Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. S. Karthik, IT Analyst, Tata Consultancy Services	Dr. Neelanarayanan,, Professor, School of Computer Science and Engineering, VIT Chennai	Dr.P.Muthulakshmi
		Dr.S.P.Angelin Clartet

Course Code	UMS20G03T	Course Name	STATISTICAL METHODS	Course Category	G	*Generic Elective Course*	L	T	P	C
							3	1	0	4

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Mathematics and Statistics*	Data Book / Codes/Standards	*Graph sheet needed; t, F and χ^2 table is needed*		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	*To provide foundations in Bio Statistics*
CLR-2 :	*To provide a strong foundations of organizing the data, diagrammatic and graphical presentation.*
CLR-3 :	*To apply Statistical techniques for biological problems.*
CLR-4 :	*To understand the characteristics of biological problems.*
CLR-5 :	*To provide the application of correlation and regression in biological sciences.*
CLR-6 :	*To analyze the sample data in order to estimate or predict characteristics of the larger population from which the sample is drawn.*

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*

Learning	1	2	3
	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)

Program Learning Outcomes (PLO)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Scientific Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3

CLO-1 :	*To understand the statistical modeling and its limitations, and have skill in description, interpretation and exploratory analysis of data by graphical and other means;*	*3*	*85*	*80*	*L*	*L*	*L*	*M*	*L*	-	-	-	*L*	*M*	*H*	*M*	-	-	-
CLO-2 :	*To calculate and apply measures of central tendency - grouped and ungrouped data cases.*	*3*	*80*	*75*	*M*	*M*	*M*	*M*	*M*	-	-	-	*M*	*M*	*H*	*M*	-	-	-
CLO-3 :	*To understand and apply measures of dispersion - grouped and ungrouped data cases.*	*3*	*85*	*80*	*H*	*H*	*M*	*H*	*M*	-	-	-	*M*	*M*	*H*	*H*	-	-	-
CLO-4 :	*Find the relationship between two or more variables using correlation and regression.*	*3*	*85*	*80*	*M*	*H*	*M*	*H*	*M*	-	-	-	*M*	*M*	*H*	*H*	-	-	-
CLO-5 :	*Perform Test of Hypothesis for small sample. Learn non-parametric test such as the Chi-Square test for Independence and Goodness of Fit.*	*3*	*85*	*80*	*H*	*H*	*M*	*H*	*H*	-	-	-	*M*	*M*	*H*	*M*	-	-	-
CLO-6 :	*Perform the Analysis of Variance - One way Classifications.*	*3*	*75*	*80*	*H*	*H*	*M*	*H*	*M*	-	-	-	*M*	*M*	*H*	*M*	-	-	-

		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*	*Nature and scope of statistical methods* *Definition of statistics* *Numerical Data*	*Measures of Central tendency* *i. Definition* *ii. Functions of average* *iii. Characteristics of a typical average*	*Measures of Dispersion,*	*Correlation Analysis:* *Correlation - Definition and uses* *Types of correlation*	*Testing of Hypotheses* *-Testing Procedures*
	SLO-2	*Nature of statistics*	*Arithmetic mean* *Individual series*	*Range –Individual, Discrete series and Continuous series*	*Methods for Finding Correlation Coefficient,* *Properties of correlation coefficient*	*Definition of test statistic t and its uses*
S-2	*SLO-1*	*Importance of statistics*	*Arithmetic mean* *Discrete series*	*Quartile Deviation - Individual and Discrete series*	*Karl Pearson's Correlation Co-efficient*	*t-test* *Small Sample tests*
	SLO-2	*Functions of statistics*	*Arithmetic mean* *Continuous series*	*Quartile Deviation - Individual and Discrete series*	*Karl Pearson's Correlation Co-efficient*	*Testing Procedure*
S-3	*SLO-1*	*Limitations*	*Arithmetic mean* *Continuous series*	*Quartile Deviation - Continuous series*	*Spearman's Rank Correlation Coefficient with non-repeated Ranks*	*t-test* *- Test for Single Mean*

	SLO-2	Distrust of Statistics	Arithmetic mean Cumulative series	Quartile Deviation - Continuous series	Spearman's Rank Correlation Coefficient with non-repeated Ranks	t-test - Test for Single Mean
S 4	SLO-1	Classification i) Meanings ii)Objects iii) Rules of classification	Arithmetic mean Meritsand Demerits	Mean Deviation about Mean – Individual Series	Spearman's Rank Correlation Coefficient with repeated Ranks	t-test -Test for two Sample Means
	SLO-2	Classification i.Types of classification ii.Characteristics of good classification	Median Individual series	Mean Deviation about Mean – Discrete series	Spearman's Rank Correlation Coefficient with repeated Ranks	t-test -Test for two Sample Means
S-5	SLO-1	Tabulation: i.Parts of Tabulation ii.Rules of Tabulation	Median Discrete series	Mean Deviation about Mean – Continuous series	Spearman's Rank Correlation Co-efficient	t-test - t Test Statistic, when sample standard deviations are not known, but Population Standard Deviations are known
	SLO-2	Types of tables Objective of Tabulation	Median Continuous series	Mean Deviation about Median – Individual series	Problems on finding the best pair of judgements	t-test - t Test Statistic, when sample standard deviations are not known, but Population Standard Deviations are known
S-6	SLO-1	Components of Good Table Rules of construction of the table.	Median Continuous series	Mean Deviation about Median – Discrete series	Bivariate Distribution	Chi-Square distribution - Definition and its Uses
	SLO-2	Difference between classification and tabulation.	Median Merits and Demerits	Mean Deviation about Median– Continuous series	Bivariate Distribution	Chi-Square test - Testing Procedure
S -7	SLO-1	Diagrammatic representation of various types of statistical data : Bar Diagram	Mode Individual series	Standard Deviation – Individual and Discrete Series	Regression Analysis: Regression - Definition and Uses	Test based on Goodness of fit

	SLO-2	Types of Bar diagram	Mode Discrete series	Standard Deviation – Individual and Discrete Series	Regression Coefficients	Test based on Goodness of fit
S -8	SLO-1	One dimensional Diagrams	Mode Continuous Series	Standard Deviation- Continuous Series	Regression Equations	Testing the Independence of Attributes using Chi-Square
	SLO-2	Two dimensional Diagrams	Mode Continuous Series	Standard Deviation- Continuous Series	Types of Regression Equations	Testing the Independence of Attributes using Chi-Square
S-9	SLO-1	Pie chart	Mode Continuous series	Coefficient of Variation	Regression Equation of X on Y and Regression Equation of Y on X	F-test - Test Statistic of F-test
	SLO-2	Histogram	Mode Meritsand Demerits	Coefficient of Variation	Regression Equation of X on Y and Regression Equation of Y on X	Uses and testing Procedures
S-10	SLO-1	Frequency Polygon	Empirical Relation	Graphical solution of Dispersion Lorenz curve	Regression Equation of X on Y and Regression Equation of Y on X	Testing the equality of variance using F distribution
	SLO-2	Frequency Curve	Empirical Relation	Graphical solution of Dispersion Lorenz curve	Regression Equation of X on Y and Regression Equation of Y on X	Testing the equality of variance using F distribution
S-11	SLO-1	Less than O gives	Graphical solution of Median	Skewness Bowley's coefficient of Skewness	Relationship between Correlation and Regression Coefficients	Analysis of Variance – Definition and Uses
	SLO-2	More than O gives	Graphical solution of Median	Skewness Bowley's coefficient of Skewness	Problems on the Relationship between the Coefficients	Analysis of Variance – testing procedure
S-12	SLO-1	Lorenz Curve	Graphical solution of Mode	Concept of Kurtosis	Finding the corrected Correlation Coefficient values by correcting the wrongly entered inputs	ANOVA - One Way Classification

	SLO-2	*Lorenz Curve*	*Graphical solution of Mode*	*Concept of Kurtosis*	*Finding the corrected Correlation Coefficient values by correcting the wrongly entered inputs*	*ANOVA - One Way Classification*

Learning Resources	*Theory:* ***1***. Pillai, R.S.N, Bagavathi, V. (2009),Statistics,Theory and Practice,7th Edition,S.ChandLtd,NewDelhi. ***2***. Gupta, S.P. (2012), Statistical Methods, 4th Edition, Sultan Chand & Sons, New Delhi. ***3***. Khan and Khanum, (2008), Fundamentals of Bio Statistics, 3rd Edition, Ukaaz Publications, Hyderabad. ***4***. Ken Black, (2013), Business Statistics for Contemporary Decision Making, 7th Edition, John Wiley Publications

Learning Assessment

Bloom's Level of Thinking		Continous 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	30%		30%		30%		30%		30%	
	Understand										
Level 2	Apply	40%		40%		40%		40%		40%	
	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**
Dr.M.A.Baskar, Professor & Head, Dept. Of Mathematics, Loyola college, Chennai	S. Suruthi, Assistant Professor, Dept. Mathematics and Statistics, FSH, SRMIST
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