

Applied Multivariate Statistical Modeling - Video course

COURSE OUTLINE

Data driven decision making is the state of the art today. It spreads across all sectors of human civilization. Engineers today gather huge data and seek meaningful knowledge out of these for interpreting the process behavior. Scientists do experiments under controlled environment and analyze them to confirm or reject hypotheses. Managers and administrators use the results out of data analysis for day to day decision making. Data collection and storage is an easy task today. Data-driven decision making now is the way of life. The aim of this course is therefore to build confidence in the students in analyzing and interpreting multivariate data. The course will help the students by:

- (i) Providing guidelines to identify and describe real life problems so that relevant data can be collected,
- (ii) Linking data generation process with statistical distributions, especially in the multivariate domain,
- (iii) Linking the relationship among the variables (of a process or system) with multivariate statistical models,
- (iv) Providing step by step procedure for estimating parameters of a model developed,
- (v) Analyzing errors along with computing overall fit of the models,
- (vi) Interpreting model results in real life problem solving, and
- (vii) Providing procedures for model validation.

COURSE DETAIL

Module No.	Module description	Topic	Duration
1	Background	Introduction to multivariate statistical modeling	2 hr
2	Basic univariate statistics	Univariate descriptive statistics	1 hr
		Sampling distribution	1 hr
		Estimation	2 hr
		Hypothesis testing	1 hr
3	Basic multivariate statistics	Multivariate descriptive statistics	2 hr
		Multivariate normal distribution	2 hr
		Multivariate Inferential statistics	2 hr
		Analysis of variance (ANOVA)	2 hr
		Multivariate analysis of variance (MANOVA)	2 hr
		Tutorial: ANOVA	2 hr



NPTEL

<http://nptel.ac.in>

Management

Pre-requisites:

Basic Statistics

Additional Reading:

Analyzing multivariate data by James Latin, J Dooglas Carrol and Paul E Green, Cengage Learning India Pvt. Ltd., 2003.

Hyperlinks:

1. www.duxbury.com
2. www.prenhall.com/statistics

Coordinators:

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4	Multivariate models	Case study: MANOVA	1 hr
		Multiple linear regression (MLR): Introduction	1 hr
		MLR: Sampling distribution of regression coefficients	1 hr
		MLR: Model adequacy tests	1 hr
		MLR: Test of assumptions	1 hr
		MLR: Model diagnostics	1 hr
		MLR: Case study	1 hr
		Multivariate linear regression (MvLR): Introduction	1 hr
		MvLR: Estimation	1 hr
		MvLR: Model adequacy tests	1 hr
		Regression modeling using SPSS	1 hr
		Principle component analysis (PCA): Introduction	1 hr
		PCA: Model adequacy and interpretation	1 hr
		Factor analysis (FA): Introduction	1 hr
		FA: Estimation and model adequacy testing	1 hr
		FA: Rotation, factor scores, and case study	1 hr
		Cluster analysis (CA)	2 hr
		Introduction to structural equation modeling (SEM)	1 hr
		Correspondence analysis	2 hr

References:

1. Applied multivariate statistical analysis by R A Johnson and D W Wichern, Sixth Edition, PHI, 2012.
2. Multivariate data analysis by [Joseph F. Hair Jr](#), [Rolph E. Anderson](#), Ronald L Tatham, and [William C. Black](#), Fifth Edition, Pearson Education, 1998.