SEMESTER – I

Course Code	PAD21101T	Course Name	STATISTICAL FOUNDATIONS	Course Category	C	Professional Core Course	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mathematics and Statistics		Data Book / Codes/Standards	Statistical Table and Graph sheet	

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	To provide the extensive knowledge of basic statistical concepts			
CLR-2 :	To understand the Concepts of discrete distributions-Binomial distribution			
CLR-3 :	To learn the concepts of continuous distribution – Normal distribution and their properties			
CLR-4 :	To acquire the knowledge of sampling , statistical hypothesis testing			
CLR-5 :	To gain the knowledge of design of experiments			
CLR-6 :	To understand and interpret data using Testing of Hypothesis based on non-parametric methods			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	Program Learning Outcomes (PLO)													
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	To acquire the knowledge of data organist ion, descriptive measures and probability	3	85	80	L	H	H	M	-	-	-	-	-	H	H	-	-	M	H
CLO-2 :	To collect data relating to variable/variables which will be examined and calculate descriptive statistics from these data.	3	80	75	M	H	H	H	H	H	-	M	-	H	H	-	-	M	H
CLO-3 :	To identify distribution form relating to the variable/variables.	3	85	80	M	H	H	M	H	H	-	M	-	H	H	-	-	M	H
CLO-4 :	To acquire the skill of analysing the relationship between the independent and dependent variables	3	85	80	M	H	H	H	-	-	-	-	-	H	M	-	-	M	H
CLO-5 :	To apply different methods of sampling and the testing of hypothesis for Big data	3	85	80	H	H	M	M	M	M	M	M	-	H	H	-	M	M	H
CLO-6 :	To apply hypothesis testing via non-parametric tesys	3	85	80	M	H	H	M	-	-	-	-	-	H	H	-	-	M	H

	Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)	12	12	12	12	12

S-1	**SLO-1**	*Definition of Statistics, Types of variables*	*Definition -Discrete Random Variable, Probability Mass Function, and Cumulative distribution function*	*Definition – continuous random variables*	*Definition of sampling, types of sampling techniques*	*Definition – non-parametric test, application*
	SLO-2	*Classification and tabulation of data*	*Expectation of discrete distribution*	*Expectation of continuous distribution*	*Definition of hypothesis testing, level of significance, type – I error, type-II error*	*Sign test - procedure*
S-2	**SLO-1**	*Descriptive statistics- measures of central tendency*	*Problems on discrete distribution*	*Problems on continuous distribution*	*Concepts of One tailed test and two tailed test*	*Problems on sign test*
	SLO-2	*Descriptive statistics- measures of central tendency*	*Problems on discrete distribution*	*Problems on continuous distribution*	*Determination of sample size*	*Problems on sign test*
S-3	**SLO-1**	*Descriptive statistics- measures of central tendency*	*Problems on discrete distribution*	*Definition of Normal distribution*	*Determination of sample size*	Wald-Wolfowitz Run Test - procedure
	SLO-2	*Descriptive statistics- measures of central tendency*	*Problems on discrete distribution*	*Importance of Normal distribution*	*Large sample test – one sample test statistic*	*Run test- One sample test- problem*
S 4	**SLO-1**	*Measures of dispersion-problems*	*Problems on discrete distribution*	*Uses of Normal distribution*	*Problems on single sample mean*	*Run test – two sample- problems*
	SLO-2	*Measures of dispersion-problems*	*Definition of Binomial distribution and its applications*	*Properties of normal distribution*	*Equality of two sample mean – test statistics*	*Run test – two sample- problems*
S-5	**SLO-1**	*Measures of dispersion-problems*	*Fitting of Binomial distribution*	*Definition of Standard Normal distribution*	*Equality of two sample mean – test statistics*	*Median test – procedure*
	SLO-2	*Probability – types of events*	*Problems on Binomial distribution*	*Area properties of standard normal distribution*	*Small sample test – single mean*	*Problem – median test*
S - 6	**SLO-1**	*Conditional probability –Bayes theorem*	*Problems on Binomial distribution*	*Problems on normal distribution*	*Equality of two mean - problem*	*Kolmogorov Smirnov test – procedure*
	SLO-2	*Problems on probability*	*Problems on Binomial distribution*	*Problems on normal distribution*	*Equality of two mean - problem*	Problems on KS test
S- 7	**SLO-1**	*Probability distribution- discrete and continuous distribution*	*Problems on Binomial distribution*	*Problems on normal distribution*	*Equality of two mean - problem*	Problems on KS test
	SLO-2	*Definition – correlation analysis, properties, Karl Pearson's coefficient of correlation*	*Problems on Binomial distribution*	*Problems on normal distribution*	*Paired t-test – test statistic*	Problems on KS test
S - 8	**SLO-1**	*Problems on correlation*	*Problems on Binomial distribution*	*Problems on normal distribution*	*Problems on dependent samples*	Problems on KS test
	SLO-2	*Problems on correlation*	*Problems on Binomial distribution*	*Problems on normal distribution*	*Chi-square test – independent of attributes and goodness of fit*	Problems on KS test
S - 9	**SLO-1**	*Problems on correlation*	*Problems on Binomial distribution*	*Problems on normal distribution*	*2 X 2 contingency table*	Problems on KS test

	SLO-2	*Definition of Regression Analysis, properties*	*Problems on Binomial distribution*	*Problems on normal distribution*	*Problems on independence of attributes*	Wilcoxon test - procedure
S - 10	SLO-1	*Problems on Regression lines*	*Problems on Binomial distribution*	*Problems on normal distribution*	*Problems on independence of attributes*	Problems on Wilcoxon test
	SLO-2	*Problems on regression lines*	*Problems on Binomial distribution*	*Problems on normal distribution*	*Problems on goodness of fit*	Problems on KS test
S-11	SLO-1	*Problems on regression lines*	*Problems on Binomial distribution*	*Problems on normal distribution*	*Design of experiment – ANOVA*	Mann Whitney tesy - procedure
	SLO-2	*Problems on regression lines*	*Mean and variance of binomial distribution*	*Problems on normal distribution*	*One-way classification – problem*	Problems on MW test
S-12	SLO-1	*Properties of regression coefficients*	*Mean and variance of binomial distribution*	*Problems on normal distribution*	*Two-way ANOVA - problem*	Problems on MW test
	SLO-2	*Properties of regression coefficients*	*Mean and variance of binomial distribution*	*Problems on normal distribution*	*Two-way ANOVA - problem*	Problems on MW test

Learning Resources	***Theory:*** *1. Pratap Dangeti, Statistics for Machine Learning, Practical Statistics for Data Scientists, 2nd Edition,* 2020 *Andrew Bruce and Peter Gedeck,* **2.** Davis Freedman, Robert Pisani and Roger Purves, An Easy to Understand Guide to Statistics and Analytics, Third Edition, By David M. Levine and David F. Stephan, December 2014 *3.* Robert A. Donnelly and Fatma Abdel-Raou, Statistics, 3E, July

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA_1 (10%)		CLA_2 (10%)		CLA_3 (20%)		CLA_4 (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	40%	-	40%	-	40%	-	40%	-	40%	-
	Understand										
Level 2	Apply	30%	-	30%	-	30%	-	30%	-	30%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers	
Experts from Academic	**Internal Experts**
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Dr.Vincent, Associate Professor, VIT	