Course Code	Course Title	Teaching Load			Marks		Exam (hrs)		Credits
		L	T	P	Int.	Ext.	Int.	Ext.	
BP801T	Biostatistics & Research Methodology	3	1	-	25	75	1	3	4

Scope: To understand the applications of Biostatics 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.

Objectives: 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.

Module 01 **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 correlation - Pharmaceuticals examples.

Module 02 **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, essence of sampling, types of sampling, Type I Error, Type II Error ,Standard error of mean (SEM)- Pharmaceutical examples

Parametric test

- t-test (Sample, Pooled or Unpaired and Paired) , ANOVA, (One way and Two way), Least Significance difference.

Module 03 **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 design of Experiments, Experiential Design Technique, and 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.

Module 4 **08 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's to Industrial and Clinical trial approach.

Module 05 **07Hours**

Design and Analysis of experiments

Factorial Design

- Definition, 22, 23design. Advantage of factorial design.

Response Surface methodology

- Central composite design, Historical design, Optimization Techniques.

Recommended Books (Latest edition)

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork.
2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha.
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