

B. PHARMACY

Syllabus ♦ Semester-8

Subject name with code: **13PH0801 Biostatistics and Research Methodology**

Course Objective

To understand the applications of Biostatistics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, non-Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.

Course Outcomes

Upon completion of the course, the student shall be able to

1. Know the operation of M.S. Excel, SPSS, R and MINITAB®, DoE (Design of Experiment).
2. Know the various statistical techniques to solve statistical problems.
3. Appreciate statistical techniques in solving the problems.

Teaching and assessment scheme

Teaching Scheme (Hours)			Credits	Theory/ Tutorial Marks			Practical Marks		Total Marks
Theory	Tutorial	Practical		CSE	IA (I)	ESE (E)	TW	Viva (V)	
3	1	0	4	10	15	75	0	0	100

Theory syllabus

Teaching hours: **45 Hours**

Unit-1

10 Hours

Introduction: Statistics, Biostatistics, Frequency distribution. Measures of central tendency: Mean, Median, Mode Pharmaceutical examples. Measures of dispersion: Dispersion, Range, standard deviation, Pharmaceutical Problems. Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlations - Pharmaceuticals examples.

Unit-2

10 Hours

Regression: Curve fitting by the method of least squares, fitting the lines $y = a + bx$ and $x = a + by$, Multiple regression, standard error of regression - Pharmaceutical Examples. Probability: Definition of probability, Binomial distribution, Normal distribution Poisson's distribution, properties - problems Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, the essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of the mean (SEM) - Pharmaceutical examples. Parametric test: t-test (Sample, Pooled or Unpaired and Paired), ANOVA, (One way and Two way), Least Significance difference.

Unit-3

10 Hours

Non-parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test. Introduction to Research: Need for research, Need for the design of Experiments, Experiential Design Technique, plagiarism. Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph. Designing the methodology: Sample size determination and power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

Unit-4

8 Hours

Blocking and confounding system: for two-level factorials. Regression modelling: Hypothesis testing in Simple and Multiple regression models. Introduction to Practical components of Industrial and Clinical Trials Problems: Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software to Industrial and Clinical trial approach.

Unit-5

7 Hours

Design and analysis of experiments: Factorial Design: Definition, 2^2 , 2^3 design. Advantage of factorial design. Response Surface methodology: Central composite design, Historical design, Optimization Techniques.

Tutorials will be based on the above syllabus.

Teaching hours: **15 Hours**

Recommended references (Latest edition)

1. Pharmaceutical statistics - Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. New York.

2. Fundamental of Statistics - Himalaya Publishing House- S. C. Gupta.
3. Design and Analysis of Experiments - PHI Learning Private Limited, R. Pannerselvam.
4. Design and Analysis of Experiments - Wiley Students Edition, Douglas and C. Montgomery.