

<b>Programme</b>	<b>BS Botany</b>	<b>Course Code</b>	<b>BOT-311</b>	<b>Credit Hours</b>	<b>2</b>
<b>Course Title</b>	<b>Biostatistics (Theory)</b>				
<b>Introduction</b>					
The course will provide knowledge about the importance and use of statistics in life sciences. It will help the students to understand the methods to analyze data pertaining to their research work and to assess the significance of their experimental designs.					
<b>Learning Outcomes</b>					
After completing this course, the student will:					
<ul style="list-style-type: none"> <li>• gain knowledge about the importance and use of statistics in life sciences.</li> <li>• understand the methods to analyze data pertaining to their research work and to assess the significance of their experimental designs.</li> <li>• apply basic statistical procedures for analysis of data for practical and research.</li> </ul>					
<b>Course Contents</b>					
<b>Introduction objectives and scope:</b>					
<ul style="list-style-type: none"> <li>• Definition</li> <li>• Characteristics</li> <li>• Importance and limitations</li> <li>• Population and samples</li> </ul>					
<b>Frequency distribution:</b>					
<ul style="list-style-type: none"> <li>• Variable types</li> <li>• Formation of frequency table from raw data</li> <li>• Summation, notation and statistical inference</li> <li>• Data transformation.</li> </ul>					
<b>Measures of central tendencies and dispersion:</b>					
<ul style="list-style-type: none"> <li>• Arithmetic mean</li> <li>• Median</li> <li>• Mode</li> <li>• Range</li> <li>• Variance</li> <li>• Standard deviation</li> <li>• Standard error of the mean</li> <li>• Mean deviation.</li> </ul>					
<b>Organizing and describing data (Standard distributions):</b>					
<ul style="list-style-type: none"> <li>• Random sampling and the binomial distribution</li> <li>• Probability, Types of Probabilities, Random variables, Combining probabilities,</li> </ul>					

Probability distributions, Binomial distributions.

- Poisson and normal distributions, properties and applications.

**Basic experimental design:**

- Concept and design
- Principles of experiments
- Observational studies
- Planning of experiments
- Replication and randomization
- Field plot technique

- Layout and analysis of completely randomized design
- Randomized complete block design
- Latin square
- Factorial design
- Treatment comparison

**Tests of significance:**

- T-test: (Basic idea, confidence limits of means, significant difference of means.
- Chi square test: Basic idea, testing goodness of fit to a ratio, testing association (contingency table).

F-test: Introduction and application in analysis of variance.

- LSD test, Duncan's New Multiple Range test (for comparison of individual means). Bonferroni test.

**Introduction to comparing of means:**

- Unit organization, Basic one-way ANOVA, Types of sums of squares, How ANOVA works, The ANOVA Table. Two-way ANOVA-Factorial designs: (two-way factorial analysis, calculating and analyzing the two-way ANOVA, Linear combination, multiple comparisons. Correlation and Regression.