**BIOSTATISTICS**

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| **Course Code:** 0542-2109 | **Course Title:** Biostatistics | |
| **Course Type:** Compulsory | **Level/Term:** Level 2, Term 1 | **Pre-requisite (s):** None |
| **Credit: 3.0** | **Contact Hours: 2.5 Hrs/Week** | **Total Marks: 100 (CIE: 35, SMFE:65)** |

**Rationale of course:** In real life, statistical methods can apply to solve different problems and help to make an effective decision that affect our daily lives. Statistical methods are used in development of planning, commerce, industry, business, formation of development policy, agricultural sector, social science etc. By studying this course, students will learn the fundamental knowledge about statistics and their applications.

**Content of the Course:**

| Sl No | Course Content (as Summary) | Hrs | CLOs |
|---|---|---|---|
| 1 | **Introduction to Statistics**<br>**(**Meaning and Definition of Statistics, Types of statistics; Population and sample; Parameter and statistic; Variable and types of variables; Characteristics, Levels of data) | 4 | CLO1 |
| 2 | **Data Presentation**: Constructing frequency distribution and relative frequency distribution: Qualitative and quantitative data;<br>Cumulative frequency distribution; Graphic presentation of a frequency distribution with merits and demerits. | 4 | CLO2 |
| 3 | **Descriptive statistics:**<br>**Measures of Central Tendency and Measures of Location:**<br>Arithmetic Mean, Geometric Mean, Harmonic Mean, Weighted Mean, Median and Mode with uses, advantages and limitations; Quartile, Percentile and Decile; Mathematical Problems and Box-Whisker plot<br>**Measures of Dispersion and Shape of the Distribution:**<br>Meaning of dispersion; measures of dispersion; absolute measures of dispersion Relative measures of dispersion; Application of different measures of dispersion; Concept of Skewness, kurtosis and their measures. | 7 | CLO2<br>CLO4 |
| 4 | **Introduction to Probability:**<br>Sample Space, Tree diagram, Define probability, Marginal probability, Joint probability, Conditional probability, Addition rule, Multiplication rule. | 5 | CLO3<br>CLO4 |

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| 5 | **Probability Distribution:**<br>Basic idea of Probability Distribution, Binomial distribution, Poisson distribution and Normal distribution with mathematics | 3 | CLO3<br>CLO4 |
| 6 | **Test of Hypothesis:** Definition, Objectives, applications of Hypothesis, types of hypothesis acceptance and rejection area, Mean Test, types of errors, power of test, significance level. | 5 | CLO3<br>CLO4 |
| 7 | **Correlation Analysis:**<br>Bi-variate data, scattered diagram, simple correlation, calculation of correlation coefficient, interpretation, multiple correlation | 6 | CLO3<br>CLO4 |
| 8 | **Regression Analysis:**<br>Simple regression with examples; Multiple regression with examples; Simple linear Regression model Estimation with related mathematics; coefficient of determination with interpretation | 6 | CLO3<br>CLO4 |
| 9 | **Sample size calculation:**<br>Sample size calculation for human and animal studies (cross sectional studies, case-control study, and cohort study) | 2 | CLO4 |

**Course Learning Outcomes: At the end of the Course, the Student will be able to-**

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| CLO1 | Develop a comprehensive understanding of both the theoretical and practical aspects of statistics. |
| CLO2 | Acquire fundamental knowledge concerning descriptive statistics, encompassing techniques for data presentation, measures of central tendency and dispersion, and the shape of distributions. |
| CLO3 | Apply appropriate statistical tools (Regression, data mining, and probability) to solve practical problems in biostatistics. |
| CLO4 | Apply acquired statistical knowledge and skills effectively in diverse settings, demonstrating competence in data analysis, interpretation, and inference. |

**Mapping of Course Learning Outcomes to Program Learning Outcomes-**

| | PLO1 | PLO2 | PLO3 | PLO4 | PLO5 | PLO6 | PLO7 | PLO8 | PLO9 | PLO10 | PLO11 | PLO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLO1 | √ | | | | | | | | | | | |
| CLO2 | √ | | | | | | | | | | | |
| CLO3 | | | | | √ | | | | | | | |
| CLO4 | | | | | | | | | | | | √ |

**Mapping Course Learning Outcome (CLOs) with the Teaching-Learning and Assessment Strategy**

| CLOs | Teaching-Learning Strategy | Assessment Strategy |
|---|---|---|
| CLO1 | Brainstorming Sessions, Voice over PPT, Lecture Video, Open Discussion | Feedback Session, Q/A session, H5P (Interactive Content), Quiz, Midterm Examination |
| CLO2 | Voice Over PPT, Lecture Video, Interactive Session, Mind Mapping | Q/A Session, H5P (Interactive Content), Quiz, Midterm Examination, Assignment |
| CLO3 | Voice Over PPT, Lecture Video, Interactive Session, Mind Mapping | Q/A Session, H5P (Interactive Content), Quiz, Final Examination, Assignment |
| CLO4 | Voice Over PPT, Lecture Video, Interactive Session, Mind Mapping | Q/A Session, H5P (Interactive Content), Quiz, Final Examination, Assignment |

**ASSESSMENT PATTERN**

**CIE- Continuous Internal Evaluation (35 Marks):**

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| Class Tests | 15 |
| Assignments | 5 |
| Presentation | 8 |
| Class Attendance | 7 |

**SMEE- Semester Mid and End Examination (65 Marks):**

| Bloom's Category | Midterm Exam (25) | Semester End Examination (40) |
|---|---|---|
| Remember | 5 | 10 |
| Understand | 5 | 10 |
| Apply | 10 | 10 |
| Analyze | 5 | 10 |
| Evaluate | | |
| Create | | |

**LEARNING MATERIALS**

**Recommended Books:**


1. M. Nurul Islam, *Introduction to Statistics and Probability*, Book World.
2. Applied Statistics and Probability for Engineers by Douglas *C. Montgomery, Arizona State University*.
3. Statistics and Probability for Engineering Applications with Microsoft® Excel by W.J. DeCoursey College of Engineering, University of Saskatchewan Saskatoon.