

NATIONAL UNIVERSITY OF SINGAPORE  
NUS Business School  
Department of Decision Sciences

## **DSC1007 Business Analytics – Models and Decisions**

**Lecturers :** Dr. Liu Qizhang  
Asst Prof Wang Tong  
A/P Chou Fee Seng  
A/P Tan Kok Choon

**Session:** Semester I, 2014/2015

### **Description**

We are now at the era of *big data*. Companies are able to collect tremendous amount of data, very often more than necessary, with ease. “Information is Power” is no longer valid if companies are not able to make correct decision timely out of the data. The use of business analytics for modeling and decisions represents the future of best practices for tomorrow’s success companies.

This course prepares students with fundamental theory and basic instruments to capture business insights from data and thus make good managerial decisions. Quantitative models and tools such as Decision Analysis, Simulation Modeling and Mathematical Optimization are covered to demonstrate the use of scientific methods in business decision making. Practical examples and cases with rich data are used to stimulate students’ interest and understanding in Business Analytics.

### **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) Laws of Probability, Bayes Theorem, Covariance
- b) Discrete Probability Distributions
- c) Continuous Probability Distributions
- d) Normal Distribution and the Central Limit Theorem

### **2) Managerial Decision Analysis**

- a) Decision Tree Model and Analysis
- b) General Method Decision Analysis

### **3) Simulation Modeling: Concepts and Practice**

- a) Random Number Generators
- b) Using the Sample Data for Analysis
- c) Computer Software for Simulation Modeling

### **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

## **Reading List**

Compulsory reading:

“Data Analysis, Optimization, and Simulation Modeling” 5<sup>th</sup> Edition by Albright and Winston

Supplementary reading:

“Data, Models and Decisions: The Fundamentals of Management Science” by Dimitris Bertsimas and Robert M Freund, Dynamic Ideas (2004)

## **Prerequisites**

Fundamental skills in Excel.

## **Weightage of Assessment**

Continuous Assessment :

Class Discussion	15%
Group Project	15%
Quiz	10%
Assignments	10%

Final Examination                      50%

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## **DSC1007 Business Analytics**

### **Lecturers :**

Dr Liu Qizhang  
Prof Melvyn Sim  
Assoc Prof Tan Kok Choon

**Session**: Semester II, 2014/2015

### **Description**

We are now at the era of *big data*. Companies are able to collect tremendous amount of data, very often more than necessary, with ease. “Information is Power” is no longer valid if companies are not able to make correct decision timely out of the data. The use of business analytics for modeling and decisions represents the future of best practices for tomorrow’s success companies.

This course prepares students with fundamental theory and basic instruments to capture business insights from data and thus make good managerial decisions. Quantitative models and tools such as Decision Analysis, Simulation Modeling and Mathematical Optimization are covered to demonstrate the use of scientific methods in business decision making. Practical examples and cases with rich data are used to stimulate students’ interest and understanding in Business Analytics.

### **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

- 4) Managerial Decision Analysis
- 5) Simulation Modeling: Concepts and Practice
- 6) 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**

### **5) Foundations of Probability and Their Applications**

- a) Laws of Probability, Bayes Theorem, Covariance
- b) Discrete Probability Distributions
- c) Continuous Probability Distributions
- d) Normal Distribution and the Central Limit Theorem

### **6) Managerial Decision Analysis**

- a) Decision Tree Model and Analysis
- b) General Method Decision Analysis

### **7) Simulation Modeling: Concepts and Practice**

- a) Random Number Generators
- b) Using the Sample Data for Analysis
- c) Computer Software for Simulation Modeling

### **8) 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

## **Reading List**

Compulsory reading:

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Supplementary reading:

“Data, Models and Decisions: The Fundamentals of Management Science” by Dimitris Bertsimas and Robert M Freund, Dynamic Ideas (2004)

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