boundary conditions, variational notation, variable end points, Sturm Liouville problem, Rayleigh-Ritz method. Classification of integral equations, Green's function, separable kernels, iterative methods, Neumann series, approximation of undetermined coefficients, method of collocation, weights and approximation of kernel. ***(Jan-May 2018)***

MATH F111	Algebra-I	Enrolled	BITS Goa	Dr. Prabal Paul	Topics in Algebra; Herstein

Groups, Rings and Fields. Topics covered: subgroups, counting principles, normal and quotient groups, homomorphisms, automorphisms, Caley's theorem, permutation groups, Sylow's theorem, direct products, classification of finite groups, direct product. Polynomial rings, matrix rings, group rings, homomorphism, quotient rings, ideals, Euclidean rings, unique factorization domain. ***(Aug-Dec 2018)***

MATH F111	Elementary Real Analysis	Enrolled	BITS Goa	Dr. J. K. Sahoo	Principles of Mathematical Analysis; W. Rudin

Topics covered: Ordered sets, fields, least upper bound and greatest lower bound, basic topology, metric spaces, compact and connected sets, Cantor set, numerical sequences and series, continuous and uniformly continuous functions, elementary Riemann integral, point and uniform convergence of functions, differentiability, functions of several variables and inverse function theorem. ***(Aug-Dec 2018)***

MATH F111	Study Project	A	BITS Goa	Dr. Prasanna Kumar N.	-

Project courses are designed to provide students with an opportunity to get involved in research under the supervision of an instructor. In this course, I worked an Approach to prove the Sendov conjecture. Reading material involved "Geometry of Polynomials" by M. Marden and "Topics in Polynomials: Extremal problems, Inequalities, Zeros" by Milovanovic, Mitrinovic, Rassias. ***(Aug-Dec 2017)***

Course No.	Course Title	Grade	School	Instructor	Textbook(s)
MATH F111	Design Project-1	A	BITS Goa	Dr. Prasanna Kumar N.	-

Studied a series of papers by Dalal and others on Bounds of Regions containing all the zeros of a complex polynomial and published new such bounds based on number sequences that provided better bounds for some polynomials. ***(Jan-May 2018)***

MATH F111	Design Project-2	Enrolled	BITS Goa	Dr. Prasanna Kumar N.	-

Studying improvements of Cauchy's bound for region containing all the zeros of a complex polynomial in the direction given by V.K. Jain's paper. Working on using grouping of cubic factors of polynomials to arrive at a similar but better result. ***(Aug-Dec 2018)***

Grading Scale is as follows:

Letter Grade	*A*	*A-*	*B*	*B-*	*C*	*C-*	*D*	*E*
Qualitative Meaning	*Excellent*	*Very Good*	*Good*	*Above Average*	*Average/ Fair*	*Below Average*	*Poor*	*Exposed*
Grade Point	*10*	*9*	*8*	*7*	*6*	*5*	*4*	*2*