

Course Code: 0542-211(Stat-211) Course Title: Sampling Distribution
Marks:100 Credits: 03 Number of Class: 39-42

Rationale:

The role of the course sampling distribution in statistical inference is astronomically relevant and essential. The concept of variants transformation and distribution of sample mean, sample variance, and sample covariance is utmost required to decision making in any field of statistical data analysis.

Objectives:

Objectives of this course are:

- To present the general theory of statistical distributions.
- To present the standard distributions found in statistical practice.
- To present the relationships among distributions found in statistical practice.

To provide a good grounding in the general theory of statistical distributions.

Learning Outcomes:

Having successfully completed this course/module student will be able to

CLO1	Derive both central and non-central chi-square, t and F distributions from normal distribution;
CLO2	Calculate moments and moment generating function;
CLO3	Recall definitions of probability function, density function, cumulative distribution function and moment generating function, and their inter-relationships;
CLO4	Gather knowledge in details variate transformation and Laplace transformation.
CLO5	Apply moment generating function to determine distribution function and moments.
CLO6	Recall well known distributions such as Bernoulli, binomial, Poisson, geometric, uniform, exponential, normal, Cauchy, gamma and beta distributions and determine the relationship of those distributions with the central and non-central chi-square, t and F distributions;
CLO7	Construct the distribution of sample mean, sample variance, sample covariance and use these concepts in statistical inference.

Mapping between Program Learning Outcome (PLO) and Course Learning Outcome (CLO):

PLOs CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8
CLO1	3	3	2	2		2	1	
CLO2	3	3	2					
CLO3	3	3	2			1		
CLO4	3	3	1				1	
CLO5	3	3	1	2				
CLO6	3	3	2	2		1		
CLO7	3	3	2	2			1	

Course Content, Teaching and Assessment Strategy

CLOs	Course Content	Teaching Strategy	Assessment Strategy	No. of Lec.
CLO1	Random Variable, Its Distribution and Properties, Functions of Random Variable; Sum, Product, and Ratio. Theory of Large Samples, Convergence of Random Variable, Modes of Convergence, Law of Large Number (Strong Law and Weak Law), Central Limit Theorem.	Interactive Class, Open Discussion, Participatory Q/A Session, Online resources and Practical	Assignments, Class Tests, Presentation, Attendance and Final Examination.	5
CLO2 CLO3	Concept of Probability and Sampling Distribution. Different methods of sampling distribution, methods of obtaining sampling distribution. Variate Transformations: Square Root, Log, Sin Inverse, Fisher's Z Transformation, Laplace Transformation, Hyperbolic inverse, tan inverse			7
CLO3 CLO4	Exact Sampling Distribution Related to Normal Population.			10
CLO5	Distribution of Sample Mean, Sample Variance, Sample Covariance. Distribution of Sample Correlation and Regression Coefficients.			10

CLO6 CLO7	Central and Non-Central Distribution of t , Chi square (χ^2), F , Cochran's Theorem, Fisher's Z and their Applications.			10
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Mapping of Course Learning Outcomes (CLOs) with the Teaching – Learning & Assessment Strategy

CLOs	Teaching-Learning Strategy	Assessment Strategy
CLO1	Classroom Discussion	Interactive Question-Answer
CLO2	Expository sharing	Assignment and Presentation
CLO3	Student Group Discussion	Midterm
CLO4	Discussion and Slide Show	Summative Measure (Final Exam.)
CLO5	Lecture and Reflective Discussion	Summative Measure (Final Exam.)
CLO6	Lecture and Reflective Discussion	Summative Measure (Final Exam.)
CLO7	Lecture and Reflective Discussion	Summative Measure (Final Exam.)

Text Book

1. Hogg, R. V. and Craig, A. T. (2002): *Introduction to Mathematical Statistics*, 5th edition, Pearson Education, Asia.

Reference Books

2. Arnold, B. C., Balakrishnan, N. and Nagaraja, H. N (2008): *A First Course in Order Statistics*, SIAM.
3. Rohatgi, V. K. and Saleh, A. K. Md. (2000): *An Introduction to Probability and Statistics*, Second edition, Wiley-Interscience.
4. Mood, A. M. and Graybill, F. A. and Boes, D.C. (1974): *Introduction to the Theory of Statistics*, 3rd edition, McGraw-Hill, New York.