

## Academic Planner

### A. Teaching Plan

Teacher's Name: Stanzin Dorjai

Department: MATHEMATICS

Year: 2020-2021 (Odd Semester)

Course: B.Sc. (Hons.) Mathematics

Sl. No.	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1		Calculus and Geometry	Core	The first derivative test for relative extrema, Concavity and inflection points, Second derivative test for relative extrema, Curve sketching using first and second derivative tests.	01/04/2021	17/04/2021
2		Calculus and Geometry	Core	Limits to infinity and infinite limits, Graphs with asymptotes, Vertical tangents and cusps, L'Hôpital's rule.	19/04/2021	03/05/2021
3		Calculus and Geometry	Core	Parametric representation of curves and tracing of parametric curves (except lines in $\mathbb{R}$ ), Polar coordinates and the relationship between Cartesian and polar	17/05/2021	25/05/2021

				coordinates. Tracing of curves in polar coordinates.		
4		Calculus and Geometry	Core	Volumes by slicing disks and method of washers. Volumes by cylindrical shells, Arc length, Arc length of parametric curves.	26/05/2021	05/06/2021
5		Calculus and Geometry	Core	Reduction formulae, and to obtain the iterative formulae for the integrals of the form:	7/06/2021	19/06/2021
6		Calculus and Geometry		Techniques of sketching conics: parabola, ellipse and hyperbola..	20/06/2021	30/06/2021
7		Calculus and Geometry	Core	Reflection properties of conics, Rotation of axes, second degree equations and their classification into conics using the discriminant.	01/07/2021	17/07/2021
8		Calculus and Geometry	Core	Vector-valued functions, Differentiation of vector-valued functions, gradients, divergence, curl and their geometrical interpretation.	19/07/2021	24/07/2021
9		Calculus and Geometry	Core	Spheres, Cylindrical surfaces. Illustrations of graphing standard quadric surfaces like cone, ellipsoid.	26/07/2021	02/08/2021

Sl. No.	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32371208	Probability theory and Statistics	DSE	Sample space, probability axioms, real random variables (discrete and continuous	02/01/2021	09/01/2021
2	32371208	Probability theory and Statistics	DSE	cumulative distribution function, probability mass/density functions, mathematical expectation, moments, moment generating function, characteristic function	11/01/2021	30/01/2021
3	32371208	Probability theory and Statistics	DSE	discrete distributions: uniform, binomial, Poisson, geometric, negative binomial, continuous distributions: uniform, normal, exponential	01/02/2021	19/02/2021
4	32371208	Probability theory and Statistics	DSE	Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions,	22/02/2021	28/02/2021
5	32371208	Probability theory and Statistics	DSE	expectation of function of two random variables, conditional expectations, independent random variables, bivariate normal distribution,	01/03/2021	13/03/2021
6	32371208	Probability theory and Statistics	DSE	correlation coefficient, joint moment generating function (jmgf) and calculation of covariance (from jmgf), linear regression for two variables	15/03/2021	23/03/2021

7	32371208	Probability theory and Statistics	DSE	Chebyshev's inequality, statement and interpretation of (weak) law of large numbers and strong law of large numbers	01/04/2021	07/04/2021
8	32371208	Probability theory and Statistics	DSE	Central Limit theorem for independent and identically distributed random variables with finite variance,	08/04/2021	17/04/2021
9	32371208	Probability theory and Statistics	DSE	Markov Chains, Chapman-Kolmogorov equations, classification of states.	19/04/2021	29/04/2021
Sl. No.	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32351601	Complex Analysis (practical)		<p>1. Declaring a complex number and graphical representation. e.g <math>Z_1 = 3 + 4i</math>, <math>Z_2 = 4 - 7i</math></p> <p>2. Program to discuss the algebra of complex numbers. e.g., if <math>Z_1 = 3 + 4i</math>, <math>Z_2 = 4 - 7i</math>, then find <math>Z_1 + Z_2</math>, <math>Z_1 - Z_2</math>, <math>Z_1 * Z_2</math>, and <math>Z_1 / Z_2</math></p>	11/01/2021	30/01/2021
2	32351601	Complex Analysis (practical)		<p>3. To find conjugate, modulus and phase angle of an array of complex numbers. e.g., <math>Z = [ 2+ 3i \ 4-2i \ 6+11i \ 2-5i]</math></p> <p>4. To compute the integral over a straight-line path between the two specified end points. e. g., , where C</p>	01/02/2021	19/02/2021

				is the straight line path from $-1 + i$ to $2 - i$ .		
3	32351601	Complex Analysis (practical)		5. To perform contour integration. e.g., (i), where C is the Contour given by $x = y^2 + 1$ ; . (ii) , where C is the contour given by , which can be parameterized by $x = \cos (t)$ , $y = \sin (t)$	22/02/2021	28/02/2021
4	32351601	Complex Analysis (practical)		6. To plot the complex functions and analyze the graph . e.g., (i) $f(z) = Z$ (ii) $f(z)=Z^3$ (iii) $f(z) = (Z^4-1)^{1/4}$ etc.	01/03/2021	13/03/2021
5	32351601	Complex Analysis (practical)		7. To perform the Taylor series expansion of a given function $f(z)$ around a given point $z$ . The number of terms that should be used in the Taylor series expansion is given for each function. Hence plot the magnitude of the function and magnitude of its Taylors series expansion. e.g., (i) $f(z) = \exp(z)$ around $z = 0$ , $n = 40$ . (ii) $f(z)=\exp(z^2)$ around $z = 0$ , $n = 160$ .	15/03/2021	23/03/2021
6	32351601	Complex Analysis (practical)		8. To determines how many terms should be used in the Taylor series	01/04/2021	07/04/2021

				<p>expansion of a given function <math>f(z)</math> around <math>z = 0</math> for a specific value of <math>z</math> to get a percentage error of less than 5 %.</p> <p>e.g., For <math>f(z) = \exp(z)</math> around <math>z = 0</math>, execute and determine the number of necessary terms to get a percentage error of less than 5 % for the following values of <math>z</math>:</p> <p>(i) <math>z = 30 + 30i</math></p>		
7	32351601	Complex Analysis (practical)		<p>9. To perform Laurents series expansion of a given function <math>f(z)</math> around a given point <math>z</math>.</p> <p>e.g., (i) <math>f(z) = (\sin z - 1)/z^4</math> around <math>z = 0</math></p> <p>(ii) <math>f(z) = \cot(z)/z^4</math> around <math>z = 0</math>.</p>	08/04/2021	17/04/2021
8	32351601	Complex Analysis (practical)		<p>10. To compute the poles and corresponding residues of complex functions.</p> <p>e.g.,</p> <p>11. To perform Conformal Mapping and Bilinear Transformations.</p>	19/04/2021	29/04/2021

#### A. Outstation Field visits for students

Project Name / Paper Name	N.A.		
Destination	N.A.	Travel Mode	N.A.
Departure Month	N.A.	Return	N.A.

Faculty-in-Charge	N.A.	Number of Students going	N.A.
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**B. Internal Assessment: House Exam (Test/Presentation etc.) & Assignment\***

Course Code	Course Name	Unique Paper Code	Topic Name	Day and Date	Date/s of Exhibiting the Assessment Sheet to students, Discussing the marks, Returning/Retaining
<b>2020 – 2021 (Odd Sem.)</b>					
563	B.Sc. (Hons.) Mathematics (DSE)	32371208	Probability theory and statistics	20/04/2021	26/04/2021
582	B.Sc. (Prog.) Physical Science (II sem)		Calculus and Geometry	26/07/2021	29/07/2021
563	B.Sc. (Hons.) Mathematics (VI sem)	32351601	Complex analysis practical	22/04/2021	27/04/2021

\*Marks of the Internal Assessment to be submitted to the College 15 days before the last working day of every semester

**C. Organization of Department/College Society Meetings by Staff Advisor/Convener**

Department/Society	Meeting Date	Purpose
<b>2020 - 2021</b>		


**D. College Functions**

<b>College Function</b>	<b>Function Date</b>	<b>Role to be played</b>
NA	NA	NA



## Academic Planner

### B. Teaching Plan

Teacher's Name: **Stanzin Dorjai**

Department: **MATHEMATICS**

Year: **2020-2021 (Odd Semester)**

Course: **B.Sc. (Hons.) Mathematics**

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32357504	Calculus	Ge-1	The first derivative test, Concavity and inflection points, Second derivative test, Curve sketching using first and second derivative test.	27/11/2020	4/12/2020
2	32357504	Calculus	Ge-1	Limits at infinity, Horizontal asymptotes, Vertical asymptotes, Graphs with asymptotes; L'Hôpital's rule.	6/12/2020	11/12/2020
3	32357504	Calculus	Core	Volumes by slicing, Volumes of solids of revolution by the disk method, Volumes of	13/12/2020	1/01/2021

				solids of revolution by the washer method, Volume by cylindrical shells.		
4	32355101	Calculus	Core	Length of plane curves, Arc length of parametric curves, Area of surface of revolution.	3/01/2021	08/01/2021
5	32355101	Calculus	Core	Techniques of sketching conics, Reflection properties of conics.	10/01/2021	15/01/2021
6	32355101	Calculus	Core	Polar coordinates, Graphing in polar coordinates.	17/01/2021	22/01/2021
7	32355101	Calculus	Core	Vector-valued functions: Limit, continuity, Derivatives, Integrals, Arc length, Unit tangent vector, Curvature, Unit normal vector.	24/01/2021	5/02/2021
8	32355101	Calculus	Core	Functions of several variables: Graphs, Level curves, Limits and continuity, Partial derivatives and differentiability.	7/02/2021	12/02/2021
9	32355101	Calculus	Core	Functions of several variables: The chain rule, Directional derivatives and gradient vectors.	14/02/2021	19/02/2021
10	32355101	Calculus	Core	Functions of several variables: Tangent plane and normal line, Extreme values and saddle points.	21/02/2021	05/03/2021

Sl. No	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32357502	Mathematical Modelling and Graph theory	DSE	Power series solution of a differential equation about an ordinary point, Solution about a regular singular point	10/08/2020	21/08/2020
2	32357502	Mathematical Modelling and Graph theory	DSE	The method of Frobenius, Legendre's and Bessel's equations.	23/08/2020	28/08/2020
3	32357502	Mathematical Modelling and Graph theory	DSE	Laplace transform and inverse transform, Application to initial value problem up to second order.	30/08/2020	11/09/2020
4	32357502	Mathematical Modelling and Graph theory	DSE	Monte Carlo simulation modeling: Simulating deterministic behavior (area under a curve, volume under a surface) Generating random numbers: Middle square method, Linear congruence;	13/09/2020	25/09/2020
5	32357502	Mathematical Modelling and Graph theory	DSE	Queuing models: Harbor system, Morning rush hour;	27/09/2020	01/10/2020
6	32357502	Mathematical Modelling and Graph theory	DSE	Overview of optimization modeling; Linear programming model: Geometric solution, Algebraic solution, Simplex method, Sensitivity analysis.	02/10/2020	17/10/2020
7	32357502	Mathematical Modelling and Graph theory	DSE	Graphs, Diagraphs, Networks and subgraphs, Vertex degree, Paths and cycles, Regular and bipartite graphs,	19/10/2020	31/10/2020
8	32357502	Mathematical Modelling and Graph theory	DSE	Four cube problem, Social networks, Exploring and traveling, Eulerian and Hamiltonian graphs,	2/11/2020	13/11/2020

9	32357502	<b>Mathematical Modelling and Graph theory</b>	DSE	<b>Applications to dominoes, Diagram tracing puzzles, Knight's tour problem, Gray codes</b>	16/11/2020	27/11/2020
<b>Sl. No</b>	UPC	Paper Name	Core/AECC/GE/SEC	Topic/Unit	Start Date	End Date
1	32357502	<b>Mathematical Modelling and Graph theory (Practical)</b>	DSE	<b>Plotting of Legendre polynomial for <math>n = 1</math> to 5 in the interval <math>[0,1]</math>. Verifying graphically that all the roots of <math>P_n(x)</math> lie in the interval <math>[0,1]</math>.</b>	10/08/2020	21/08/2020
2	32357502	<b>Mathematical Modelling and Graph theory (Practical)</b>	DSE	<b>Automatic computation of coefficients in the series solution near ordinary points</b>	23/08/2020	28/08/2020
3	32357502	<b>Mathematical Modelling and Graph theory (Practical)</b>	DSE	<b>Plotting of the Bessel's function of first kind of order 0 to 3.</b>	30/08/2020	11/09/2020
4	32357502	<b>Mathematical Modelling and Graph theory (Practical)</b>	DSE	<b>Automating the Frobenius Series Method</b>	13/09/2020	25/09/2020
5	32357502	<b>Mathematical Modelling and Graph theory (Practical)</b>	DSE	<b>Programming of either one of the queuing model (a) Single server queue (e.g. Harbor system) (b) Multiple server queue (e.g. Rush hour)</b>	27/09/2020	01/10/2020

6	32357502	<b>Mathematical Modelling and Graph theory (Practical)</b>	DSE	<b>Programming of the Simplex method for 2/3 variables</b>	02/10/2020	17/10/2020
7	32357502	<b>Mathematical Modelling and Graph theory (Practical)</b>	DSE	<b>Automatic computation of coefficients in the series solution near ordinary points</b>	19/10/2020	31/10/2020

#### E. Outstation Field visits for students

<b>Project Name / Paper Name</b>	N.A.				
<b>Destination</b>	N.A.	<b>Travel Mode</b>	N.A.		
<b>Departure Month</b>	N.A.	<b>Return</b>	N.A.		
<b>Faculty-in-Charge</b>	N.A.	<b>Number of Students going</b>	N.A.		

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<b>2020 – 2021 (Odd Sem.)</b>					
563	B.Sc. (Hons.) Mathematics (DSE)	32357502	Mathematical Modelling and graph theory	09/11/2020	12/11/2020
582	B.Sc. (Hons.) GE-1 (I sem)	32355101	Calculus	22/02/2021	25/02/2021
563	B.Sc. (Hons.) Mathematics (DSE)	32357502	Mathematical Modelling and graph theory	10/11/2020	13/11/2020

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**G. Organization of Department/College Society Meetings by Staff Advisor/Convener**

Department/Society	Meeting Date	Purpose
<b>2020 - 2021</b>		

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**H. College Functions**

<b>College Function</b>	<b>Function Date</b>	<b>Role to be played</b>
NA	NA	NA