

Annexure III

Annexure II

Annexure I

Department of Statistics
H.N.B. Garhwal University, Srinagar Garhwal
(Uttarakhand) (A Central University)



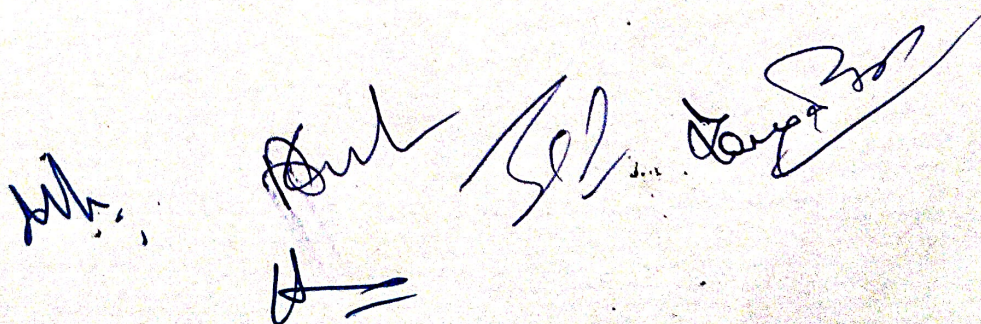
Syllabus for UG (Statistics)
Framework Program of B.Sc/B.A. 1st Years
(First And Second Semester)

(National Education Policy-2020)

Academic Session 2025-26
&
Onwards

Course Category	Semester-I				Semester-II			
	Subject/Title	No. of paper	Credits		Subject/Title	No. of paper	Credits	
			T	P			T	P
Discipline-Specific Core	DSC Subject-I (Major)- Basic Descriptive Statistics and Probability Theory	1	2	2	DSC Subject-I Advance Descriptive Statistics and Probability Distributions	1	2	2
	DSC Subject-II (Minor)	1	2	2	DSC Subject-II	1	2	2
MD/ID Subject-1	MD/ID-I- Basic Statistical Methods and Probability Theory I	1	2	2	MD/ID-II- Advance Statistical Methods and Probability Theory II	1	2	2
MD/ID Subject-2	MD/ID-I	1	2	2	MD/ID-II	1	2	2
SEC/AEC	Differential Calculus Or AMSC/Field Work/SEC	1	2	-	Algebra Or Field work/ SEC/ Communication Skills	1	2	-
VAC	Understanding and Connecting with Environment Or Life Skills & Personality development	1	2	-	Understanding and Connecting with Environment Or Life Skills & Personality Development	1	2	-
Total		6	12	8		6	12	8

- ❖ The student may opt for any one course from Field Work / Skill Enhancement Course (SEC) / Communication Skills in one semester and any one course from Additional Multidisciplinary Skill Course (AMSC) / Field Work / Skill Enhancement Course (SEC) in the other semester.
- ❖ Field Work/Discipline Specific Skill Enhancement Course (SEC): Students may opt SEC/Field Work related to any discipline subject opted by her/him as a DSC in the first year.
- ❖ **Field Work:** In addition to providing students with practical, experience-based learning, field work aims to expose them to real-world socio-economic and societal challenges, allowing them to bridge the gap between theory and practice and develop effective solutions to real-life problems.
- ❖ **AMSC:** Additional Multidisciplinary Skill Course (is offered as SEC)
Following courses are offered under AMSC, University may add new courses under AMSC in future:
 1. Plant Nursery Development and Management
 2. Basic Yoga Practices
 3. Physical Education and Sports Management
 4. Regional Folklores and their Cultural Context
 5. Indian Traditional Music
 6. Tour and Travel Operations
- ❖ **Communication Skills (AEC):** 'Communication Skills' course will be offered in Hindi, English and Sanskrit Languages, student may opt any one language for studying the course
- ❖ **Life Skill & Personality Development (VAC)**
- ❖ **Understanding and Connecting with Environment (VAC)**



Year	Sem.	Course Code	Paper Title	Theory/Practical	Credits
I	I	STAT T-101	Basic Descriptive Statistics and Probability Theory	Theory	02
		STAT P-102	Basic Descriptive Statistics and Probability Theory Lab	Practical	02
			Multidisciplinary / Interdisciplinary Subject		
		STAT T-103	Statistical Methods and Probability Theory I	Theory	02
		STAT P-104	Statistical Methods and Probability Theory I Lab	Practical	02
			Skill Course		
		STAT T-105	Differential Calculus	Theory	02
		STAT T-106	Extracurricular Courses (Understanding and Connecting with Environment) (University will prepare the course)		02
	II	STAT T-107	Advanced Descriptive Statistics and Probability Distributions	Theory	02
		STAT P-108	Advanced Descriptive Statistics And Probability Distribution Lab	Practical	02
			Multidisciplinary / Interdisciplinary Subject		
		STAT T-109	Advanced Statistical Methods and Probability Theory II	Theory	02
		STAT P-110	Advanced Statistical Methods and Probability Theory II Lab	Practical	02
			Skill Course		
		STAT T-111	Algebra		02
		STAT P-112	Life Skills and Personality Development (University will prepare the course)		02

Subject Prerequisites

To study this subject a student must have the subject(s) Mathematics in class XII.

Program/B.Sc./B.A.	Year: First	Semester: First
Subject: STATISTICS		
Course Code: -STAT T-101	Course Title: Basic Descriptive Statistics and Probability Theory	
Credits: 02		Core: Compulsory
Part-A: Basic Descriptive Statistics		
I	Introduction to Statistics, Meaning of Statistics, Importance of Statistics, Scope of Statistics in Industry, Introduction and contribution of Indian Scholars in Statistics. Concept of Statistical population, Attributes and Variables (Discrete and Continuous), Different types of scales – Nominal, Ordinal, Ratio and Interval, Primary data – designing a questionnaire and schedule, collection of primary data, checking their consistency, Secondary data.	
II	Presentation of data: Classification, Tabulation, Diagrammatic & Graphical Representation of Grouped data, Frequency distributions, Cumulative frequency distributions and their graphical representations, Histogram, Frequency polygon and Ogives. Stem and Leaf plot, Boxplots.	
III	Measures of Central tendency and Dispersion and their properties, Merits and Demerits of these Measures.	
IV	Moments and Factorial moments, Sheppard's correction for moments, Measures of Skewness and Kurtosis and their significance, Measures based on quartiles.	

Part-B: Probability Theory	
V	Random experiment, Trial, Sample point and Sample space, Events, Operations of events, Concept of equally likely, mutually exclusive and Exhaustive events. Definition of Probability: Classical, Relative frequency and Axiomatic approaches.
VI	Discrete Probability Space, Properties of Probability under Set Theory Approach, Independence of Events, Conditional Probability, Total and Compound Probability theorems, Bayes theorem and its applications.
VII	Random Variables – Discrete and Continuous, Probability Mass Function (p.m.f.) and Probability density function (p.d.f.), Cumulative distribution function (c.d.f.) Joint distribution of two random variables, Marginal and Conditional distributions, Independence of random variables.
VIII	Expectation of a random variable and its properties, Expectation of sum of random variables and product of independent random variables, Conditional expectation and related problems. Moments, Moment generating function (m.g.f.) & their properties, Continuity theorem for m.g.f. (without proof). Chebyshev's inequality, Weak law of large numbers for a sequence of independently and identically distributed random variables and their applications (without proof).

Suggested Readings:

Part A:

Goon, A.M., Gupta, M.K. and Dasgupta, B. (2013). Fundamental of Statistics, Vol I, World Press, Kolkata.

Goon, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamental of Statistics, Vol II, World Press, Kolkata.

Part B:

Gupta, S.C. and Kapoor, V.K. (2000). Fundamentals of Mathematical Statistics (10th ed.), Sultan Chand and Sons.

Meyer, P. (2017). Introductory Probability and Statistical Applications (2nd ed.), New Delhi, Oxford & IBH Publishing Co. Pvt. Ltd.

Course Code: -STAT P-102		Course Title: Basic Descriptive Statistics and probability Theory Lab	
Credits: 02 (Practical)		Core: Compulsory	
1. Problems based on graphical representation of data by Histogram, Frequency polygons, frequency curves and Ogives, Stem and Leaf Plot, Boxplot. 2. Problems based on calculation of Measures of Central Tendency. 3. Problems based on calculation of Measures of Dispersion. 4. Problems based on calculation of Moments, Measures of Skewness and Kurtosis. 5. Computation of conditional probabilities based on Bayes theorem.			
Course Code: -STAT T-103		Course Title: Basic Statistical Methods and Probability Theory I	
(MD/ID)	Credits: 02	Core: Compulsory	
Part-A: Basic Statistical Methods			
I	Introduction to Statistics, Meaning of Statistics, Importance of Statistics, Scope of Statistics in Industry, Introduction and contribution of Indian Scholars in Statistics. Concept of Statistical population, Attributes and Variables (Discrete and Continuous), Different types of scales – Nominal, Ordinal, Ratio and Interval, Primary data – designing a questionnaire and schedule, collection of primary data, checking their consistency, Secondary data.		
II	Presentation of data: Classification, Tabulation, Diagrammatic & Graphical Representation of Grouped data, Frequency distributions, Cumulative frequency distributions and their graphical representations, Histogram, Frequency polygon and Ogives.		
III	Measures of Central tendency and Dispersion and their properties, Merits and Demerits of these Measures.		

Part B- Probability Theory I

IV	Random experiment, Trial, Sample-point and Sample space, Events, Operations of events, concept of equally likely, mutually exclusive and Exhaustive events. Definition of Probability: Classical, Relative frequency and Axiomatic approaches.
V	Discrete Probability Space, Properties of Probability under Set Theory Approach, Independence of Events, Conditional Probability, Total and Compound Probability theorems, Bayes theorem and its applications.
VI	Random Variables – Discrete and Continuous, Probability Mass Function (pmf) and Probability density function (pdf), Cumulative distribution function (cdf), Joint distribution of two random variables, Marginal and Conditional distributions, Independence of random variables.

Suggested Readings:

Part A:

, S.C. and Kapoor, V.K. (2000). Fundamentals of Mathematical Statistics (10th ed.), Sultan Chand and Sons.

Gupta Part B:

Gupta, S.C. and Kapoor, V.K. (2000). Fundamentals of Mathematical Statistics (10th ed.), Sultan Chand and Sons.

Meyer, P. (2017). Introductory Probability and Statistical Applications (2nd ed.), New Delhi, Oxford & IBH Publishing Co. Pvt. Ltd.

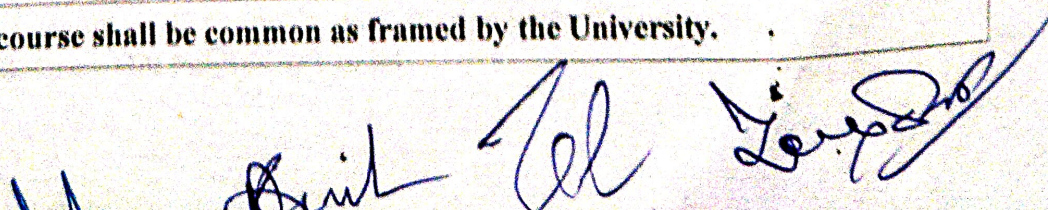
Course Code: -STAT P-104		Course Title: Basic Statistical Methods and Probability Theory I Lab	
(MD/ID)	Credits: 02 (Practical)	Core: Compulsory	
	1. Problems based on graphical representation of data by Histogram, Frequency polygons, frequency curves and Ogives. 2. Problems based on calculation of Measures of Central Tendency. 3. Problems based on calculation of Measures of Dispersion.		
Course Code: -STAT T-105		Course Title: Skill Enhancement Course: Differential Calculus	
	Credits: 02	Core: Compulsory	
I	Limit, Continuity and Differentiability: Functions of one variable, Limit of a function (ϵ - δ), Continuity of a function, Properties of continuous functions, Intermediate value theorem, Classification of Discontinuities, Differentiability of a function, Rolle's Theorem.		
II	Mean value theorems and their geometrical interpretations, Applications of mean value theorems.		
III	Successive Differentiation, Expansions of functions and Indeterminate forms: Successive Differentiation, nth Differential coefficient of functions, Leibnitz Theorem, Taylor's Theorem, Maclaurin's Theorem, Taylor's and Maclaurin's series expansions.		

Suggested Readings:

1. M. Ray: Differential Calculus.
2. H. S. Dhami: Differential Calculus.

Extracurricular Courses

Course Code: -STAT-106	Course Title: Understanding and Connecting with Environment		
Credits: 02		Core: Compulsory	
The contents of this course shall be common as framed by the University.			



II Semester B.Sc./B.A. -Statistics

Course Code: - STATT-107		Course Title: Advanced Descriptive Statistics and Probability Distributions	
Unit	Core: Compulsory		Credits: 02
Part-A: Advanced Descriptive Statistics			
I	Bivariate data, Principles of least squares, most plausible values, Meaning of curve fitting, Fitting of straight line, parabola, logarithmic, power curves and other simple forms by method of least squares.		
II	Bivariate frequency table, Correlation, Types of relationships, Scatter diagram, Karl-Pearson's Correlation Coefficient and its properties.		
III	Rank correlation and its coefficient (Spearman and Kendall Measures) Regression analysis through both types of regression equations for X and Y variables.		
IV	Attributes: Notion and Terminology, Contingency table, Class frequencies and Ultimate class frequencies, Consistency, Association of Attributes, Independence, Measures of association for 2X2 table, Chi-square, Karl Pearson's and Tschuprow's Coefficient of Association.		
Part-B: Probability Distributions			
V	Discrete Probability Distributions: Binomial distribution, Poisson distribution (as limiting case of Binomial distribution), Hypergeometric, Geometric and Negative Binomial, Uniform and Multinomial distributions, fitting of Binomial, Poisson and Uniform distributions.		
VI	Continuous Probability Distributions: Exponential, Gamma, Beta distributions. Cauchy, Laplace, Pareto, Weibull, Log normal distributions.		
VII	Normal distribution and its properties, Standard Normal variate, Normal distribution as limiting case of Binomial distribution, fitting of Normal distribution.		
VIII	Order Statistics, Distributions of minimum, r^{th} and maximum order statistic, Joint distribution of r^{th} and s^{th} order statistics (in continuous case), Distribution of sample range & sample median for uniform and exponential distributions.		
Credits: 02		Core: Compulsory -	
The contents of this course shall be common as framed by the University.			

Suggested Readings:

Part A:

- Goon, A.M., Gupta, M.K. and Dasgupta, B. (2013). Fundamental of Statistics, Vol I, World Press, Kolkata.
- Goon, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamental of Statistics, Vol II, World Press, Kolkata.
- Gupta, S.C. and Kapoor, V.K. (2000). Fundamentals of Mathematical Statistics (10th ed.), Sultan Chand and Sons.

Part B:

- Meyer, P. (2017). Introductory Probability and Statistical Applications (2nd ed.), New Delhi, Oxford & IBH Publishing Co. Pvt. Ltd.
- Mood A.M., Graybill F.A. and Boes D.C. (2007). Introduction to the Theory of Statistics (3rd ed.), New Delhi, Tata McGraw Hill Publishing Co. Ltd.

Course Code: - STATP-108	Course Title: Advanced Statistics and Probability Distribution Lab	
Credits: 02(Practical)		Core: Compulsory
Topic		
1. Problems based on fitting of curves by Method of least squares e.g. fitting of straight line, second degree polynomial, power curve, exponential curve etc. 2. Problems based on determination of Regression lines and calculation of Correlation coefficient – grouped and ungrouped data. 3. Problems based on determination of Rank correlation. 4. Fitting of Binomial, Poisson and Normal distribution.		

Multidisciplinary / Interdisciplinary Subject-Statistics

Programme/B.Sc./B.A.		Year: First	Semester: Second
Course Code: - STAT T-109 (MD/ID)		Course Title: Advanced Statistical Methods and Probability Theory II	
Unit	Core: Compulsory		Credits: 02
Part-A: Advanced Statistical Methods			
I	Bivariate data, Principles of least squares, most plausible values, Meaning of curve fitting, Fitting of straight line, parabola, logarithmic, power curves and other simple forms by method of least squares.		
II	Bi-Variate frequency table, Correlation, Types of relationships, Scatter diagram, Karl-Pearson's Correlation Coefficient and its properties.		
III	Rank correlation and its coefficient (Spearman and Kendall Measures) Regression analysis through both types of regression equations for X and Y variables.		
I V	Attributes: Notion and Terminology, Contingency table, Class frequencies and Ultimate class frequencies, Consistency, Association of Attributes, Independence, Measures of association for 2X2 table, Chi-square, Karl Pearson's and Tschuprow's Coefficient of Association.		
Part-B: Probability Theory II			
V	Discrete Probability Distributions: Binomial distribution, Poisson distribution (as limiting case of Binomial distribution), Hypergeometric, Geometric and Negative Binomial, Uniform and Multinomial distributions, fitting of Binomial, Poisson and Uniform distributions.		
VI	Continuous Probability Distributions: Exponential, Gamma, Beta distributions. Cauchy, Laplace, Pareto, Weibull, Log normal distributions.		

Suggested Readings: Part A:

Goon, A.M., Gupta, M.K. and Dasgupta, B. (2013). Fundamental of Statistics, Vol I, World Press, Kolkata.

Goon, A.M., Gupta, M.K. and Dasgupta, B. (2011). Fundamental of Statistics, Vol II, World Press, Kolkata.

Gupta, S.C. and Kapoor, V.K. (2000). Fundamentals of Mathematical Statistics (10th ed.), Sultan Chand and Sons.

Part B:

Gupta, S.C. and Kapoor, V.K. (2000). Fundamentals of Mathematical Statistics (10th ed.), Sultan Chand and Sons.

Course Code: - STAT P-110	Course Title: Advanced Statistical Methods and Probability Theory II Lab
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(MD/ID)	Credits: 02(PRACTICAL)	Core: Compulsory
Topic		

1. Problems based on fitting of curves by Method of least squares.
2. Problems based on determination of Regression lines and calculation of Correlation coefficient – grouped and ungrouped data.
3. Problems based on determination of Rank correlation.

Course Code: - STAT-111	Course Title: Skill Enhancement Course: Algebra
Credits: 02	Core: Compulsory
I	Numbers: Natural numbers, Integers, Rational and Irrational numbers, Real numbers, Complex numbers, Mappings, Equivalence relation and partitions, Congruence modulo n.
II	Roots of equations: Fundamental Theorem of Algebra, Relations between Roots and Coefficients, transformation of equations, Descartes rule of signs, Algebraic Solution of a Cubic equations (Cardan method), Bi-quadratic Equation.

Suggested Readings:

1. Leonard E. Dickson: First Course in the Theory of Equations.
2. Burnside, William Snow, Panton and Arthur William: The Theory of Equations, Volume I.

Life skill and Personality development

Course Code: - STAT-112	Course Title: Life skill and Personality development
Credits: 02	Core: Compulsory
The contents of this course shall be common as framed by the University.	

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