



B. Sc. Statistics (Faculty of Science)
B. Sc. First Year Semester (II)

Course Code	US02MISTA01	Title of the Course	DESCRIPTIVE STATISTICS FOR BIVARIATE DATA
Total Credits of the Course	02	Hours per Week	02

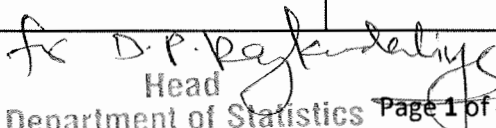
Course Objectives:	<ol style="list-style-type: none"> 1. To establish functional relationship between two variables. 2. To study causal relationship between two related variables and measure the strength of relationship between two variables. 3. Understand the line of best fit as a tool for summarizing a linear relationship and predicting for the future.
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Course Content		
Unit	Description	Weightage* (%)
I	<p>Curve fitting :</p> <p>Principle of least squares</p> <p>Fitting of (i) $Y = a + bX$ (ii) $Y = a + bX + cX^2$ (iii) $Y = ab^X$ (iv) $Y = aX^b$</p> <p>Correlation :</p> <p>Objectives, Definition, Methods of studying correlation (a) Scatter diagram method (b) Karl- Pearson's correlation coefficients and its properties (with proof) (c) Spearman's Rank Correlation coefficient and its properties (with proof)</p> <p>Examples</p>	50%
II	<p>Regression Analysis :</p> <p>Meaning and importance, Derivation of both the regression lines and properties of regression coefficients (with proof) and Examples</p>	50%

Teaching-Learning Methodology	Interactive Class Lectures, ICT Tools, hand on experience in problem solving through practical sessions.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage




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Vallabh Vidyanagar, Gujarat
(Reaccredited with 'A' Grade by NAAC (CGPA 3.25)
Syllabus with effect from the Academic Year 2023-2024

1.	Internal Written / Practical Examination	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Attendance	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to

1. understand and interpret the correlation between two variables
2. learn how to apply linear regression models in practice
- 3.

Suggested Text Books/ References:

Sr. No.	Text Books
1.	B. L. Agarwal (2003). Programmed STATISTICS (Questions – Answers). New Age International Publishers. Chap. 13, 14, 16.
2.	D. Bhattacharya and S. Roychowdhury (2019 reprint). STATISTICS, Theory and Practice, 3 rd Ed., U.N. Dhur & Sons Pvt. Ltd., Kolkata. Chap. 8-9.
3.	D. freedman, R. Pisani, R. Purves (2017 reprint). Statistics, 4 th Ed., Viva Books, Kolkata. Chap. 8-12.
4.	Goon, A.M., Gupta, M. K. And Dasgupta, B. (2002). Fundamental of Statistics, Vol. I, 8 th Ed., The World Press, Kolkata. Chap. 11-12, 14.
5.	B. L. Agarwal (2006). Basic Statistics, Revised 4 th Ed., New Age International Publishers. Chap. 24.
	Reference Books
5.	Bilal, M. A. And Richard, H. M. (2015). Probability, Statistics, and reliability for Engineers and Scientists, 3 rd Ed. Special Indian Ed., CRC Press. Chap. 12.
6.	J. McClave and T. Sincich (2018). Statistics, 13 th Ed., Pearson, NY. Chap. 2, 11.
7.	A. Anderson and D. Semmerlroth (2015). Statistics for Big Data for Dummies: A Wiley Brand. John Wiley & Sons. Chap 15-16.





Course Code	US02MISTA02	Title of the Course	Statistics Practical - II
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	<ol style="list-style-type: none">1. To understand the two-dimensional data in scientific and other fields2. To summarize and derive tangible information contained in the two-dimensional inter-related and time related scientific and other data
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List of Practicals

Sr.	Task Using MS-EXCEL /Manual
1	Tabulation of scientific data: Bivariate quantitative data, bivariate quantitative-qualitative data
2	Diagrammatical presentation of all bivariate scientific data: Scatter diagram, box-plots
3	Fitting of Straight line
4	Fitting of Second degree Parabola
5	Fitting of Exponential Curve
6	Fitting of Power curve
7	Computation of Karl Pearson correlation coefficient
8	Computation of Spearman's rank correlation coefficient
9	Fitting of regression lines

REFERENCE MATERIAL

1.	Fred, Pyrczak (2017). SUCCESS at STATISTICS, A worksheet with Humor, 6 th Ed., Routledge, NY.
2.	Pal, N. And Sarkar, S. (2005). STATISTICS, Concepts and Applications, Prentice Hall of India, New Delhi.
3.	K.V.S. Sarma (2001). STATISTICS made Simple DO It Yourself on PC, Prentice Hall of India, New Delhi.



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4.	B. L. Agarwal (2006). Basic Statistics, Revised 4 th Ed., New Age International Publishers. Chap. 24.
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Week-wise Teaching Plan

Week	Topics
1	Definition and scope of bivariate data in sciences.
2	Bivariate Data: quantitative and qualitative, attributes and variables, causal relationship and association, Classification and tabulation of data.
3	Diagrammatic presentation and interpretation of bivariate data, scatter plots.
4	Measure of correlation: Karl Pearson correlation coefficient and its interpretation.
5	Spearman's rank correlation (for qualitative and quantitative data), Properties of correlation coefficients.
6	Measures of causal relationship: Introduction to regression and two regression lines, least square method.
7	Fitting of regression lines and examples.
8	Properties of regression coefficients. Measure of quality of regression: Coefficient of determination R-square.





B. Sc. (Any B-group Subject) (Faculty of Science)
Skill Enhancement Course First year Semester (II)

Course Code	US02SESTA01	Title of the Course	BIOSTATISTICS FOR DATA HANDLING
Total Credits of the Course	02	Hours per Week	02

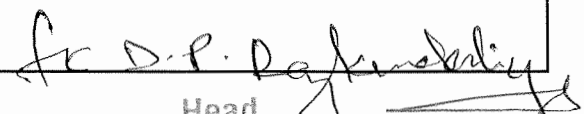
Course Objectives:	<ol style="list-style-type: none"> 1. To understand the data characteristics of interests, their pattern and relationships in scientific, medical fields 2. To summarize and derive tangible information contained in the scientific and medical field data 3. To be able to identify and apply suitable statistical methods for study of the population characteristics
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Course Content		
Unit	Description	Weightage* (%)
I	Handling Bivariate Data: Examples of bivariate data Correlation concept, kinds of correlation, graphical measure of correlation, coefficient (numerical measure) of correlation such as Pearson Correlation and Spearman's Correlation. Regression analysis for cause and effect relationship. Regression equations (without proof).	50
II	Tests of significance of (single) mean (as population mean) such as Z-test, t-test, sign test for median, Tests of significance of difference between two means (comparing two population means) such as Z-test, t-test, Wilcoxon signed rank sum test, Mann-Whitney U test. Chi-square test for 2x2 contingency table.	50

Teaching-Learning Methodology	Interactive Class Lectures, ICT Tools, hand on experience in problem solving through practical sessions.
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Evaluation Pattern	
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Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to

1. Identify distribution patterns for the given biological data.
2. Quantify and represent the measures of bivariate relationships in the biological data.
3. Calculate confidence interval and carry out test the significance for the sample quantity pertaining to the population characteristics under study.

Suggested Text Books/ References:

Sr. No.	Text Books
1.	S. Prasad (2006). Elements of Biostatistics, 2 nd revised ed., Rastogi Publications, Meerut-250002.
2.	Irfan Ali Khan, Atiya Khanum, and Shiba Khan (2018). Fundamentals of Biostatistics, 5 th revised ed., Ukaaz Publications, Moosarambagh, Hyderabad-500036.
3.	Marcello Pagano and Kimerlee Gauvreau (2004). Principles of Biostaistics, 2 nd ed., Thompson Asia Pte. Ltd., Singapore.
4.	Wayne W. Daniel (2007). Biostatistics: A Foundation for Analysis in the Health Sciences, 7 th ed. John Wiley INDIA Student Edition.
5.	G.C. Patel and G.K. Jani (2017). Basic Biostatistics for Pharmacy, 2 nd ed., Atul Prakashan, Gandhi Road, Ahmedabad.
	Reference Books
5.	B. L. Agarwal (2003). Programmed STATISTICS (Questions – Answers). New





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	Age International Publishers. Chap. 1-5.
6.	B. L. Agarwal (2006). Basic Statistics, Revised 4 th Ed., New Age International Publishers. Chap. 18.



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B. Sc. Statistics (Faculty of Science)
Inter Disciplinary
First Year Semester (II)

Course Code	US02IDSTA01	Title of course	Foundation of Statistics-II
Total Credit of course	02	Hours per week	02

Course Objectives:	1. To establish functional relationship between two variables. 2. To study causal relationship between two related variables and measure the strength of relationship between two variables.
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Course Content		
Unit	Description	Weightage* (%)
I	Correlation: Objectives, Definition, Methods of studying correlation (a) Scatter diagram method (b) Karl- Pearson's correlation coefficients and its properties (without proof) (c) Spearman's Rank Correlation coefficient and its properties (without proof) Probable Error and Standard Error Coefficient of determination Correlation in bivariate frequency table Concurrent deviation method Examples	50%
II	Regression Analysis: Meaning and utility Methods of studying Regression (a) Graphical method (b) Algebraic method (i) Regression equation (ii) Regression coefficient properties of regression coefficients (without proof) Regression in bivariate frequency table Examples	50%

Teaching-Learning Methodology	Interactive Class Lectures, ICT Tools, hand on experience in problem solving through practical sessions.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand and interpret the correlation between two variables
2.	Learn how to apply linear regression models in practice

Suggested Text Books/ References:	
Sr. No.	Text Books
1.	B. L. Agarwal (2006). Basic Statistics, Revised 4 th Ed., New Age International Publishers. Chap. 18.
2.	D. Bhattacharya and S. Roychowdhury (2019 reprint). STATISTICS, Theory and Practice, 3rd Ed., U.N. Dhur & Sons Pvt. Ltd., Kolkata. Chap. 8-9.
3.	D. Freedman, R. Pisani, R. Purves (2017 reprint). Statistics, 4th Ed., Viva Books, Kolkata. Chap. 8-12.
4.	Goon, A.M., Gupta, M. K. And Dasgupta, B. (2002). Fundamental of Statistics, Vol. I, 8th Ed., The World Press, Kolkata. Chap. 11-12, 14.
5.	B. L. Agarwal (2003). Programmed STATISTICS (Questions- Answers). New Age International Publishers. Chap. 13, 14, 16.





B. Sc. Statistics (Faculty of Science)
Inter Disciplinary
First Year Semester (II)

Course Code	US02IDSTA02	Title of the Course	STATISTICS PRACTICAL
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	1.To understand the two-dimensional data in scientific and other fields 2. To summarize and derive tangible information contained in the two dimensional inter-related and time related scientific and other data.
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List of Practical Using MS Excel / Pascal	
1	Calculation of Correlation by the method of Scatter diagram and its interpretation.
2	Calculation of Correlation coefficient by the method of Karl Pearson and its interpretation.
3	Calculation of Correlation coefficient by the method of Karl Pearson, and interpretation using probable error and Standard error.
4	Calculation of Correlation coefficient by the method of Karl Pearson, and interpretation using Coefficient of determination.
5	Calculation of Correlation for bivariate frequency table and its interpretation.
6	Calculation of Rank correlation and its interpretation.
7	Calculation of Correlation coefficient by Concurrent deviation method.
8	Calculation of Regression line through Graphic method (Scatter diagram).
9	Calculation of Regression line through Regression equation.

REFERENCE MATERIAL

1.	Fred, Pyrczak (2017). SUCCESS at STATISTICS, A worksheet with Humor, 6th Ed., Routledge, NY.
2.	Pal, N. And Sarkar, S. (2005). STATISTICS, Concepts and Applications, Prentice Hall of India, New Delhi.





3.	K.V.S. Sarma (2001). STATISTICS made Simple DO It Yourself on PC, Prentice Hall of India, New Delhi.
4.	B. L. Agarwal (2006). Basic Statistics, Revised 4th Ed., New Age International Publishers. Chap. 24.

