

THE GANDHIGRAM RURAL INSTITUTE (DEEMED TO BE UNIVERSITY)

CENTRE FOR APPLIED RESEARCH

UG PROGRAMME (2018 - 2019)

Paper Code	Course Title	Credits	Total
19APRU0003	B.Sc Microbiology 1. ALLIED BIO-STATISTICS - I	4	4
19APRU0004	2. ALLIED BIO-STATISTICS - II	4	4

B.Sc. MICROBIOLOGY

COURSE SYLLABUS

Course Code & Title	19APRU0003 ALLIED BIO-STATISTICS - I	No. of Credits: 4 (3 + 1)	3 hours
Programme	B.Sc Microbiology	Semester - III	Max. Marks: 100
Cognitive Level	K-1 Understanding basic concepts in Bio-Statistics		
	K-2 Skill in computing basic statistical measures in the biological data analysis		
	K-3 Interpretation of statistical outcomes		
Course Objectives	<ul style="list-style-type: none"> • To understand the basic concepts and terms and its relevance in biology. • To develop computation skills in statistics and analyze data using relevant statistical methods. 		

UNIT	CONTENT	NO. OF HOURS
I	Biostatistics – definition – types of data – Primary and Secondary data – Methods of Collection of data – Sources of data in life science – Limitation and uses of statistics.	6
II	Classification and Tabulation of data – Diagrammatic and Graphic representation of data.	16
III	Measures of Central Tendency: Mean, Median, Mode, Geometric Mean and Harmonic Mean – Merits and Demerits. Measures of dispersion: Range, Standard deviation, Mean deviation, Quartile deviation, – Merits and Demerits, Coefficient of variation.	8
IV	Measures of skewness – Definition, Types; Karl Pearson’s coefficient of skewness – Bowley’s Co-efficient of Skewness; Measures of Kurtosis – Definitions, Types and Measures; Simple problems.	12
V	Correlation: Definition, Types and Measures of Correlation – Karl Pearson’s correlation coefficients, Spearman’s Rank Correlation coefficients. Regression: Concept, Definitions – Simple regression equations – fitting of regression equation – Illustrations.	12

PRACTICAL	1. Graphical presentation of data – Diagrams, Frequency curves and polygons.	4
	2. Measures of Central values – Mean, median and mode.	6
	3. Measures of dispersion – Range, standard deviation and coefficient of variation.	6
	4. Correlation & Regression analysis – Computation of correlation coefficient and determination of regression equations.	4

REFERENCES	<p>Text Books:</p> <ul style="list-style-type: none"> • Verma B.L, Shukla G.D and Srivastava.R.N, <i>Biostatistics – Perspectives in Health Care; Research and Practice</i>, New Delhi: CBS Publishers & Distributors, 1993. • Daniel WW,(1987). <i>Biostatistics</i>, John Wiley and Sons, New York • Gurumani, N – <i>Introduction to Bio-Statistics</i>, MJA Publishers, Chennai, 2004. • Arora.P.N. and Malhan.P.K, <i>Biostatistics</i>, Delhi: Himalaya Publishing House, 1996 <p>Reference Books:</p> <ul style="list-style-type: none"> • Daroga Singh, Chaundjari.F.S, <i>Theory and Analysis of Sample Survey</i>, New Delhi; Wiley Eastern Ltd., 1986. • Gupta. C.B, <i>An Introduction to Statistical Methods</i>, New Delhi: Vikas Publishers, 1992. • Gupta. S.P, <i>Statistical Methods</i>, New Delhi: Sultan Chand, 1992 <p>Website:</p> <ul style="list-style-type: none"> • https://www.biostat.washington.edu/about/biostatistics • http://sphweb.bumc.bu.edu/otlt/MPH-Modules/BS/BS704_BiostatisticsBasics • https://www.edx.org/course/biostatistics-0
COURSE OUTCOMES	<p>On completion of the course, students will be able to do the following:</p> <p>C01: Understand the basic concepts of statistics and its relevance with core area.</p> <p>C02: Present biological data using diagrams charts and graphs.</p> <p>C03: Describe sample characteristics using descriptive statistics.</p> <p>C04: Bring out the relationship between different biological variables.</p> <p>C05: Make regression estimates and carry out analysis and interpretation of biological data.</p>

B.Sc. MICROBIOLOGY**COURSE SYLLABUS**

Course Code & Title	19APRU0004 ALLIED BIO-STATISTICS - II	No. of Credits: 4 (3 + 1)	3 hours
Class	B.Sc Microbiology	Semester - IV	Max. Marks: 100
Cognitive Level	K-1 Knowledge on application of Statistics in Bio-Sciences		
	K-2 Skill in computing statistical measures in the biological data analysis		
	K-3 Interpretation of statistical outcomes		
Course Objectives	<ul style="list-style-type: none"> To understand the basic concepts and terms and its relevance in biology. To develop computation skills in statistics and analyze data using relevant statistical methods. 		

UNIT	CONTENT	NO. OF HOURS
I	Probability – Concept, Definition; Addition and Multiplication Theorems (without proof). Simple Problems based on Probability.	6
II	Sampling – Definition, basic concepts; types of Sampling – sample versus census, simple random sampling with and without replacement, use of random number tables and lottery method for selection of random samples; Determination of sample size.	6
III	Sampling distribution - Standard error – Test of Hypothesis: Simple Hypothesis, Null hypothesis – Test of Significance: Large sample tests with regard to Mean, Differences of Means, Proportions and difference of Proportions.	8
IV	Test of Significance: Small Sample Test with regard to Mean, Difference of Means and Variances – Paired t test - Chi – square test – Procedures and simple problems.	12
V	Analysis of variance (ANOVA) – concepts and examples – explanation. ANOVA for one way and two way classifications – Procedures and simple problems.	12

PRACTICAL	1. Test of significance – Large sample tests and Test of significance for attributes.	6
	2. Test of significance – Small sample tests	4
	3. Chi-square test – Independence of attributes (for 2 X 2 contingency table)	4
	4. Analysis of variance – One-way and Two-way classifications.	6

REFERENCES	<p>Text Books:</p> <ul style="list-style-type: none"> • Verma B.L, Shukla G.D and Srivastava.R.N, <i>Biostatistics – Perspectives in Health Care; Research and Practice</i>, New Delhi: CBS Publishers & Distributors, 1993. • Daniel WW,(1987). <i>Biostatistics</i>, John Wiley and Sons, New York • Gurumani, N – <i>Introduction to Bio-Statistics</i>, MJA Publishers, Chennai, 2004. • Arora.P.N. and Malhan.P.K, <i>Biostatistics</i>, Delhi: Himalaya Publishing House, 1996 <p>Reference Books:</p> <ul style="list-style-type: none"> • Daroga Singh, Chaundjari.F.S, <i>Theory and Analysis of Sample Survey</i>, New Delhi; Wiley Eastern Ltd., 1986. • Gupta. C.B, <i>An Introduction to Statistical Methods</i>, New Delhi: Vikas Publishers, 1992. • Gupta. S.P, <i>Statistical Methods</i>, New Delhi: Sultan Chand, 1992 <p>Website:</p> <ul style="list-style-type: none"> • https://www.biostat.washington.edu/about/biostatistics • http://sphweb.bumc.bu.edu/otlt/MPH-Modules/BS/BS704_BiostatisticsBasics • https://www.edx.org/course/biostatistics-0
COURSE OUTCOMES	<p>On completion of the course, students will be able to do the following:</p> <p>C01: Understand the concepts of statistics and its relevance with core area.</p> <p>C02: Understand the concepts of probability and sampling.</p> <p>C03: Visualize their biological research issues in terms of scientific inquiry.</p> <p>C04: Understand the concept of Decision making with aid of hypothesis testing.</p> <p>C05: Make estimates and carry out analysis and interpretation of biological data.</p>