Mahatma Gandhi University

Kottayam

Programme	BSc (Hons) Statistics
Course Name	Fundamentals of Statistics and Data Visualisation
Type of Course	DSC A
Course Code	MG1DSCSTA100
Course Level	100
Course Summary	This course helps to acquire basic knowledge of various types of data, probability theory, correlation, regression and their real world applications. Additionally, spreadsheet functions are used to address numerical challenges associated with the topics discussed.

Semester						
	1		Credits		4	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3		1		75
Pre-requisites						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains	Program Outcome
1	Explain and understand the concepts of different types of data, sampling and sampling techniques.	U	1
2	Summarise data using various measures of central tendency, dispersion, skewness and kurtosis.	U	1
3	Analyse relationships between variables using scatter diagrams, correlation coefficients and regression analysis.	A, An	1

4	Develop skills in solving real- world problems through the application of regression techniques, particularly in predicting outcomes and understanding the limitations of predictions.	An, A	2, 3
5	Understand basic probability concepts including random experiments, sample space and elementary ideas of probability.	U	2
6	Apply Bayes' theorem to update probabilities based on new information and evidence.	E	1
7	Understand how statistical concepts are relevant across disciplines, fostering interdisciplinary thinking.	U	2
8	Apply using spreadsheets to illustrate and analyse statistical concepts, enhancing practical skills.	A, An	2

COURSE CONTENT

Content for Classroom Transaction (Units)

	Course Description	**Hours**	**CO NO.**
Module1	**Data and Variables, Measures of Central Tendency, Dispersion and Moments.**	**15**	
1.1	Types of data and variables: Concepts of primary data and secondary data, examples of univariate and bivariate data type, Diagrams and Graphs: Bar diagrams, pie diagram and frequency graphs.	2	1
1.2	Scales of measurements: Ordinal, nominal, ratio and interval.	2	1,7
1.3	Population and sample, Types of sampling: Non-probability and Probability sampling: Simple random sampling, systematic sampling, stratified random sampling and cluster sampling with real life examples (derivations not required).	3	2
1.4	Measures of central tendency: Arithmetic Mean (AM), Geometric Mean (GM), Harmonic Mean (HM), median and mode (examples using raw data).	3	2

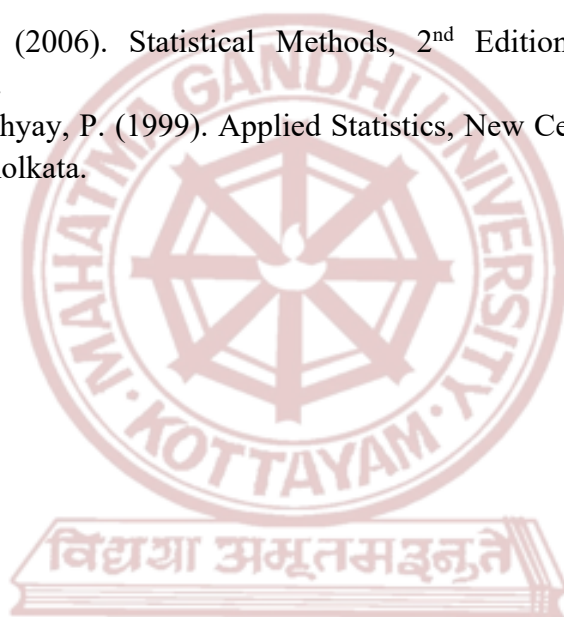|			
1.5	Measures of dispersion: Range, Quartile Deviation (QD), Mean Deviation (MD) and Standard Deviation (SD), Coefficient of Variation (CV). (examples using raw data). Box Plot.	3	2
1.6	Moments, skewness and kurtosis with examples using raw data. (derivations not required).	2	1,2
Module 2	**Correlation and Regression**	**15**	
2.1	Correlation, scatter diagram, Karl Pearson's correlation coefficient, Spearman's rank correlation coefficient. (Only the concepts, problems and properties-without proof of the above topics).	8	3
2.2	Regression: Two types of regression lines, formula and numerical problems.	7	4,7
Module 3	**Elementary Probability Theory**	**15**	
3.1	Random experiment, sample space and event with examples.	4	5
3.2	Elementary ideas of probability: Frequency, classical and axiomatic definitions with examples.	5	5
3.3	Conditional probability, independence of events, total probability law, Bayes' theorem (without proof) with examples.	6	5,6,7
Module 4	**Problem Solving using Spreadsheets** (A practical record with minimum 5 problems has to be submitted).	**30**	
4.1	Introduction to spreadsheet	**5**	1
4.2	Using spreadsheet, solve numerical problems associated with topics covered in various modules	25	7,8
Module 5	**Teacher Specific Content.**		

Teaching and Learning Approach	**Classroom Procedure (Mode of transaction)** Direct Instruction: Brainstorming lecture, E-learning, interactive Instruction, Seminar, Group Assignments, Authentic learning, Presentation by students by group.
Assessment Types	**MODE OF ASSESSMENT** **A. Continuous Comprehensive Assessment (CCA)** *Formative assessment* **Theory: 15 marks** Quiz, Assignments **Practical: 15 marks** Lab involvement, Practical Record,Viva voce *Summative assessment* **Theory: 10 marks** Written tests
	B. End Semester Evaluation (ESE) **Theory : 50 marks** i) Short answer type questions: Answer any 7 questions out of 10 (7*2=14). ii) Short essay type questions: Answer any 4 questions out of 6 (4*6=24). iii) Essay type questions: Answer any 1 question out of 2 (1*12=12). **Practical: 35 marks** Problem solving skills: 30 marks Record: 5 marks

References:

1. Gupta, S. C. and Kapoor, V. K. (2020). Fundamentals of Mathematical Statistics, 12th Edition, Sultan Chand and Sons.
2. Gupta, S.P. (2021). Statistical Methods, 46th Edition, Sultan Chand and Sons: New Delhi.
3. Beverly J. Dretzke. (2008). Statistics with Microsoft Excel, 4th Edition, Pearson.

Suggested Readings:

1. Medhi, J. (2006). Statistical Methods, 2nd Edition, New Age International Publishers.
2. Mukhopadhyay, P. (1999). Applied Statistics, New Central Book Agency Private Limited, Kolkata.