

## Course contents for Advances in Biostatistics

1. **Faculty:** FLSB
2. **Course Code:** LSB505
3. **Course Title:** Advances in Biostatistics
4. **Number of Credits:** 3 (2,1,0)
5. **Course objectives:**

Statistics is the practice or science of collecting and analyzing numerical data in large quantities, especially for the purpose of inferring proportions in a whole from those in a representative sample. The course aims to develop competency and expertise in the application of statistical methods applied to biological data obtained in experimental techniques, methodology and the safe laboratory practice. Students also will get an opportunity to learn R programming for doing statistical analysis.

6. **Minimum prerequisites for taking this course, if any:**  
Basic knowledge of mathematics, data analysis and interpretation would be expected. Should have basic laptop.

7. **Course structure with units, if applicable:**

### **Module I**

Introduction to R Programming Language.

### **Module II**

Statistics and Biostatistics: Preliminary concepts.

Measures of Central Tendency: Mean, Median, Mode using R

Measures of Dispersion: Range, Standard deviation, Variance using R

### **Module III: Probability and Continuous Distribution**

Random Experiments, Trial and Event, Sample Space, Mutually Exclusive or Disjoint Events, Mutually Exhaustive Events, Equally Probable Events, Complementary Event, Classical definition of Probability, Statistical definition of Probability, Axiomatic definition of Probability, Addition theorem, Multiplication theorem, Conditional Probability, Bayes' Theorem. Expectation, Normal Distribution, Properties of Normal distribution

### **Module IV: Correlation and Regression**

Bivariate distribution Correlation, Types of Correlation, Simple Correlation Coefficient for ungrouped data, Properties and Interpretation of Correlation Coefficient, Coefficient of determination, Scatter diagram, Standard Error, Probable error of Correlation Coefficient. Rank correlation and Some examples using R.

Definition, Regression lines and Regression Coefficients, Properties of Regression Coefficients, Some examples. Method of least square: Fitting of straight line using R.

### **Module V: Advance Statistics**

Parameter, Statistic, Null hypothesis, Alternative hypothesis, Critical region, Type I Error, Type II Error, Level of significance, P-value and its applications using R

Test of Significance for Small samples: One sample t-test, Paired t-test, Degrees of freedom for t-test, F test for equality of Population variances, Degrees of freedom for F-test.

Test of Significance for Large samples: Normal test for sample mean and population mean, Normal test for two sample means using R

Chi-square Test: Test of goodness of fit, Test of Independence of attributes, Degrees of freedom for Chi-square test, Coefficient of contingency, Yates' correction for continuity.

Analysis of Variance: One way and Two way.

