NATIONAL UNIVERSITY OF SINGAPORE
NUS Business School
Department of Analytics & Operations

DAO1704X Decision Analytics Using Spreadsheets

Lecturer: A/P Tan Kok Choon

Session: Semester 2, 2017/2018

Course Description

With increasing availability of computing power and digitalisation of the global economy, decision making has undergone an evolutionary change, resulting in more use of data at all levels within an organization. Future-ready graduates thus need to be equipped with Analytics skills. Companies can now collect huge amounts of data with ease, very often more than necessary. "Information is Power" is no longer valid if companies are not able to make good use of the data in timely decision making. The use of Analytics in business decisions thus represents the best practice for tomorrow's success companies.

This module aims to prepare students with the theoretical foundation and basic Analytics skills to extract from data, using spreadsheets, actionable insights for managerial decisions. Quantitative tools such as Decision Tree, Simulation and Optimization are introduced to demonstrate the use of scientific methods in decision making. Practical examples and cases with rich data sets are used to stimulate students' interest and foster understanding of the use of Analytics in management.

At the end of this module, students are expected to become conversant with use of spreadsheets in the business environment. Students will also be exposed to the data dimension in making decisions at all levels in the corporate setting.

Course Outline

1) **Data Management and Visualization with Pivot Table**
   a) Using Pivot Table to organize, summarize and visualize data

2) **Probability Distributions and Modeling Uncertainty**
   a) Laws of Probability, Conditional Probability, Bayes Theorem
   b) Using Excel functions, such as BINOM.DIST, POISSON.DIST and NORM.DIST, to model decision problems with uncertainty
   c) Using Q-Q plot to visualize probability distributions from data

3) **Simulation**
   a) Building Monte-Carlo simulation models with built-in Excel functions, such as RAND, BINOM.INV, NORM.INV, LOOKUP, COUNTIF
   b) Using Histogram and other Excel charts to summarize and visualize simulation results for decision making

4) **Decision Tree – Decision Making under Uncertainty**
   a) Developing spreadsheet models for evaluating Decision Trees

5) **Optimization Models and Their Applications**
   a) Introduction to linear and discrete optimization models with examples of business applications in transportation, resource allocation, manpower scheduling, and production planning

b) Mathematical formulation and spreadsheet models of linear and discrete optimization decision problems
c) Using Solver to obtain the optimal solution of a linear programming problem and sensitivity analysis

Reading List

Compulsory reading:
"Data Analysis, Optimization, and Simulation Modeling" 6th Edition by Albright and Winston

Supplementary reading:
"The Analytics Edge" by Allison K. O'Hair, Dimitris Bertsimas, and William R. Pulleyblank

Prerequisite

Basic Excel skills.

Weightage of Assessment

Continuous Assessment:	
Tutorials	20%
Quiz	10%
Assignments	15%
Group Project	15%
Final Examination	40%

Schedule

Week 1	Introduction to Business Analytics
Week 2	Data Intelligence
Week 3	Introduction to Basic Probability Theory
Week 4	Discrete Probability Distributions
Week 5	Continuous Probability Distributions
Week 6	Decision Trees
Week 7	Introduction to Simulation Modeling
Week 8	Introduction to Linear Optimization
Week 9	Sensitivity Analysis & Shadow Prices
Week 10	Introduction to Discrete Optimization
Week 11	Applications of Optimization
Week 12	Project Presentation
Week 13	Project Presentation