Course Title: Probability and Statistics
Course No: Math. Ed.   449   **Credit Hour: 3**
Nature of Course: Theory   **Total Period:**48 hour
Level: Bachelor Degree (Minor Math)   **Semester: IV**

1.   Course Description

Statistics helps us to crunch large amount of information into usable numbers. A major reason for the development and regular use of statistics is a need to cope with the limited capacity of human working memory. Statistics aims to condense opinions, performances and comparisons among them into summary numbers that can be understood in a simple way through graph and in more advance way through test of significance where probability has major role.

2. General Objectives

The general objectives of this course are as follows:
1. To make the students familiar with correlation and regression, probability, random variable, discrete and continuous probability distribution, sampling distribution, estimation of parameters, and test of hypothesis.

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 • Interpretation of r • Rank correlation, • Properties of correlation.
II	• Define regression and describe its types • Find the equation of regression and its properties • Write relation between correlation and regression.	Unit II: Regression (6) • Types of relationship • Estimation of regression equations, • Properties of regression equations • Difference between correlation and regression
III	• Explain sample space, events, Probability of an event, Axioms of probability, • State and prove Baye's theorem., • Define random variables, discrete random variable, probability distributions, cumulative distribution,	Unit III: Probability Distribution (9) • Sample space, events • Probability of an event • Axioms and theorems of probability • Conditional probability & Baye's theorem.

	• Explain mathematical expectation, moments, mean and variance • State uniform distribution and write its properties • State Binomial distributions and write its properties. • Define continuous random variable, probability density, cumulative density, mean and variance, • State and prove Chebychev's inequality Describe laws of large numbers	• Random variables, discrete random variable, probability function, probability distributions, cumulative distribution, • Mathematical expectation, moments, mean and variance, • Uniform distribution and its properties, • Binomial distributions and its 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) • Meaning and Importance • Measure of Divergence from Normality • Properties: mean and variance, • Area under the standard normal curves • Z score
V	• Define parameter and statistics • Explain sampling distribution of mean, variance and chi-square, standard error of statistics, 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 central limit theorem • Estimation: Point estimation, interval estimation, • Confidence interval for mean and variance.
VI	• Define null hypothesis, alternate hypothesis. • 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　　　(4) • Null/alternate hypothesis • One/two tailed test • Type I and Type II errors • Level of significance, critical values, test statistics • Steps of hypothesis testing
VII	• Solve test of hypothesis for difference between two means of	Unit VII Large Sample Test　　　(5)

	large samples with unknown population variance.	• Z-test: Difference between two means of large samples with unknown population variance
VIII	• Solve Difference between two means of small samples with unknown common variance, significance of independence • Test the Significance of r- test for correlation coefficient	Unit VIII Small Sample Test (8) • t-test: difference between two means of small samples with unknown common variance. • Chi-square test: significance of independence • r-test: Significance of test for correlation coefficient.

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	4
VII	Lecture, discussion in group and question answer	5
VIII	Lecture, discussion in group and question answer	8

5 Evaluation
5.1 Internal Evaluation 40%

Internal evaluation will be conducted by 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 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. (2014): Introduction to Statistics: Kathmandu: Indira Pandit

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