

College of Engineering, Pune

Department of Mathematics

(MA (MI) 17001) Statistics for Business Finance

Minor Certification in Mathematics with specialization in 'Financial Engineering' (Semester V)

Teaching Scheme

Lectures: 3hrs / week

Examination Scheme

Internal Test 1: 20 marks

Internal Test 2: 20 marks

End Sem. Exam: 60 marks

Objectives :

1. To enable students to present, analyze and interpret data.
2. To enable students to use concepts of probability in business situations.
3. To enable students to make inferences from samples drawn from large datasets.
4. To enable students to apply univariate and multivariate statistical techniques.

Unit I : Introduction to Business Statistics-Descriptive Statistics, Populations and samples – the need for inference tools. Graphical depictions of data. Frequency graphs, histograms, scatter-plots. Mean, variance and standard deviation for populations and samples. Measures of location and dispersion. Measures of Distribution Shape, Relative location and outliers-z-score, Chebyshev's Theorem, Empirical rule. **[6Hrs]**

Unit II : Introduction to Probability theory-Some basic relationships of probability, Conditional Probability, Bayes' Theorem. Random variable, Discrete Probability Distributions, Expected value, Variance, Binomial, Hypergeometric and Poisson Probability Distributions. Continuous Probability Distributions-Uniform, Normal and Exponential, Normal approximation of discrete probability distributions-case of binomial and Poisson. **[6Hrs]**

Unit III : Measures of Association: Correlation, Variance analysis – Covariance, Regression Analysis. Introduction to linear regression.Fitting a linear model to data. Interpretation of the regression coefficients. **[6Hrs]**

Unit IV : Sampling and Sampling Distributions-Need of sampling, Different sampling techniques, Concept of parameter and an estimator, Sampling distribution, Central Limit Theorem, Concept of Standard error, Relationship between sample size and the sampling distribution, Point estimator, properties of point estimators. Estimation-Concept of margin of error, Interval estimation of Population mean and Population proportion, Determination of sample size. **[6Hrs]**

Unit V : Hypothesis Testing-Null and Alternative Hypothesis, Type I and Type II errors. Power of a test. Hypothesis testing using the normal distribution. The t-distribution. One sample, paired and independent samples t-tests. Non parametric Tests- Chi Square-Goodness of fit and Test of

Independence, ANOVA- The need for a new technique to compare means of multiple groups. The omnibus hypothesis and post-hoc tests. [6Hrs]

Unit VI : Time Series Analysis and Forecasting Moving Average, Estimation, Seasonal variations, Trend analysis, Forecasting. [10Hrs]

Text Book :

- Ronald E, Walpole, Sharon L. Myers, Keying Ye, Probability and Statistics for Engineers and Scientists (8th Edition), Pearson Prentice Hall, 2007

Reference Books :

- Anderson, Sweeney and Williams, “Statistics for Business and Economics”, Cengage Learning, 2001(11e).
- Levin and Rubin, “Statistics for Management”, Prentice-Hall, 2007
- Douglas C. Montgomery, Design and Analysis of Experiments (7th Edition), Wiley Student Edition, 2009.
- S. P. Gupta, Statistical Methods, S. Chand & Sons, 37th revised edition, 2008
- William W. Hines, Douglas C. Montgomery, David M. Goldsman, Probability and Statistics for Engineering, (4th Edition), Willey Student edition, 2006.

Outcomes : Students will be able to

1. **have** a conceptual understanding of the course and sequencing of concepts related to business statistics, probability theory, sampling and sampling distributions, testing of hypothesis and time series analysis.
2. **Demonstrate** the understanding of concepts, thus, collecting and presenting the data, facts and figures, **explain** discrete and continuous probability distributions, **summarize** different techniques of hypothesis testing.
3. **calculate** probabilities, **apply** tests of hypothesis for various population parameters.
4. **Apply** the knowledge / concepts to solve problems using different statistical tools and techniques.
5. **Interpret** the analysis for decision making to real life problems.