OTM-252 Introduction to Operations Research

Cr Hrs: 3.0

Course Description
This course is an introduction to using operations research tools to solve business problems. Some of the typical business problems resolved during this course would related to optimization, efficiency analysis and enhancement, performance appraisal, manufacturing choices and transportation. This course will teach the use of 'quants' (used in lieu of 'quantitative techniques') from the perspective of a future business and operations manager. It places special emphasis on developing the skills and instincts needed to make good decisions and become a more effective manager. Hands on practice with different software is included in this course to assist students as they work towards mastering the subject matter.

Course Objectives
The 6th semester BBA students at NBS have studied basic courses in business mathematics, statistics and accounting. The primary objective of this course is to build upon their existing quantitative intuition and show them, with practice, how to resolve some of the core and common business problems with help of numerical justification. Another objective is to make the students comfortable with facing complex business situation and simplifying/decomposing such situations with the power of numbers.

Learning Outcomes
Upon successful completion of this course, the students will ▪ Know how to identify decision making environments on the basis of risk and uncertainty ▪ Have an understanding of decision trees and how to apply them in decision-making ▪ Be able to use MS Excel to present data, perform basic calculations and formulate basic models ▪ Be able to formulate simple linear programming models, solve them in MS Excel and specialist operations research software The Management Scientist®, and interpret the output of solutions ▪ Be able to visualise the logistic operations mathematically and hence make such systems efficient ▪ Apply and comprehend the output of mathematical modelling and visualise its applications in finance, consumer behaviour, social and medical research

Required Course Material
Textbook: ▪ Primary: Barry Render, Ralph Stair, and Michael Hanna, **Quantitative Analysis for**

Management, 10th ed. or later

- Secondary**:** Wayne L Winston, Christian Albright, **Operations Research: Application and Algorithms**, 4th edition or later

  *Since 2007, alternate – abridged versions of this primary text by Winston and Albright have been released as **Practical Management Science**. Students may choose to buy either of the two books as they have the same exercises for majority of the topics*

Software:

- MS Excel (2007 or later) – Having it installed on personal computing devices is essential for all students
- Management Scientist® – made available in the lab

Course Content (session-wise)

S No	Topic	Sub-topics / additional activities
1	Introductions	Intro to teacher, course policies and outline, and quants career
2	Refresher of basic concepts	Fundamentals of algebra, linear and quadratic functions, matrices, exponents, polynomials, probability, permutation, sequences and series
3	Decision analysis – I	Decision-making environments, dealing with uncertainty and risk
4	Practice	Directed exercises
5	Decision analysis – II	Bayesian analysis, decision trees
6	Practice	Directed exercises
7	Decision analysis – III	Utility theory and applications
8	Practice	Directed exercises
9	Linear programming – I	Fundamentals and assumptions, problem formulation, graphical solution
10	Practice	Directed exercises
11	Linear programming – II	Duality, primal-dual algorithm, sensitivity analysis
12	Practice	Directed exercises
13	Computer tools for OR	Fundamentals of spreadsheet modelling
14	Practice	Directed exercises
15	Computer tools for OR	Working with Solver
16	Practice	Directed exercises

	Mid-semester examination	
17	Computing tools for OR	Working with The Management Scientist®
18	Practice	Directed exercises
19	Transportation	Transportation problem and algorithm, Northwest Corner method
20	Practice	Directed exercises
21	Transportation	Trans-shipment problem, stepping stone method
22	Practice	Directed exercises
23	Assignment techniques	Assignment through transportation algorithms
24	Practice	Directed exercises
25	Assignment techniques	Assignment through Flood's technique
26	Practice	Directed exercises
27	Applications of OR	Mini cases in operations research
28	Practice	Directed exercises
29	Project presentations	
30	Project presentations	
	Buffer week	
	Final examination	