

Proposed Syllabus

for

Skill Enhancement Course Papers for

**B.Sc. (Program) Mathematical Sciences/Physical Science/Applied Physical
Science/B.A. (Program)**

under the

Choice Based Credit System

**Department of Operational Research
University of Delhi
Delhi-110007**

**Proposed Scheme for Choice Based Credit System in
B.Sc. (Program) Mathematical Sciences/Physical
Science/Applied Physical Science/B.A. (Program)**

Sem.	CORE COURSE (DCC) (12)	Ability Enhancement Compulsory Course (AECC) (2)	Skill Enhancement Course (SEC) (4)	Discipline Specific Elective DSE (6)
I				
II				
III			SEC - OR 1 Operational Research Applications	
IV			SEC - OR 2 Project Management	
V			SEC - OR 3 Portfolio Optimization	
VI			SEC - OR 4 Business Data Analysis	

Skill Enhancement Course (SEC) (Credit: 02 each)

SEC - OR 1

1. Operational Research Applications

SEC - OR 2

1. Project Management

SEC - OR 3

1. Portfolio Optimization

SEC - OR 4

1. Business Data Analysis

SEC - OR 1: Operational Research Applications

Media allocation problem, Cargo Loading Problem, Production Scheduling Problem, Cutting stock problem, School bus routing problem using spanning tree, Simulation, Knapsack problem, Set Covering Problem, Fixed Charge Transportation Problem, Project Selection Problem.

References /Suggested Readings:

1. Hamdy A. Taha: Operations Research-An Introduction, Prentice Hall, 9th Edition, 2010.
2. A. Ravindran, Don T. Phillips, James J. Solberg: Operations Research. Principles and Practice, John Wiley & Sons, 2005.
3. Frederick Hillier and Gerald Lieberman, Introduction to Operations Research. 9th Edition, McGraw-Hill Professional, 2010.
4. Wayne L. Winston, Operations Research: Applications and Algorithms, 4th Edition, Duxbury Press, 2003.

SEC - OR 2: Project Management

Basics of project management, feasibility and technical analysis: materials and equipment, project costing & financing, financial aspects, cost benefit analysis, success criteria and success factors, risk management.

Mathematical models: project selection, project planning, cost-time trade-off, resource handling/leveling.

References /Suggested Readings:

1. Ravi Ravindran: Operations Research and Management Science Handbook, CRC Press, 2008.
2. Harold Kerzner: Applied Project Management: Best Practices on Implementation, John Wiley & Sons, Inc., 2000.
3. Goodpasture, J. C.: Quantitative Methods in Project Management, J Ross Publishing, Boca Raton, Florida, USA, 2003.
4. Meredith, J. R. and Mantel Jr., S. J.: Project Management: A Managerial Approach, John Wiley, New York. 2004.

SEC - OR 3: Portfolio Optimization

Financial markets. Investment objectives. Measures of return and risk. Types of risks. Portfolio of assets. Expected risk and return of portfolio. Diversification. Mean-variance portfolio optimization- the Markowitz model and the two-fund theorem, risk-free assets and one fund theorem, efficient frontier. Portfolio performance evaluation measures.

Books Recommended

1. F.K. Reilly, Keith C. Brown, *Investment Analysis and Portfolio Management*, 10th Ed., South-Western Publishers, 2011.
2. H.M. Markowitz, *Mean-Variance Analysis in Portfolio Choice and Capital Markets*, Blackwell, New York, 1987.
3. D.G. Luenberger, *Investment Science*, 2nd Ed., Oxford University Press, 2013.

SEC - OR 4: Business Data Analysis

Business fundamentals, Importance of business data analytics, Evolution of business data analytics, Scope of business data analytics

Data processing and data warehousing

Data Management, Data Summarization, Data Cleaning, Data integration, Data reduction, Data warehousing, OLAP vs. OLTP, ROLAP, MOLAP Techniques for data analysis.

Association rule mining- Market Basket Analysis, Prediction Analysis, Unsupervised and supervised learning.

References /Suggested Readings:

1. Randy Bartlett, A practitioner's guide to business analytics: Using Data Analysis Tools to Improve Your Organization's Decision Making and Strategy, McGraw Hill Professional, 2013
2. Alex Berson and Stephen J. Smith, Data Warehousing, Data Mining & OLAP, , Tata McGraw – Hill Edition, Tenth Reprint 2007
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining, Pearson Education, 2007
4. G. K. Gupta, Introduction to Data Mining with Case Studies, Easter Economy Edition, Prentice Hall of India, 2006