MTH 212.3 Probability and Statistics (3-2-0)

	Theory	Practical	Total
Sessional	30	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:

The main objectives of this course are to provide basic concepts of probability a statistics to the engineering students. After completing this course, the student would be able to understand variables, probability distribution, point estimation and hypothesis testing. After completing this course the student will be able to solve simple linear regression and correlation.

Course Contents:

1. Introduction and Descriptive Statistics (5 hrs)

Introduction and limitation of statistics, Presentation and classification data-frequency distribution, Histogram, Pictorial and diagrammatic method Measures of central tendencyand location-mean, median, quartiles and percentiles, measures, of dispersion (variability) – Range, quartile deviation, Deviation, standard deviation and coefficient of variation.

2. Probability (5 hrs)

Random experiment, sample space, event and types of events, counting rule various approaches probability, Laws of probability-additive, multiplicative, conditional-probability and independence, Baye's theorem.

3. Random Variable and Probability Distribution (12 hrs)

Discrete random variables, Probability mass function, Expectation and laws expectation, sun and product, Discrete probability distributions, Poisson, Geometric and negative binomial, Continuous random variable, Probability density, Function, Cumulative distribution functions, Expected values of continuous random variables, Continuous probability distribution-rectangular, Negative exponential, Gamma, Beta and normal distribution.

4. Bivariate Random Variables and Joint Probability Distribution (3 hrs)

Joint probability distribution, Marginal probability function, conditional probability function (discrete and continuous cases), sums and averages of random variables, The central limit theorem.

5. Point Estimation (3 hrs)

Population and sample, Concept o point estimation, Parameter and statistic, Criteria o good estimator.

6. Testing of Hypothesis (10 hrs)

Concept of hypothesis, Types of hypothesis, types of error, Acceptance and critical reions Concept and uses of standard error, Level of significance, procedure of testing of hypothesis, Hypothesis testing procedure based on large samples (Z-test), Test for single proportion and difference of two proportions, test for single mean of a population and difference of two population means, Hypothesis testing procedures based on small samples t-test for mean for a normal population, t-test for the difference of mean of two normal populations, Paired t-test.

7. Hypothesis Testing Based on Two Samples (2 hrs)

Confidence interval for a population, confidence interval for a population mean (small and large sample cases)

8. Simple Linear Regression and Correlation (5 hrs)

Simple linear probabilistic model principle of least squares method estimating β and β1coefficients-inferences about β_1 coefficient, inferences concerning μx.y and the prediction of future values. Test of reliability of the fitted regression equation (coefficient of determination, R_2), Simple correlation, Speaman's rank correlation coefficient.

Text Book:

1. Johnson, Richard A., Probability and Statistics for Engineers 5th Edition, Prentice Hall of India Private Ltd, New Delhi, 1994.

Reference Books:

1. Sayami, S.B. : Manual on *Statistics* Nepal Engineering College, Kathmandu, 1997.
2. *Singh, M.L: Statistical* Methods (for all graduate level students), J.M Singh Publication, Kathmandu, 1999.
3. Jay L. Devore, *Probability and Statistics for Engineering and the Sciences,* Brooks/Core Publishing Company, Monterey, California, 1982.
4. Stirzaker, David, Elementary Probability, Cambridge University Press, 1996.
5. Frank, Harry and Steven C. Althoen, *Statistics*, Cambridge University Press, 1995.