University of Kerala

Discipline	STATISTICS				
Course Code	UK3DSCSTA208				
Course Title	STATISTICAL INFERENCE				
Type of Course	**DSC**				
Semester	III				
Academic Level	200 – 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites					

COURSE OUTCOMES

	Up on Completion of the course, students should be able to:	Cognitive level	PSO addressed
CO1	Define the concept of sampling distributions.	Understand	PSO 1
CO 2	Explain the properties of estimators	Understand	PSO 1
CO3	Solve numerical problems for the point and interval estimators of the parameters.	Apply	PSO 1,2,3,4,5
CO4	Explain the fundamental concepts of testing of hypothesis.	Understand	PSO 1
CO5	Apply tests for hypothesis	Apply	PSO 1,2,3,4,5,6

COURSE CONTENT

Module	Content	Hrs
I	**Sampling distributions**	10
	Sampling distributions - Parameter and statistic, Sampling distributions- Central limit Theorem (Statement only). Distribution of mean of a sample taken from a normal population; chi-square, t and F distributions (definitions only) and statistics following these distributions, relation between normal, chi-square, t and F distributions (No derivations required).	
II	**Estimation Theory**	10
	Point estimation, desirable properties of estimators – unbiasedness, consistency, efficiency (definitions and simple problems) and sufficiency (definition only); Confidence Interval of mean, variance and difference of means (No derivations required). Methods of estimation –Maximum likelihood and method of moments	
III	**Testing of Hypothesis**	15

	Testing of Hypothesis: statistical hypotheses, null and alternative hypotheses, simple and composite hypotheses, two types of errors, significance level, p-value, power of a test. Z test- testing mean and proportion (one and two sample cases). Chi-square test of goodness of fit, independence/homogeneity.	
IV	**Small sample tests**	**10**
	Small sample tests: t- test for one sample, independent samples and paired samples, Chi-square test for variance, F- test for equality of variances.	
V	**Practicum**	**30**
	Practical based on Modules II, III &IV. Practical is to be done using **R package.**	

PRACTICAL/LABWORK
List of Practical worksheet
1. Confidence interval.
2. Z-test
3. T-test
4. Chi-square test
5. F- test for equality of variances

REFERENCES
1. Gupta, S.C and Kapoor, V.K (2020). Fundamentals of Mathematical Statistics, Sultan Chands.
2. Mukhopadhyay, P. (1996). Mathematical Statistics. New Central Book Agency (P) Ltd, Calcutta
3. Agarwal, B.L. (2006). Basic Statistics. 4th Edition, New Age international (P) Ltd., New Delhi.
4. Dalgaard, P. (2008). Introductory Statistics with R, Springer, New York.
5. Purohit, S. G., Deshmukh, S.R., & Gore, S. D. (2008). Statistics using R. Alpha Science International, United Kingdom.

Name of the Course: STATISTICAL INFERENCE
 Credits: 3:0:1 (Lecture:Tutorial:Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial	Practical (P)
1	Define the concept of sampling distributions.	PSO 1 PO 1	Understand	F, C	L	
2	Explain the properties of estimators	PSO 1 PO 1	Understand	F, C	L	
3	Solve numerical problems for the point and interval estimators of the parameters	PSO 1,2,3,4,5 PO 1,2,4,7	Apply	P	L	P

4	Explain the fundamental concepts of testing of hypothesis	PSO 1 PO 1	Understand	F, C	L	
5	Apply large tests of hypothesis.	PSO 1,2,3,4,5,6 PO 1,2,4,7	Apply	P, M	L	P

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs:

	PS O 1	PS O 2	PS O 3	PS O 4	PS O 5	PS O 6	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2						2							
CO 2	3						2							
CO 3	3	2	1	1	2		2	1		2			2	
CO 4	1						1							
CO 5	3	2	1	1	2		2	1		2			2	

Assessment Rubrics:
- Quiz / Assignment/ Discussion / Seminar
- Internal Examinations
- Practical Evaluation
- End Semester Examinations

Mapping of COs to Assessment Rubrics :

	Internal Exam	Quiz / Assignment/ Discussion / Seminar	Practical Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓	✓	✓	✓
CO4	✓	✓		✓
CO5	✓	✓	✓	✓
CO6	✓	✓		✓

University of Kerala

Discipline	STATISTICS				
Course Code	UK3DSCSTA209				
Course Title	PROBABILITY AND DISTRIBUTIONS - I				
Type of Course	**DSC**				
Semester	III				
Academic Level	200 – 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5
Pre-requisites					

COURSE OUTCOMES

	Up on Completion of the course, students should be able to:	Cognitive level	PSO addressed
CO1	Illustrate random variables and their probability distributions	Analyse	PSO-1,2,3,4
CO2	Calculate moments of random variables	Apply	PSO-1,2,3,4
CO3	Determine generating functions of random variables	Apply	PSO-1,2,3
CO4	Demonstrate bivariate random variables and their distributions	Analyse	PSO-1,2,3,4

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

COURSE CONTENT

Module	Content	Hrs
I	**Random variable**	13
	Random variable, Distribution function of a random variable - properties, Discrete and Continuous random variables, probability mass function and probability density function, their properties, functions of random variables, transformation of random variables.	
II	**Bivariate random variable**	12
	Bivariate random variable, joint distribution function and its properties, joint probability mass function and joint probability density function and their properties, marginal and conditional distributions, independence of random variables, transformations of bivariate random variable.	
III	**Mathematical expectation**	10
	Mathematical expectation, properties, addition and multiplication theorem on expectation, expectation of function of random variables, moments-univariate and bivariate, Cauchy – Schwartz inequality, correlation coefficient, conditional expectation (regression function), conditional variance.	
IV	**Generating functions**	10