Institute of Microbiology and Molecular Genetics
Faculty of Life Sciences
University of the Punjab, Lahore
Course Outline

Programme	BS	Course Code	MMG403	Credit Hours	03
Course Title	BIOSTATISTICS				

COURSE INTRODUCTION

Life-sciences research generates a lot of data, and it is very difficult to draw correct conclusions with prior knowledge of basic statistics. So, biostatistics is a skill vital for every life scientist, especially a microbiologist or geneticist. This course will cover an introduction to the key concepts of biostatistics, providing a background understanding of descriptive and analytical methods that are used for proper interpretation of experimental results. This course consists of basic statistical concepts, data collection, summarization, presentation, significant differences, basic methods of association, and regression modeling. The skills learned in this course will be used in future research projects and daily life.

LEARNING OUTCOMES

On the completion of the course, the students will:
1. be able to identify different variables
2. be able to summarize and present data
3. have an idea of basic probability
4. able to formulate hypothesis
5. able to apply proper statistical test on any given data and interpret it

COURSE CONTENT

Introduction to Biostatistics and its scope in Microbiology and Genetics; Types of variables; Experimental Designing; Collection of Primary and Secondary data; Presentation of data: Tabulation, Classification, Visual Presentation (Diagrams and Graphs); Measures of Central Tendency: Mean, Mode, Median, Quartile; Measures of Dispersion: Range, Variance, Standard Deviation, Standard Error, Probability : Normal distribution; Standard curve and Z-scores; Concept of Probability , Laws of Probability;
Concept of Hypothesis Testing; Chi-square test: Goodness of Fit, Test of Independence/Association/Equal proportion; Student's t-test: One-sample, Independent sample, Paired sample; Analysis of Variance; Correlation; Regression

PRACTICALS

1. Students will collect class data related to different variables and then summarize and analyze
2. Students will collect leave length and width data of different plants then summarize and analyze

TEXTBOOKS AND READING MATERIAL

1. Dytham, C. 2011. *Choosing and Using Statistics: A Biologist's Guide* (3rd edition), Wiley-Blackwell, UK.
2. MacGillivray, H., Utts, J. M., and Heckard, R. F. (2014). *Mind on Statistics*. Cengage Learning.
3. McDonald, J. H. (2014). *Handbook of Biological Statistics*. Sparky House Publishing. https://www.biostathandbook.com/
4. Ross, S. M. (2010). *Introductory Statistics*, Elsevier Science, USA.
5. Rossi, R. J. (2022). *Applied Biostatistics for the Health Sciences* (2nd edition). John Wiley & Sons, Inc.
6. Samuels, M. L., Witmer, J. A., and Schaffner, A. A. (2016). *Statistics for the Life Sciences* (5th edition). Pearson, USA.

ASSESSMENT

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on activities, short tests, projects, practicals, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It will be in the form of a test to assess the student's understanding of basic statistical concepts and their application in real situation.