

FOUR-YEAR UNDERGRADUATE
PROGRAM

under

THE NEW CURRICULUM AND CREDIT FRAMEWORK, 2022

NEW SYLLABUS

for

STATISTICS

(w.e.f. the academic session 2024-2025)



UNIVERSITY OF NORTH BENGAL

Raja Rammohunpur, P.O. - NBU Campus

District - Darjeeling, Pin - 734013,

West Bengal, India

STATISTICS MINOR

(for Single Major and Single Minor Course)

Semester	Paper Code	Paper Level	Paper	Paper Description	Paper Type	Full Marks	Credit	
							L	T/P
1 st	STATMIN 101	100	MIN – 1	Descriptive Statistics - I	TH +PNLB	80	3	1
2 nd	STATMIN 202	100	MIN – 2	Probability and Probability Distribution – I	TH+PNLB	80	3	1
3 rd	STATMIN 303	200	MIN – 3	Descriptive Statistics - II	TH+PNLB	80	3	1
4 th	STATMIN 404	200	MIN – 4	Probability and Probability Distribution – II	TH+PNLB	80	3	1

STATISTICS DSC

(for Three Discipline Specific Multidisciplinary Course)

Semester	Paper Code	Paper Level	Paper	Paper Description	Paper Type	Full Marks	Credit	
							L	T/P
1 st	STATDSC 101	100	DSC – 1	Descriptive Statistics - I	TH +PNLB	80	3	1
2 nd	STATDSC 202	100	DSC – 2	Probability and Probability Distribution – I	TH+PNLB	80	3	1
3 rd	STATDSC 303	200	DSC – 3	Descriptive Statistics - II	TH+PNLB	80	3	1
4 th	STATDSC 404	200	DSC – 4	Probability and Probability Distribution – II	TH+PNLB	80	3	1

Semester-1									
Paper Description	Descriptive Statistics-I		Paper Code				STATMIN 101 / STATDSC 101		
Paper (Type)	Minor / DSC Course (Theory + Practical Non-Lab Based)		Credit				Marks		
Paper Level	Class Hours	Sem. End Exam.	L	T	P	Total	TH	PRC	Total
100	4 Hours/week	2 Hr. 30 Min	3	--	1	4	60	20	80

Descriptive Statistics-I (Theory)		3 credits
Unit 1		5L
<p>Introduction: Definition and scope. Nature of Statistics, Uses of Statistics, and Statistics in relation to other discipline</p>		
Unit 2		10L
<p>Types of Data: Primary and secondary data. Concepts of population and sample, quantitative and qualitative data, cross-sectional and time-series data, discrete and continuous data.</p> <p>Scales of measurement: Nominal, ordinal, interval, and ratio.</p>		
Unit 3		10L
<p>Presentation of data: Tabular and graphical. Frequency distributions, cumulative frequency distributions and their graphical representations. Frequency polygon, Histogram, Pie chart, Ogive, Bar plot, etc</p>		
Unit 4		20L
<p>Concept of univariate data</p> <p>Measures of Central Tendency: Mean, Weighted mean, Median, Mode, Geometric and harmonic means, Properties, merits and limitations, relation between these measures.</p> <p>Measures of Dispersion: Range, Mean deviation, Variance, Standard deviation, Coefficient of variation, Gini's Coefficient and Lorenz Curve.</p>		
Suggested Readings		
1.	Goon, Gupta and Dasgupta: Fundamentals of Statistics, World Press	
2.	Gupta & Kapoor: Fundamentals of Mathematical Statistics, S Chand	
4.	Kendal and Stuart: Advanced Theory of Statistics, PHI	
5.	Gupta S C: Fundamentals of Statistics, Himalaya Publishing House	
6.	Spiegel & Stephens, Statistics, Mc Graw Hill International	
7.	Kapoor J N & Saxena H C: Mathematical Statistics, S Chand	
8.	Vijay K. Rohatgi and A.K. Md. Ehsanes Saleh : An Introduction to Probability and Statistics	

Descriptive Statistics – I Practical

**1 Credit
15L**

List of Practical:

1. Diagrammatic representation of data.
2. Problems based on construction of frequency distributions, cumulative frequency distributions and their graphical representations.
3. Problems based on Frequency polygon, Histogram, Pie chart, Ogive, Bar plot.
4. Problems based on measures of central tendency.
5. Problems based on measures of dispersion.
6. Problems based on combined mean and variance and coefficient of variation.

Semester-2									
Paper Description	Probability and Probability Distribution-I			Paper Code			STATMIN 202 / STATDSC 202		
Paper (Type)	Minor / DSC Course (Theory + Practical Non-Lab Based)			Credit			Marks		
Paper Level	Class Hours	Sem. End Exam.	L	T	P	Total	TH	PRC	Total
100	4 Hours/week	2 Hr. 30 Min	3	--	1	4	60	20	80

Probability and Probability Distributions-I		3 credits
Unit 1		10L
<p>Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical, and axiomatic.</p> <p>Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes’ theorem, and its applications.</p>		
Unit 2		10L
<p>Random variables: Discrete random variables, p.m.f. and c.d.f., statement of properties of c.d.f, illustrations and properties of random variables.</p> <p>Continuous random variables, p.d.f and c.d.f., illustrations and properties, univariate transformations with illustrations.</p>		
Unit 3		10L
<p>Mathematical Expectation: One Dimensional random variable and their properties. Probability generating function. Moments. Moment generating function.</p>		
Unit 4		10L
<p>Standard discrete probability distributions: Uniform, Binomial, Poisson and Hyper-Geometric.</p>		
Suggested Readings		
1.	Goon, Gupta and Dasgupta: Fundamentals of Statistics, World Press	
2.	Gupta & Kapoor: Fundamentals of Mathematical Statistics, S Chand	
4.	Kendal and Stuart: Advanced Theory of Statistics, PHI	
5.	Gupta S C: Fundamentals of Statistics, Himalaya Publishing House	
6.	Spiegel & Stephens, Statistics, Mc Graw Hill International	
7.	Kapoor J N & Saxena H C: Mathematical Statistics, S Chand	
8.	Vijay K. Rohatgi and A.K. Md. Ehsanes Saleh : An Introduction to Probability and Statistics	

Probability and Probability Distributions-I Practical	1 Credit 15L
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List of the Practical:

1. Application problems based on Classical Definition of Probability.
2. Application problems based on Bayes' Theorem.
3. Fitting of Binomial distributions for n and $p = q = \frac{1}{2}$.
4. Fitting of Binomial distributions for given n and p .
5. Fitting of Binomial distributions after computing mean and variance.
6. Fitting of Poisson distributions for given value of mean.
7. Fitting of Poisson distributions after computing mean.
8. Fitting of suitable distribution.
9. Application problems based on Binomial distribution.
10. Application problems based on Poisson distribution.

Semester-3									
Paper Description	Descriptive Statistics-II		Paper Code				STATMIN 303 / STATDSC 303		
Paper (Type)	Minor / DSC Course (Theory + Practical Non-Lab Based)		Credit				Marks		
Paper Level	Class Hours	Sem. End Exam.	L	T	P	Total	TH	PRC	Total
100	4 Hours/week	2 Hr. 30 Min	3	--	1	4	60	20	80

Descriptive Statistics - II		3 credits
Unit 1		10L
Moments: Moments, Skewness and Kurtosis.		
Unit 2		15L
Bivariate data – Scatter diagram, correlation coefficient and its properties, Correlation ratio, Correlation Index, Intra class correlation, Concept of Regression, Principles of least squares, Fitting of polynomial and exponential curves. Rank correlation – Spearman’s and Kendall’s measures.		
Unit 3		15L
Analysis of Categorical Data: Consistency of data, independence and association of attributes, measures of association – Pearson’s and Yule’s measures, Goodman-Kruskal’s γ . Odds Ratio. Fitting of logit model through least squares		
Suggested Readings		
1.	Goon, Gupta and Dasgupta:	Fundamentals of Statistics, World Press
2.	Gupta & Kapoor:	Fundamentals of Mathematical Statistics, S Chand
4.	Kendal and Stuart:	Advanced Theory of Statistics, PHI
5.	Gupta S C:	Fundamentals of Statistics, Himalaya Publishing House
6.	Spiegel & Stephens,	Statistics, Mc Graw Hill International
7.	Kapoor J N & Saxena H C:	Mathematical Statistics, S Chand
8.	Vijay K. Rohatgi and A.K. Md. Ehsanes Saleh	An Introduction to Probability and Statistics

Descriptive Statistics – II Practical

**1 Credit
15L**

List of Practical:

1. Problem based on correlation Co-efficient from bivariate data
2. Problems based on rank correlation co-efficient from qualitative data
3. Problems based on fitting of regression lines by least square method
4. Problems based on lines of regression, angle between lines and estimated values of variables.
5. Problems based on categorical data

Semester-4									
Paper Description	Probability and Probability Distribution-II		Paper Code				STATMIN 404 / STATDSC 404		
Paper (Type)	Minor / DSC Course (Theory + Practical Non-Lab Based)		Credit				Marks		
Paper Level	Class Hours	Sem. End Exam.	L	T	P	Total	TH	PRC	Total
100	4 Hours/week	2 Hr. 30 Min	3	--	1	4	60	20	80

Probability and Probability Distributions-II		3 credits
Unit 1		10L
<p>Continuous random variables, p.d.f. and c.d.f., illustrations and properties, univariate transformations with illustrations. Two dimensional random variables: continuous type, joint, marginal and conditional, p.d.f., and c.d.f.. Independence of two variables.</p>		
Unit 2		15L
<p>Probability Convergence: Markov & Chebyshev. Weal Law of Large Number Standard continuous probability distributions: uniform, normal and exponential with their properties and limiting/approximation cases</p>		
Unit 3		15L
<p>Two dimensional random variables: discrete type, joint, marginal and conditional p.m.f and c.d.f., statement of properties of c.d.f, independence of variables, trinomial distribution. Bivariate Normal Distribution (BVN): p.d.f. of BVN, properties of BVN, marginal and conditional p.d.f. of BVN.</p>		
Suggested Readings		
1.	Goon, Gupta and Dasgupta: Fundamentals of Statistics, World Press	
2.	Gupta & Kapoor: Fundamentals of Mathematical Statistics, S Chand	
4.	Kendal and Stuart: Advanced Theory of Statistics, PHI	
5.	Gupta S C: Fundamentals of Statistics, Himalaya Publishing House	
6.	Spiegel & Stephens, Statistics, Mc Graw Hill International	
7.	Kapoor J N & Saxena H C: Mathematical Statistics, S Chand	
8.	Vijay K. Rohatgi and A.K. Md. Ehsanes Saleh : An Introduction to Probability and Statistics	

Probability and Probability Distributions-II Practical	1 Credit 15L
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List of the Practical:

1. Fitting of suitable distribution.
2. Problems based on area property of normal distribution.
3. To find the ordinate for a given area for normal distribution
4. Application based problems using normal distribution.
5. Fitting of normal distribution when parameters are given.
6. Fitting of normal distributions when parameters are not given.