Programme: BICTE **Semester: IV**
Course Title: Probability and Statistics **Nature of Course:** Theory
Course Title: Math. Ed. 436 **Credit Hour: 3**
Level: Bachelor's Degree **Total Period:**48 hour

1. **Course Description**

This is an integrated course of probability and statistics for students with bachelor's degrees in Information and Communication Technology (BICTE). This course provides a foundation for the students to understand the basic concept of mathematics to be applicable in the field of technology. The main aim of this course is to develop an in-depth understanding of different aspects of probability and statistics. This course covers correlation and regression, probability distributions, sampling distributions, estimation of parameters, and hypothesis testing.

2. **General Objectives**

The general objectives of this course are as follows:

- To impart practical knowledge and skills in deriving properties of correlation and regression and applying them to solve problems.
- To make the students familiar with random variables, and different discrete and continuous probability distributions.
- To make the students able to use sampling distribution and estimation of parameters, and use test of hypothesis in research work.

3. Specific Objectives and Contents

Unit	Objectives	Contents
I	• Define correlation and describe its types. • Interpret the different values of r. • Compute Pearson's moment correlation and writes its properties	Unit I: Correlation (4) • Types of correlation • Computation of correlation coefficient (r) and its interpretation, • Rank correlation, • Properties of correlation.
II	• Define regression and describe its types • Find the equation of regression and its properties • Write the relation between correlation and regression.	Unit II: Regression (6) • Types of relationship • Estimation of regression equations, • Properties of regression equations • Relationship between correlation and regression.
III	• Explain sample space, events, probability of an event, Axioms of probability, • State and prove Baye's theorem.,	Unit III: Probability Distribution (9) • Basic terms of Probability. • Axioms and theorems of probability

	• Define discrete random variables, probability function, probability distributions, cumulative distribution, moments, mean, and variance. • State uniform distribution and write its properties • State Binomial distributions and write their properties. • Define a continuous random variable, probability density, cumulative density, mean and variance, • State and prove Chebychev's inequality Describe laws of large numbers	• Conditional probability & Baye's theorem. • Discrete random variable, probability function, probability distributions, cumulative distribution, moments, mean, and variance. • Uniform distribution and its properties, • Binomial distributions and their properties. • Continuous random variable, probability density, cumulative density, mean, and variance. • Chebychev's inequality and laws of large numbers.
IV	• State normal distributions and writes its properties. • Calculate the area under the standard normal curves, Z score • Derive the normal approximations to the binomial distribution.	Unit IV: Normal distributions (4) • Measure of Divergence from Normality • Properties: mean and variance, • Area under the standard normal curves • Z score
V	• Define parameters and statistics • Explain sampling distribution of the mean, variance, standard error of statistics, and central limit theorem. • Define point and interval estimation. • State the properties of point estimation. • Compute the confidence interval for mean and variance.	Unit V: Sampling Distribution and Estimation (8) • Parameter and statistics, sampling distribution of mean/variance • Application of the central limit theorem • Estimation**:** Point estimation, interval estimation, • Confidence interval for mean and variance.
VI	• Define null and alternate hypotheses. • Identify one-tailed, two-tailed test, Type I, and Type II errors. • Set level of significance and calculate critical region. • Identify test statistics and describe sequential steps of hypothesis testing.	Unit VI: Test of Hypothesis (17) • Basic concepts. • Null/ Alternative hypothesis. • One-tailed / two-tailed tests • Type I / Type II errors • Level of significance, Critical region, and Test statistics • Steps in hypothesis testing.

	• Solve test of hypothesis for the difference between two means of large samples with unknown population variance. • Solve the Difference between two means of small samples with unknown common variance, the significance test of independence	• Z-test: the difference between two means of large samples with unknown population variance. • T-test: difference between two means of small samples with unknown common variance. • Chi-square test: significance test of independence.

4.2 Specific Instructional Techniques

The specific teaching and learning techniques chapter wise are listed below:

Unit	Activity and Instructional Techniques	Teaching Hours (48)
I	Lecture, discussion in group and question answer	4
II	Lecture, discussion in group and question answer	6
III	Lecture, discussion in group and question answer	9
IV	Lecture, discussion in group and question answer	4
V	Lecture, discussion in group and question answer	8
VI	Lecture, discussion in group and question answer	17

5 Evaluation

5.1 **Internal Evaluation** 40%

Internal evaluation will be conducted by the subject teacher based on the following aspects:

Attendance	4 marks
Participation in learning activities	6 marks
First assignment	10 marks
Second assignment	10 marks
Third assignment	10 marks
Total	40 marks

5.2 **External Evaluation** (60%)

The examination section Dean Office, Faculty of Education will conduct the final examination at the end of the first semester. The type of questions and marks allocated for each question will be as follows:

Objective type questions (multiple choice)	10 x 1 mark	=	10 marks
Short answer questions	6 x 5 marks	=	30 marks
Long answer questions	2 x 10 marks	=	20 marks
Total		=	60 marks

6 Recommended Books

Freund J. E. (1997): Modern elementary Statistics, New Delhi: Prentice Hall of India

Garrett, H. E. (). *Statistics in psychology and education*. Longmans, NY: Green and Co. Inc.

Hayslett, H. T (1983): *Statistics Made Simple*, Heinemann: London

7. References

Mendenhall, W, Scheaffer, R. L. and Wackerly, D. D. (1987): *Mathematical Statistics with Applications.* Boston: PWS Publishers.

Wallpole, R. (1979): *Introduction to Statistics*, Delhi: Macmillan, India

Pandit, R. P. and Bhattarai, L. N. (2016). *Mathematical Statistics,* Kathmandu: Indira Pandit

Pandit Pandit, R. P. and Pahari, S. (2016): *Modern Elementary Mathematics*, Kathmandu: Indira Pandit