Course title: Statistical Methods for Management				
Course code: BSI 175	**No. of credits:** 3	**L-T-P distribution:** 28-17-00		**Learning hours:** 45

Pre-requisite course code and title (if any): Knowledge of mathematical techniques is required to understand the subject.

Department: Department of Business and Sustainability

Course coordinator (s):	**Course instructor (s):**
Contact details:	
Course type:	**Core**	**Course offered in:** Semester I

Course Description

This course gives students an exhaustive introduction to statistical methods important in business and infrastructure. For last few decades India's growth rate is impressive along with high competition in the economy. Economic growth, expansion of trade and business has forced to invest in infrastructure. Given this background, businessmen can no longer rely on the old system of hit-or-miss methods or leave their future on chances. They have now to proceed on scientific principles, prepare themselves for competitive markets and plan their business accordingly. The managers have therefore to depend on a variety of factors (like present labour condition, prices of raw materials etc.). All these factors are statistically taken account of before fixing the price of new commodity or services, so that it may find a suitable place in the market. This course would be offered to MBA Business Sustainability as well as MBA Infrastructure. The lectures of this course would be provided in joint class; however, tutorials classes would be separate for each programme.

Course Objectives

In the course the students would be exposed to relative example in economics of infrastructure and business applications. The primary objective of this course is to motivate the use of statistical analysis and at the same time encourage students to go beyond the mathematical applications of technique and to develop critical judgment through statistical analysis. The specific objectives of the course are enabling student –

- to understand and use of statistical methods ranging from graphical presentation of data to descriptive statistical representation of data for infrastructure & business-related studies;
- to analyse data for understanding the characteristics of the business & infrastructure related factors, their association etc.
- apply statistical techniques to forecast the market situation and to take proper decisions.

Course content

Module	Topic	L	T	P
1	**Introduction: Data and Statistics** Data: Concept & types of data; importance of data in infrastructure & business; Data sources: introduction to infrastructure & business-related data & sources.	2		
2	**Descriptive Statistics** Summarizing data: how to handle data scientifically to make proper decisions; Exploration & representation of infrastructure related data: tabulation, cross tabulation, variability checking, measuring the distribution and location statistically, association among inputs and outputs; Use of diagrams in business & infrastructure projects and reporting.	4	3	
3	**Probability Distribution** Introduction to set theory and probability; Discrete and continuous distributions; Random variables; Discrete & continuous probability distributions: theory and its applications in business & infrastructure management.	4	3	

4	**Sampling and Sampling Distributions** Statistical Inference: concepts & relevance in business & infrastructure; Methods of Sampling: purposive, random, stratified, systematic, multi-stage; Concepts and estimation of - Point Estimation, Sampling Distribution of Mean, Sampling distribution of p, differences of means, proportions, difference of proportions, variances, ratio of variances sample size determination; Standard normal, χ^2, t and F distributions.	4	3	
5	**Problem of Estimation** Population mean; Population proportion; Point and interval estimation, confidence interval; Determining sample size.	2	1	
6	**Hypothesis Testing** Null and alternative hypothesis; Test of significance; Type I and Type II errors; Practical issues	2	2	
7	**Analysis of Variance** Introduction to analysis of variance; Assumptions and analysis of one-way classified data; Assumptions and analysis of two-way classified data; Comparison of equality of k-population means; Multiple comparisons.	3	1	
8	**Simple linear regression – Introduction** Simple regression model; Least square method; Coefficient of determination; Model assumptions; Testing of significance; Predictions; Residual analysis.	4	3	
9	**Index Numbers** Method of construction of index numbers; Consumer price index (CPI) & Wholesale price index; Time series of index numbers; Deflation of index number.	3	1	
	Total	28	17	0

Evaluation criteria

The break-up of the evaluation procedure is as follows – Test-1: Written Examination (Module 1 & 2) -   20% Test-2: Written Examination (Module 3) -   20%

Test-3: Project Work (Primary data collection, analysis and presentation) (Module 2 -8) -   20% Indicators for assessment: (a) Identification of the problem; (b) Data collection; (c) Relevance of the data analysis method; (d) Representation and explanation; (e) Punctuality and timeline adherence.

Note: (a), (b) and (c) would carry a weightage of 10% each; (c) would carry 30% weightage and (d) would carry 40 % weightage.

Test-4: Written Examination (Module 3 – 9) -   40%

Learning outcomes: After successful completion of the course, students will be able to –
1. Understand the fundamental principles of statistics and data analysis (Test 1,2 and 3)
2. Understand the principles, techniques and approaches used for statistical inferences (Test 3 & 4)
3. Apply statistical concepts to business and economic models (All Tests)
4. Solve problems of importance using statistical techniques (All Tests)
5. Application of data analysis for decision making (All Tests)

Pedagogical approach

The course will be delivered through lectures and application of statistical tools in infrastructure related problems would be discussed.

References:
Textbooks:
1. Anderson DR., Dennis J. Sweeney and Thomas A. Williams (2002): Statistics for Business and Economics, Cengage Learning (10th Eds.), India.
Additional Readings:
2.   Kohler, H. (2010): Statistics for Business & Economics, Harper Collins.
3.   Levin, R. and Rubin, D. (2012): Statistics for Management, Pearson.
4.   McClave, J. and Benson, P.G. (2013): Statistics for Business and Economics, Pearson.
5.   Richard I.L. and David S.R. (2011): Statistics for Management, Pearson (7th Eds.).
6.   Stine R. and D. Foster (2014): Decision making and Analysis, Pearson New International Edition.
7.   Thukral J.K. (2015): Business Mathematics & Statistics, Mayur Paperback.

8. Triola, M.F. and Franklin, L.A. (2015): Business Statistics.
9. Watsnam, T. J. and Keith, P. (2014): Quantitative Methods in Finance, International Thompson Business Press.

Additional information (if any):

Student's Responsibility:
Attendance, feedback, discipline etc.

Prepared by: Montu Bose
Course Reviewer(s):
1. Dr. Nilanjan Sen, Assistant Professor, St. Xavier's College, Kolkata.
2. Dr. Yamini Gupt, Associate Professor, University of Delhi, Delhi.
3. Dr. Tamal K. Kayal, Assistant Professor, Rabindra Bharati University, Kolkata