PROF. RAMESH ANBANANDAM

Department of Management Studies

IIT Roorkee

INTENDED AUDIENCE : Undergraduate and Post Graduate students interested in operations management.

INDUSTRIES APPLICABLE TO : All analytics companies

COURSE OUTLINE :

This course aims to provide Undergraduate and Graduate students with a sound conceptual understanding of the role that management science plays in decision-making process. This course is applications oriented and continues to use the problem-scenario approach. A problem is described in conjunction with the management science model being introduced. The model is then solved to generate a solution and recommendation to management.

ABOUT INSTRUCTOR :

Prof. Ramesh Anbanandam is working as an Associate Professor in the Department of Management Studies, IIT Roorkee, India. He is also Joint faculty of the Center of Transportation Systems, IIT Roorkee. He did Ph.D. from IIT Delhi and M.Tech from NIT Trichy. His research area includes humanitarian supply chain management, multimodal freight transportation, sustainable mobility, healthcare waste management, and data-driven decision-making modeling. He has published more than 40 research papers in reputed journals and conferences. He was also organized international conferences, TEQIP training sessions, and NPTEL online courses. He is a regular reviewer of many peer-reviewed journals and actively participating in various seminars, talks, and conferences in India and abroad.

COURSE PLAN :

Week 1: Introduction to Decision Making withy Spreadsheet, Profit, Cost, and Revenue Models, Breakeven Analysis, Formulation and assumptions of Linear Programing Problems, Graphical Solution Method of solving Linear Programming Problems, Solving Linear Programming Problems using MS Excel Solver, Special Cases of Linear Programming Problems: Alternate optimal solution, unbounded problems, Infeasibility.

Week 2: Sensitivity Analysis, Range of optimality, Dual value, Limitations of classical sensitivity analysis, Linear Programming Applications: Marketing (Media selection, Marketing Research), Linear Programming Applications: Finance (Portfolio Management)

Week 3: Linear Programming Applications: Operations (Production Scheduling, A Make-or-Buy Decision), Linear Programming Applications: workforce allocation, Advanced Linear Programming Applications: Data Envelopment Analysis, Game Theory, Game Theory- B's perspective Dominance rule.

Week 4: Advanced Linear Programming Applications: Finance - Portfolio Models and Asset Allocation for conservative and moderate risk-taking investor, Introduction to Revenue management, Linear Programming Problem for Revenue Management

Week 5: Distribution and Network Models: Transportation Problem and Transhipment Problem, Assignment Problem, Shortest Path Problem, Maximum flow problem, Production and Inventory problem.

Week 6: Non-Linear Optimization Models: Markowitz Portfolio Model and its variants, Forecasting adoption of a new product- Bass Forecasting Model, Application of Non-linear Programming for Pricing, Project Scheduling: PERT/CPM, Earliest Starting and Earliest Finishing times of activities, Forward Pass, Latest Starting and Latest Finishing times of activities, Backward Pass, Slack.

Week 7: Project Scheduling for uncertain activities, Expected duration of an activity, Variance of an activity, Finding the probability of a path meeting the deadline, Time–Cost trade-offs, Crashing Activity Times, Linear Programming Model for Crashing, Inventory Models: Economic Order Quantity (EOQ) Model, Non-Linear Programming for finding EOQ, Reorder point. Inventory Model with Planned Shortages.

Week 8: Quantity Discounts for the EOQ Model, Single-period Inventory Model with Probabilistic Demand, Multi-Period Order-Quantity, Reorder Point Model with Probabilistic Demand, Periodic Review Model (P-type) with Probabilistic Demand, Financial risks associated with the development of a new product: Simulation, Risk Analysis.

Week 9: Financial Risks associated with the development of a new product, Inventory Simulation, Waiting Line Simulations.

Week 10: Decision Analysis, Decision Trees, Payoff Tables, Decision Making with and without Probabilities, Risk Analysis, Sensitivity Analysis, Computing Branch Probabilities with Baye's Theorem, Utility Theory

Week 11: Formulation of Goal Programming, Multicriteria Decisions - Analytic Hierarchy Process (AHP), Pairwise Comparisons, Consistency Ratio, Overall Priority Ranking.

Week 12: Time Series Analysis and Forecasting Time Series Patterns, Moving Averages and Exponential Smoothing, Linear Trend Projection, Seasonality, Conclusion.