



University of Kerala

Discipline	STATISTICS				
Course Code	UK2MDCSTA101				
Course Title	BIVARIATE AND CATEGORICAL DATA ANALYSIS				
Type of Course	MDC				
Semester	II				
Academic Level	100 – 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	2 hours	-	2 hours	4
Pre-requisites					

COURSE OUTCOMES

Up on Completion of the course, students should be able to:		Cognitive level	PSO addressed
CO1	Evaluate the linear relationship between variables.	Evaluate	PSO -1, 2, 4, 5
CO2	Analyse the degree and nature of relationship between variable data sets	Analyse	PSO 1
CO3	Determine the independence of attributes	Apply	PSO 1 ,2,3,4,5

COURSE CONTENT

Module	Content	Hrs
I	Correlation Analysis	10
	Correlation Analysis: Scatter diagram, direct and inverse correlation, Karl Pearson's coefficient of correlation – formula and problems, Spearman's rank correlation including tied ranks (no derivation) – formula and numerical problems	
II	Regression Analysis:	10
	Regression Analysis: Simple linear regression, regression coefficients and properties (no derivation), point of intersection two regression lines, identification of two regression lines, coefficient of determination and its interpretation	
III	Testing of Qualitative variables	10
	Testing of Qualitative variables : Null and alternative hypothesis, type I and II errors, Level of significance and power of a test, Contingency table, Independence of attributes and criterion of independence, Expected frequencies, Chi-square statistic and Table of Chi-square, Chi-square test for independence (Concept and Simple examples), Relative risk and odds ratios.	

IV	Practicum	20
	Illustrate module 1,2,3 using statistical software/Spread Sheet/JASP.	

REFERENCES

1. Agarwal B.L. (2006). Basic Statistics, 4th Edition, New Age International (P) Ltd
2. Gupta S.C. and Kapoor V.K. (1994). Fundamentals of Mathematical Statistics. Sultan Chand & Sons. New Delhi
3. Sharma A.K. (2005). Text Book of Sampling and Attributes, Discovery Publishing House New Delhi
4. www.libreoffice.org
5. Berk, K. N., & Carey, P. (1998). Data Analysis with Microsoft Excel. Pacific Grove, CA: Duxbury Press.

Name of the Course: BIVARIATE AND CATEGORICAL DATA ANALYSIS

Credits: 2:0:1 (Lecture:Tutorial:Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial (T)	Practical (P)
CO1	Determine the linear relationship between variables.	PSO -1, 2, 4, 5 PO 1, 4,7	Apply	C P	L	P
CO2	Calculate the degree and nature of relationship between variable data sets	PSO 1 PO 1	Understand	FC	L	
CO3	Determine the independence of attributes	PSO1,2,3,4,5 PO 1 4 7	Apply	P	L	P

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

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	2		1	2		1			2			2	
CO 2	2						1							
CO 3	2	2	2	2	2		2			2			2	
CO 4	2	2	2	2	2		2			2			2	

Correlation Levels:

Level	Correlation
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-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

Mapping of COs to Assessment Rubrics :

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



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	Identify sampling distributions and calculate probabilities	Apply	PSO 1, 2 PO-1, 2
CO2	Apply the concepts of estimation to identify properties of estimators and use the method of maximum likelihood to construct estimators	Create	PSO 1, 2 PO-1, 2
CO3	Explain the fundamental concepts of testing of hypothesis and identify the various types of hypotheses	Analyze	PSO 1,2,3 PO-1, 2, 3, 6
CO4	Construct hypotheses for large and sample tests and carry out testing procedures	Create	PSO 1,2,3,5,6 PO-1, 2, 5, 8

COURSE CONTENT

Module	Content	Hrs
I	Sampling distributions	10
	Sampling distributions - Parameter and statistic, Central limit Theorem (Statement only). Sampling distributions - Distribution of mean of a sample taken from a normal population (No proof needed); chi-square, t and F distributions (definitions only, no proofs needed) 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, efficiency (definitions and problems), consistency and sufficiency (definition only); Method of estimation –Maximum likelihood Estimation (Definition, properties of MLE and numerical problems) Interval Estimation - Confidence Interval for mean (Single sample case only, no derivations required).	
III	Testing of Hypothesis	7
	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. (Concept and numerical problems)	
IV	Large and Small sample tests	18
	Large Sample Tests: Z test- testing mean (one and two sample cases). Chi-square test of independence/homogeneity. 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	Title of the Module	30
	Practical based on Modules II, III & IV. Practical is to be done using R software .	

PRACTICAL/LABWORK**List of Practical Worksheets:**

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)
CO1	Identify sampling distributions and calculate probabilities	PSO 1, 2 PO-1, 2	Apply	F, C, P	L	
CO2	Apply the concepts of estimation to identify properties of estimators and use the method of maximum likelihood to construct estimators	PSO 1, 2 PO-1, 2	Create	F, C, P	L	P
CO3	Explain the fundamental concepts of testing of hypothesis and identify the various types of hypotheses	PSO 1,2,3 PO-1, 2, 3, 6	Analyze	F, C, P	L	P
CO4	Construct hypotheses for large and sample tests and carry out testing procedures	PSO 1,2,3,5,6 PO-1, 2, 5, 8	Create	P, C, M	L	P

Mapping of COs with PSOs and POs :

	P S C 1	P S C 2	P S C 3	P S C 4	P S C 5	P S C 6	P C 1	P C 2	P C 3	P C 4	P C 5	P C 6	P C 7	P C 8
CO 1	2	1					2	1						
CO 2	2	1					2	1						
CO 3	2	3	1				2	1	1					

3														
CO 4	2	3	1		1	1	2	1		1			1	

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

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	✓	✓	✓	✓
CO 4	✓	✓	✓	✓



University of Kerala

Discipline	STATISTICS				
Course Code	UK1DSCSTA109				
Course Title	DESCRIPTIVE STATISTICS AND PROBABILITY				
Type of Course	DSC				
Semester	I				
Academic Level	100 – 199				
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	Distinguish between the various data types	Understand	PSO-1, 2
CO2	Explain the concept of scaling and identify their significance in practical situations	Understand	PSO-1,2
CO3	Calculate the measures of Central tendency, dispersion, skewness and kurtosis	Apply	PSO-1,2,3,4
CO4	Explain the concepts of random experiments, sample space and different types of events	Understand	PSO-1,2
CO5	Calculate the probabilities of events using classical, statistical approaches.	Apply	PSO-1,2,3
CO6	Understand Axiomatic approach	Understand	PSO-1,2
CO7	Determine conditional probability and apply concepts of statistical independence and multiplication theorem	Apply	PSO-1,2,3
CO8	Use Bayes' theorem to evaluate posterior probabilities	Apply	PSO-1,2,3
CO9	Explain the concept of random variables	Understand	PSO-1,
CO10	Illustrate random variables and its probability distributions	Analyse	PSO-1,2,3

COURSE CONTENT

Module	Content	Hrs
I	Descriptive Statistics	13
	Descriptive Statistics: Data- Definition, types of data, types of scaling - nominal, ordinal, interval and ratio, Central Tendency- Concept and Measures, Dispersion – Concept & Measures of Dispersion, Raw and central Moments(first four moments and their relationship without proof), Skewness and Kurtosis (Concept and definition with problems only).	

II	Introduction to Probability	12
	Random experiments - Sample Space, Sample point; Events-algebra of events, equally likely, mutually exclusive and exhaustive events (Concept only). Probability: Statistical regularity, frequency definition, classical approaches (numerical problems), Axiomatic approach, theorems in probability (Concepts and statement of results, numerical problems), probability space.	
III	Conditional probability	10
	Conditional probability: multiplication theorem, independence of two and three events, compound probability, Bayes' theorem and its applications. (Concepts and statement of results, numerical problems).	
IV	Random variables	10
	Random variables – definition, discrete and continuous random variables, probability mass function and probability density function, distribution function. Expectation of random variables and its properties, moments, moment generating function and characteristic function.(No proofs needed)	
V	Practicum	30
	Practical based on Modules I to be done using R package	

PRACTICAL/LABWORK

List of Practical worksheet

1. Measures of Central tendency.
2. Measures of Dispersion
3. Skewness and Kurtosis

REFERENCES

1. Agarwal, B.L. (2006). Basic Statistics. 4th Edition, New Age international (P) Ltd., New Delhi.
2. Gupta S. P. (2004). Statistical Methods. Sultan Chand & Sons, New Delhi.
3. Gupta, S. C., and Kapoor, V. K. (1994). Fundamental of Mathematical Statistics. Sultan Chand & Sons, New Delhi.
4. Kenny J. F (1947). Mathematics of Statistics Part One. 2nd Edition, D. Van Nostard Company, New Delhi-1.
5. Kenny J. F & Keeping E. S (1964). Mathematics of Statistics –Part Two. 2nd Edition, D. Van Nostard Company, New Delhi-1.
6. Mukhopadhyay, P. (1996). Mathematical Statistics. New Central Book Agency (P) Ltd, Calcutta.

Name of the Course: DESCRIPTIVE STATISTICS AND PROBABILITY

Credits: 3:0:1 (Lecture:Tutorial:Practical)

C O No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)	Practical (P)
CO 1	Distinguish between the various data types	PSO-1, 2 PO 1	Understand	F, C	L	
CO 2	Explain the concept of scaling and identify their significance in practical situations	PSO-1,2 PO 1,2	Understand	F,C	L	

CO 3	Calculate the measures of Central tendency, dispersion, skewness and kurtosis	PSO-1,2,3,4 PO 1,7	Apply	C,P	L	P
CO 4	Explain the concepts of random experiments, sample space and different types of events	PSO-1,2 PO 1,2	Understand	C	L	
CO 5	Calculate the probabilities of events using classical, statistical approaches.	PSO-1,2,3 PO 1,2	Apply	P ,C	L	
CO 6	Understand Axiomatic approach	PSO-1,2 PO 1,2	Understand	F,C	L	
CO 7	Determine conditional probability and apply concepts of statistical independence and multiplication theorem	PSO-1,2,3 PO 1,2	Apply	C,P	L	
CO 8	Use Bayes' theorem to evaluate posterior probabilities	PSO-1,2,3 PO 1,2	Apply	C,P	L	
CO 9	Explain the concept of random variables	PSO-1 PO 1,2	Understand	F,C	L	
CO 10	Illustrate random variables and its probability distributions	PSO-1,2,3 PO 1,2	Analyse	C,P	L	

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

Mapping of COs with POs :

	PS O 1	PS O 2	PS O 3	PS O 4	PS O 5	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	2				1							
CO 2	1	2				1	2				2	1	

CO 3	2	1	2	1		2						1	
CO 4	2	2				1	2						
CO 5	2	1	1			1	2						
CO 6	2	1				1	2						
CO 7	3	1	1			1	2						
CO 8	3	1	1			1	2						
CO 9	3					1	2						
CO 10	2	1	1			1	2						

Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Internal Examination
- Practical Evaluation
- End Semester Examinations

Mapping of COs to Assessment Rubrics :

	Internal Exam	Quiz / Assignment Discussion / Seminar	Practical Evaluation	End Semester Exam
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓	✓	✓	✓
CO 4	✓	✓		✓
CO 5	✓	✓		✓
CO 6	✓	✓		✓
CO 7	✓	✓		✓
CO 8	✓	✓		✓
CO 9	✓	✓		✓
CO 10	✓	✓		✓



University of Kerala

Discipline	STATISTICS				
Course Code	UK1MDCSTA101				
Course Title	EXPERIMENTAL DESIGNS FOR SCIENCE				
Type of Course	MDC				
Semester	I				
Academic Level	100 - 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	2 hours	-	2 hours	4
Pre-requisites					

COURSE OUTCOMES

Up on Completion of the course, students should be able to:		Cognitive level	PSO addressed
CO1	Explain the need of experimental designs	Understand	PSO 1
CO2	Illustrate various descriptive measures in statistics	Apply	PSO 1,2, 3,4,5, 6
CO3	Demonstrate statistical reasoning in science	Apply	PSO 1,2, 3,4,5, 6
CO4	Perform statistical analyses and interpretation of results	Apply	PSO 1,2, 3,4,5, 6

COURSE CONTENT

Module	Content	Hrs
I	Experimental designs	5
	Need of experimental designs in science, Basic principles of designs- randomization, replication and local control, two sample designs, completely randomized design and randomized block design. (Concepts and examples only, derivations not required)	
II	Descriptive Statistics	10
	Descriptive Statistics for raw data: Averages (mean, median, mode), Quartiles & percentiles; Measures of Dispersion: range, quartile deviation, standard deviation; Pearson's measure of Skewness and measure of Kurtosis using partition values (Concepts and examples only, derivations not required)	
III	Introduction to Data Analysis	10
	Normal curve and its properties, Graphical tools to check normality of the data (box plot, Q-Q plot, histogram), Parameter, Statistic, Sampling distributions - Normal, chi square, t, F (Examples of statistics following these distributions), Statistical hypothesis, type I error, type II error, significance level, power of the	

	test, Z test, T test, Normality test (K-S test, Shapiro-Wilks test) and ANOVA (Concepts and examples only, derivations not required)	
IV	Practcum	20
	Practical demonstrations of Module II and III using JASP	

REFERENCES

1. Danial W., (2004). Biostatistics : A foundation for Analysis in Health Sciences, John Wiley and Sons Inc
2. Edmondson A. and Druce D.(1996). Advanced Biology Statistics, Oxford University Press
3. Goon, A.M., Gupta, M.K. and Dasgupta, B. (2016). Fundamentals of Statistics, Vol. I, 8th Ed. The World Press, Kolkata.
4. Kothari, C R, (2004). Research Methodology Methods and Techniques, New Age International Publishers, New Delhi
5. Samuels M.L. and Witmer J.A., (2002). Statistics for the life sciences, 3rd Ed, Prentice Hall
6. Whitlock M. C. and Schluter D., (2009). The Analysis of Biological Data, Roberts & Co.
7. [JASP - A Fresh Way to Do Statistics \(http://jasp-stats.org\)](http://jasp-stats.org)

Name of the Course: Experimental Designs for Science

Credits: 2:0:1 (Lecture:Tutorial:Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial	Practical (P)
CO1	Explain the need of experimental designs	PSO 1 PO 1	F,C	Understand	L	
CO2	Illustrate various descriptive measures in statistics	PSO 1,2, 3,4,5, 6 PO 1 2 4 7	P,M	Apply	L	P
CO3	Demonstrate statistical reasoning in science	PSO 1,2, 3,4,5, 6 PO 1 2 4 7	C P	Apply	L	P
CO4	Perform statistical analyses and interpretation of results	PSO 1,2, 3,4,5, 6 PO 1 2 4 7	C P	Apply	L	P

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

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO4	PSO5	PSO 6	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3						1						
CO 2	2	2	1	1	3	1	1	1		2			2
CO 3	2	2	1	1	3	1	1	1		2			2
CO 4	2	2	1	1	3	1	1	1		2			2

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium

Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Internal Examination
- 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	✓	✓	✓	✓
CO 4	✓	✓	✓	✓



University of Kerala

Discipline	STATISTICS				
Course Code	UK2DSCSTA109				
Course Title	STANDARD DISTRIBUTIONS, CORRELATION AND REGRESSION				
Type of Course	DSC				
Semester	II				
Academic Level	100 – 199				
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	Calculate Pearson's Coefficient of Correlation, Spearman's Rank Correlation Coefficient and interpret the results, Identify regression lines for data sets	Create	PSO 1,2,3,4,5
CO2	Derive marginal and conditional distributions of Bivariate Random Variables. Check for independence of random variables	Evaluate	PSO 1,2, 3
CO3	Evaluate expectation, moments, moment generating functions.	Evaluate	PSO 1,2,3
CO4	Explain Discrete Standard Distributions and apply discrete standard distributions in practical situations, Fit binomial and Poisson distributions to data sets	Create	PSO 1,2,3,4
CO5	Explain Normal and Standard normal distributions, their properties, practical applications and evaluate normal probabilities	Evaluate	PSO 1,2,3,4

COURSE CONTENT

Module	Content	Hrs
I	Bivariate data Analysis	
	Bivariate data Analysis: Scatter Diagram, Karl Pearson's Coefficient of Correlation, Spearman's Rank Correlation Coefficient, Properties of Correlation (statements and numerical problems only). Regression: Definition, Two regression lines, Fitting of Regression Lines and predictions, Coefficient of Determination	
II	Mathematical Expectation and Bivariate random variables	
	Mathematical Expectation: Expectation of a single random variable and its properties (without proof), raw moments and central moments, relation between raw moments and central moments (without proof), moment generating function and characteristic function- definition, properties (without proof) and problems. Bivariate random variables: Bivariate random variables –Joint Distribution of two random variables, properties (without proof), marginal and conditional distributions, independence of two random variables. Addition and multiplication theorems of Expectation (two random variables), Correlation (Statements and problems only)	
III	Discrete Standard distributions	15
	Discrete Standard distributions – Uniform, Binomial, Poisson – Moments, moment generating function, characteristic function, problems, additive property (Binomial and Poisson), Poisson as limiting form of Binomial, fitting of Binomial and Poisson distribution. (Statements and numerical problems only)	
IV	Normal distribution	10
	Normal distribution – Normal distribution and its uses, properties, mean, rth central moment, moment generating function, characteristic function, Standard Normal distribution- Definition, standard normal curve, numerical problems using standard normal table, convergence of Binomial and Poisson to Normal (Statements and numerical problems only)	
V	Practicum	30
	Practical based on Modules I, III & IV. Practical is to be done using R package	

PRACTICAL/LABWORK

List of Practical worksheet

1. Problems on Correlation
2. Problems on Curve fitting
3. Problems on regression lines
4. Fitting of Binomial and Poisson distribution
5. Problems based on Binomial, Poisson Normal distribution

REFERENCES

1. Gupta, S. C., and Kapoor, V. K. (1994). Fundamentals of Mathematical Statistics. Sultan Chand & Sons. New Delhi.
2. Mukhopadhyay, P. (1996). Mathematical Statistics. New Central Book Agency (P) Ltd, Calcutta.
3. Pitman, J. (1993). Probability. Narosa Publishing House, New Delhi.
4. Rohatgi V. K. (1993). An Introduction to Probability Theory and Mathematical Statistics. Wiley Eastern, New Delhi.

5. Purohit, S. G., Deshmukh, S.R., & Gore, S. D. (2008). Statistics using R. Alpha Science International, United Kingdom.

Name of the Course: STANDARD DISTRIBUTIONS, CORRELATION AND REGRESSION

Credits: 3:0:1 (Lecture:Tutorial:Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial (T)	Practical (P)
CO1	Calculate Pearson's Coefficient of Correlation, Spearman's Rank Correlation Coefficient and interpret the results, Identify regression lines for data sets	PO 1,2,3,4,6,7	Create		L	P
CO2	Derive marginal and conditional distributions of Bivariate Random Variables. Check for independence of random variables	PO1,2,7	Evaluate	F, C	L	
CO3	Evaluate expectation, moments, moment generating functions.	PO 1,2,3,6,7	Evaluate		L	
CO4	Explain Discrete Standard Distributions and apply discrete standard distributions in practical situations, Fit binomial and Poisson distributions to data sets	PO 1,2,3,6,7	Create		L	P
CO5	Explain Normal and Standard normal	PO 1,2,3,6,7	Evaluate		L	P

	distributions, their properties, practical applications and evaluate normal probabilities					
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Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	1	1	1	1	1	1	1	1	1		1	1
CO 2	1	1	1			1	1					1
CO 3	1	1	1			1	1	1			1	1
CO 4	1	1	1	1		1	1	1			1	1
CO 5	1	1	1	1		1	1	1			1	1

Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Internal Examination
- 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	✓	✓		✓
CO 4	✓	✓	✓	✓



University of Kerala

Discipline	STATISTICS				
Course Code	UK3VACSTA201				
Course Title	DATA VISUALIZATION AND INTERPRETATION				
Type of Course	VAC				
Semester	III				
Academic Level	200 – 299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	3	2hours	-	2hours	4
Pre-requisites					

COURSE OUTCOMES

Up on Completion of the course, students should be able to:		Cognitive level	PSO addressed
CO1	Explain basic concepts data	Understand	PSO-1 PO 1
CO2	Present data using diagrams and graphs	Apply	PSO-1,2,4,5 PO 1, 4, 7
CO3	Calculate the measures of central tendency and dispersion of a given data	Apply	PSO-1,2,4,5 PO 1, 4, 7
CO4	Use Spread sheet applications for statistical data analysis.	Apply	PSO-1,2,4,5 PO 1, 4, 7

COURSE CONTENT

Module	Content	Hrs
I	Data types and Scaling techniques	10
	Concepts of population and sample, quantitative and qualitative data, cross-sectional and time-series data, discrete and continuous data. Different types of scales: Nominal, ordinal, interval and ratio.	
II	Sample and census surveys	10
	Sample and census surveys-meaning and comparison. Primary data. Secondary data – its major sources. Diagrammatic presentation- line diagram, bar diagrams and pie diagrams, pictograms, cartograms and box-plot. Frequency tables, frequency polygon, frequency curve, ogives and histogram	
III	Descriptive measures	10
	Descriptive measures (concept and application only): Central tendency- Mean, median and mode. Dispersion- standard deviation, mean deviation. Relative measure of dispersion- Coefficient of variation.	
IV	Data analysis	30

	Practical based on Module 2 and 3 using Spread sheet applications like Libre office calc. Data analysis: presentation of data –Charts and Diagrams, Frequency table, Histogram, calculation of descriptive statistics.	
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PRACTICAL/LABWORK

List of Practical worksheet

1. Diagrams and Graphs
2. Frequency table and Histogram
3. Measures of Central Tendency
4. Measures of Dispersion

(Practical record not required)

REFERENCES

1. Gupta, S.C and Kapoor, V.K (2002). Fundamentals of Mathematical Statistics, Sultan Chands.
2. Kenny J. F (1947). *Mathematics of Statistics Part One*. 2nd Edition, D. Van Nostard Company, New Delhi-1.
3. Agarwal, B.L. (2006). *Basic Statistics*. 4th Edition, New Age international (P) Ltd., New Delhi.
4. Gupta S. P. (2004). *Statistical Methods*. Sultan Chand & Sons, New Delhi.
5. Dan Remenyi, George Onofrei, Joe English (2010). *An Introduction to Statistics Using Microsoft Excel*. Academic Publishing Ltd., UK
6. Neil J Salkind (2010). *Excel Statistics, A Quick Guide*. SAGE Publication Inc. New Delhi
7. Vijai Gupta (2002). *Statistical Analysis with Excel*. VJ Books Inc. Canada

Name of the Course: DATA VISUALIZATION AND INTERPRETATION

Credits: 2:0:1 (Lecture:Tutorial:Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/Tutorial (T)	Practical (P)
CO1	Explain basic concepts data	PO-1 PSO-1	Understand	F,C	L	
CO2	Present data using diagrams and graphs	PO-1,4,7 PSO-1,2,4,5	Apply	C,P	L	
CO3	Calculate the measures of central tendency and dispersion of a given data	PO-1,4,7 PSO-1,2,4,5	Apply	C,P	L	
CO4	Use Spread sheet applications for	PSO-1,2,4,5 PO 1,	Apply	P,F		P

	statistical data analysis.	4,7				
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F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs :

	PSO 1	PSO 2	PSO 3	PSO4	PS O5	PS O6	PO1	PO2	PO3	PO4	PO5	PO 6	P07	PO 8
CO 1	3					-	3							-
CO 2	1	3		2	2	-	2			1	-		2-	-
CO 3	1	3		2	2	-	2			1	-		2-	-
CO 4	1	3		2	2	-	2			1	-		2-	-

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:

- Quiz / Assignment/ Discussion / Seminar
- Internal Examination
- 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	✓	✓	✓	✓
CO 4	✓	✓	✓	✓