Globalization is forcing firms to make smarter and timely decisions to stay competitive. Increased accountability also requires managers to rely less on their intuition and more on “System 2 thinking”, i.e. facts and scientifically-tested methods, to gain insights in complex business problems and thereby substantiate the decision-making process.

Many managerial decisions, regardless of the functional orientation, are increasingly being based on analysis using quantitative models and tools such as Decision Analysis, Simulation Modelling and Mathematical Optimization. The use of these business analytics for modelling and decisions represents the future of best practices for tomorrow’s success companies.

Objectives

The learning outcomes are based on the principles of Rigor and Relevance.

Rigor
The students will learn the foundations of probability and their applications in the business environment. These fundamental concepts will be covered in an integrated manner with the business analytics tools for modeling and decisions including

1) Managerial Decision Analysis
2) Simulation Modeling: Concepts and Practice
3) Optimization Models and Their Applications

Emphasis will be made on how, what and why certain tools are useful, and what their ramifications would be when used in practice.

Relevance
Materials covered in the course are relevant and can be applied to realistic and representative business environment. Cases will also be used. This module also makes active use of the EXCEL spreadsheet, which is ubiquitous in the business environment. Last but not least, students will hone their skills to communicate their analytical findings effectively to Management.

Course Outline

1) Foundations of Probability and Their Applications
   a) Discrete Probability Distributions
b) Continuous Probability Distributions  
c) Normal Distribution and the Central Limit Theorem  
d) Statistics of a Random Sample  
e) Confidence Intervals  
f) Business Cases:  
   i) Arizona Instrumentation, Inc and the Economic Development Board of Singapore  
   ii) Consumer Convenience, Inc  

2) Managerial Decision Analysis  
a) Decision Tree Model and Analysis  
b) General Method Decision Analysis  
c) Business Case: Kendal Carb and Lobster, Inc  

3) Simulation Modeling: Concepts and Practice  
a) Random Number Generators  
b) Using the Sample Data for Analysis  
c) Computer Software for Simulation Modeling  
d) Business Case: To hedge or not to hedge  

4) Optimization Models and Their Applications  
a) Formulating Management Problems  
   i) Linear Optimization Model  
   ii) Nonlinear Optimization Model  
   iii) Discrete Optimization Model  
b) Computer Software for Optimization Modeling  
c) Business Cases:  
   i) Short Run Manufacturing Problems in DEC  
   ii) Capacity Investment, Marketing and Production at ILG, Inc  
   iii) Supply Chain Management at Dellmar, Inc  

Reading List  
Compulsory reading:  

Supplementary reading:  

Weightage of Assessment  
CA Components:  
   Tutorials/Seminars  
   Tests  
   Final Examination  
   30%  
   30%  
   40%