# GUJARAT TECHNOLOGICAL UNIVERSITY

## BIO TECHNOLOGY (04)
## BIOSTATISTICS
## SUBJECT CODE: 2180403
B.E. 8th SEMESTER

**Type of course:** B.E. (Biotechnology)

**Prerequisite:** Basic concept of Mathematics and Biotechnology.

**Rationale:**

The objective of this course is to teach the students basics of biostatistics and its applications in various fields like biology, agriculture and genetics.

**Teaching and Examination Scheme:**

| Teaching Scheme | | | Credits | Examination Marks | | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Theory Marks | | | Practical Marks | | | |
| L | T | P | C | ESE (E) | PA (M) | | PA (V) | | PA (I) | |
| | | | | | PA | ALA | ESE | OEP | | |
| 3 | 0 | 0 | 3 | 70 | 20 | 10 | 0 | 0 | 0 | 100 |

**Course Contents:**

| Sr. No. | Topics | Teaching Hours | Module Weightage |
|---|---|---|---|
| 1. | **UNIT I: Introduction to Biostatistics**<br>Introduction, Statistical terms, aims and applications of statistics, limitations of statistics | 2 | 4% |
| 2. | **UNIT II: Collection, Classification and Presentation of Data**<br>Data: Numerical Representation, types of sampling, Non probability sampling, Organization and classification of data, Methods of classification of data, Frequency Distribution Tabular and Graphic presentation, types of graphs, significance and limitations of graphs, illustrative examples. | 5 | 10% |
| 3. | **UNIT III: Central Tendency**<br>Characteristics, Measures of central tendency: mean, median, mode, Standard score or Z – score, Percentiles, Quartiles, Quintiles, Deciles | 5 | 10% |
| 4. | **UNIT IV: Variability**<br>Definition, importance, measures of dispersion : range, selected percentiles, quartiles, variance, standard deviation, mean deviation and coefficient of variation, standard error and degree of freedom | 4 | 8% |

| | | | |
|---|---|---|---|
| **5.** | **UNIT V: Skewness, Kurtosis and Moments**<br>Skewness – features, measures, significance<br>Kurtosis – features, measures, significance<br>Moments – role and types | **2** | **4%** |
| **6.** | **UNIT VI: Correlation and Regression**<br>Introduction, correlation, significance, bivariate and multivariate distributions, types of correlation, measures of correlation, objectives of regression analysis, regression coefficient, coefficient of determination, Spearman's Rank Correlation Coefficient | **5** | **10%** |
| **7.** | **UNIT VII: Theoretical Distribution, Set theory and Probability**<br>Normal Distribution, Permutation and Combination, Binomial Distribution, Multinomial Distribution, Pascal's Triangle, Poisson Distribution, Set Theory, Probability, Baye's Theory | **4** | **8%** |
| **8.** | **UNIT VIII: Analysis of Variance and Test of Significance**<br>Introduction, Test of Significance, Types of Hypothesis, Two tailed and one tailed test, Assumptions, Test of ANOVA, Computation of ANOVA | **8** | **18%** |
| **9.** | **UNIT IX: Student's t-Test, Z-Test, F- Test. Chi Square Test**<br>Introduction, Assumptions and types of t-Tests, Formula for determination of chi square, Chi square distribution, Characteristics and working rule for chi square test, characteristics of z-test and its applications, F-test, assumptions and working procedure | **8** | **18%** |
| **10.** | **UNIT X: Non Parametric Tests**<br>Introduction, advantages and disadvantages of non parametric tests, Sign Test, Wilcoxon Signed Rank test, Wilcoxon Rank Sum Test, The Mann Whitney Test, The Kolmogorov Smirnov Goodness of fit test, Kruskal – Wallis One way analysis of Variance by Ranks, | **5** | **10%** |

**Suggested Specification table with marks (Theory):**

| **Distribution of Theory Marks** | | | | | |
|---|---|---|---|---|---|
| **R Level** | **U Level** | **A Level** | **N Level** | **E Level** | **C Level** |
| 3 | 7 | 16 | 16 | 21 | 7 |

**Legends: R=** Remembrance**; U=** Understanding**; A=** Application**; N =** Analyze**;**
**E =** Evaluate; **C** = Create and above Levels **(Revised Bloom's Taxonomy)**

**Note:** This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**Reference Books:**


1. Fundamentals of Biostatistics by Veer Bala Rastogi, Publisher: Ane Books Pvt. Ltd.
2. Introduction to Biostatistics by Dr. Pranab Kumar Banerjee, Publisher: S. Chand & Company Pvt. Ltd.
3. Fundamentals of Biostatistics by Khan and Khanum, Publisher : Ukaaz Publications

**Course Outcome:**

After learning the course, the students should be able to:

1. Develop sound techniques for handling and analyzing the data
2. Process the data to draw valid inferences.

**List of Open Source Software/learning website:**

Students can refer to video lectures available on the websites including NPTEL. Students can refer to the CDs which are available with some reference books.

**ACTIVE LEARNING ASSIGNMENTS**: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.