**DSC2008 Business Analytics—Data and Decisions**

**Lecturer** : Assoc Prof Quek Ser Aik  
**Session** : Semester I, 2013/2014

**Aims & Objectives**

“Most companies today have plenty of data. However, creating intelligence and gleaning real insights from this data is what continues to elude organizations.”—*Competing on Analytics: The New Science of Winning.*

Business decisions are often made under uncertainty. In the modern business environment, technological advances facilitate the collection of huge amounts of data which can potentially improve the decision-making process. Successful businesses make use of Business Analytics and Business Intelligence, which are fundamentally based on quantitative statistical methods and optimization procedures, to identify patterns and trends in their data which eventually lead to insightful projections and realistic predictions.

The sister module, DSC1007 Business Analytics—Models and Decisions (Business Analytics I), focuses on models and processes. This module is more concerned with data and tools, and introduces students to the fundamental concepts of statistical inference such as parameter estimation and hypothesis testing, as well as to statistical tools useful in business analytics, such as regression analysis and time series analysis. This continues the theme of delivering hands-on experience in modules focusing on analytics and operations.

This module was co-designed, and is co-taught, by the Department of Decision Sciences in the NUS Business School and the Department of Statistics and Applied Probability in the Faculty of Science, to draw upon the relevant expertise from the two departments.

The module provides all BBA students with a common statistical grounding for Business Analytics, upon which specialization may be built depending on each student’s chosen major. For the truly visionary student, a natural follow-on could be NUS MSc (Business Analytics), [http://facebook.com/nusmsba](http://facebook.com/nusmsba). Biz undergrads can take some NUS MSc (BA) classes, e.g. BMA5002 is an extension of DSC2008, while BDC5101 is of DSC1007.

In keeping with the principles of Rigor and Relevance of Business Analytics I, students are expected to acquire the following knowledge and abilities.

**Rigor**

Building on the foundations of probability from Business Analytics – Models and Decisions, this module covers fundamental concepts underpinning the following business analytic tools:

1. Data summarization: pivot table;  
2. Statistical inference: sampling distributions, confidence intervals and hypothesis testing;
3. Regression analysis: linear and multiple regression, regression diagnostics and model building;
4. Time series analysis: smoothing, regression-based models, ARIMA models and forecasting;

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

Relevance
Module content makes use of examples that are based on current events and timely business topics. Adopting the Plan/Do/Report problem-solving approach, worked examples show students how to clearly define the business decision to be made and plan which method to use, do the business analysis with data-based numerical evidence and with the help of illuminating graphical displays, and finally report their findings and recommendations to the decision maker. This approach is reinforced using case-study projects involving real data in which students investigate a business-related question or make a business decision. This module also makes active use of the Excel spreadsheet and the SAS software.

Students will be equipped with the ability to “tell a story” and provide insights based on (big) data given to them (e.g. during their internships).

This module may probably be better for BBA(Accountancy) students than DSC1007 Business Analytics – Models & Decisions.

Prerequisites
For the time being: DSC1007 Business Analytics – Models & Decisions, or equivalent.

BIZ1000 Preparatory Mathematics (not prerequisite; just background materials):

We are in the process of removing all prerequisites for this module. In the interim, all interested students are invited to apply for waiver of the prerequisite DSC1007.

BBA (Accountancy) students are especially encouraged to take this module that might replace DSC1007 as a core module for future cohorts.

Module Outline
Describing data (Week 1-2)
   Data types
   Data statistics
      Description
      Sampling
   Data distributions
      Standard distributions
      Sampling distributions
      Confidence Interval
      Central Limit Theorem
Inferring from Data (Week 2-3)
  Testing hypothesis
  Comparing distributions
    Goodness-of-fit
    Homogeneity
  Comparing averages
    1 sample
    2 samples
    Multiple samples
      Analysis of Variance
  Relating variables
    Correlation

Predicting beyond Data (Week 4-6)
  Simple regression
  Multiple regression
    Variables selection
    Missing values
    Outliers
    Transformations
  Logistic regression

Time Series Analysis (Week 7-11)
  Multiple-regression-based time series models
  Smoothing methods
    Simple moving average
    Weighted moving average
    Single exponential smoothing
    Holt-Winters exponential smoothing
  Autoregressive Integrated Moving Average models

Cluster Analysis (Week 11-12)
  Distance measure
  Hierarchical cluster analysis
  K-means method