

INDIAN INSTITUTE OF TECHNOLOGY MADRAS
Department of Management Studies
Subjects and Syllabus for Comprehensive Viva
- Sanjay K (MS18Doo8)

Research Methodology for Business and Management (MS 7080)
Instructor: Dr. Saji K Mathew

Approach to research – What is research? Researcher Bias, Fundamental vs applied research Science of social science, research paradigms in management research.

Foundations of theory – Theory in management research, hypotheses and propositions, theory building, Epistemology and Ontology, Quantitative vs. Qualitative Research, Variance vs process theories, Choice of theories

Qualitative research – Qualitative research in management, different qualitative approaches, checking validity in qualitative research

Quantitative research – Concepts, constructs and measurement, scales of measurement, survey-based research, and experimental design

Research design – Level of analysis and measurement, experimental approach, cross sectional design, longitudinal design, case study design, methodological fit in research

Data Analysis for Research (MS6031)
Instructor – Dr. R.K. Amit

Introduction to statistics: Mean, median, mode, variance, pdf, cdf, mgf

Probability distributions- Gaussian Distribution, Binomial Distribution, Poisson Distribution, Chi squared Distribution, Student's t Distribution, F-Distribution

Hypotheses testing- Type1&2 error, p-value, hypothesis testing for mean, variance, Comparing the Means and variance of Paired Samples

Sampling- Estimating μ and σ , Efficiency of Estimators

Distribution of Sample Statistics, Central Limit Theorem, Bayes' Theorem, Maximum Likelihood Estimators, Confidence Intervals.

Predictive and Prescriptive Data Analytics (MS 6032)
Instructor: Dr. Nandan Sudarsanam

Introduction- Fitting Distributions to Data, Brief about Supervised, Unsupervised and semi supervised learning, Bias-Variance

Regression- Fitting lines, Statistical Inference, Evaluating model fit, Multicollinearity, Problems in regression and its fixes, Choosing variables in regression, KNN

Regularization: Ridge, Lasso, PCR, Crossvalidation, Bias variance treatment of the different methods.

Classification- Logistic Regression, SVMs, LDA, CART, Overfitting and Underfitting trees, Advantages and Disadvantages , Bootstrapping, Bagging, Random Forests, Ensemble Techniques

Clustering- Types of Clustering and Clusters, K-means and K-medoids, Hierarchical Clustering, Cluster Evaluation, Association Rule Mining and metrics to evaluate it

Information Systems Analysis– MS5561
Instructor: Dr. Nargis Pervin

Intro to Information Systems- Objective, Systems Applications in the Organization

Information System Development Models - Classification of IS Development Models, Evaluating each model in predictive vs adaptive scale, Unified Process and its variants, Phase gate/ Stage gate

Agile- Agile Manifesto, Agile frameworks, Lean startup

Project selection and management- AHP, TOPSIS, PERT, CPM

System Process and data modeling- Data Flow diagram, E-R diagram, Composite, Multivalued, and Derived Attributes, Relationship Sets with Attributes

Database Design and Normalization

Modeling, Relationship Sets, Attributes and types, Mapping Cardinalities, Keys for Relationship Sets, Normalization, Normal forms, Functional Dependencies

Design patterns- Design patterns in OOP, Types of Pattern

DATA WAREHOUSING and DATA MINING- MS6840
Instructor: Dr. Saji K Mathew

DWDM Introduction

Business intelligence & business value, Business Intelligence Architecture
Multi-Tiered Architecture, OLAP, OLTP

Data Warehouse and OnLine Analytical Processing (OLAP)

Multi-Tiered Architecture of OLAP, IT architecture, Data warehouse, Data mart, Data
Cube, Operations on Data cube- (Slicing, Dicing, Roll up, Pivot, Drill up/down)
Cuboids Corresponding to the Cube, Conceptual Modeling of Data Warehouses
Data warehousing architecture

Data mining process: Statistical learning, Data Quality, Data pre-processing, Cross
validation, Confidence interval

Classification, Trees

Classification techniques, Scoring models, Evaluating a scoring model, Classifier
performance, Decision Tree, Attribute selection method, Tree pruning, Ensemble
methods

Cluster analysis

Proximity matrix, Agglomerative clustering, Choosing variables as bases,
Measures of distance for Ordinal, Binary, Nominal, mixed type data Partition clustering
Selection of Cluster size

Text mining

Natural Language Processing, Text Mining Process, Corpus preparation, Term-by-
Document Matrix, Multi word features

Artificial Neural Networks (ANN)

The Neuron, Perceptron, Gradient Descent, ANN Training, Feed forward neural
network topologies, Components of Time Series, Model performance & prediction
errors