

**Wisconsin School of Business**  
**Fall session - 2016**  
**GB704, Data to Decisions**

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**Instructor**

Erwan Quintin, Real Estate department

Office: 5257 Grainger Hall

Office hours: Tuesdays, 11am-3pm, Wednesdays, 1pm-4pm, and by appointment

E-mail : [equintin@bus.wisc.edu](mailto:equintin@bus.wisc.edu)

URL: [erwan.marginalq.com](http://erwan.marginalq.com)

**Course objective**

This course provides you with the statistical inference and data analytics tools you will need to apply over the next two years of your MBA education. We will review the relevant foundations of statistics and probability theory but the emphasis throughout the class will be on applying the resulting concepts to canonical business examples.

**Resources**

The main source of material for this course is my power point slides. No textbook is required since this is an area where free resources are good, plentiful and easily available. The list of topics below details the readings and video-watching I expect you to do for each chapter of the class.

Videos, for the most part, are from the Khan academy (KA hereafter.) If I were you I would go through the entire inferential statistics section as you complete this class but, at the same time, I have tried to select the videos that most closely track what we will do in class. I also point you to various notes posted on [stat-help.com](http://stat-help.com) (SH hereafter.) You may want to bookmark that site for future use, it provides a lot of free tools and references. When we get to the data-mining portion of the class I will draw heavily from and suggest that you read “Data Science for Business,” by P. Foster and T. Fawcett, O’Reilly editions.

I will also expect you to become proficient with some advanced features of Excel, by far the most common tool for number crunching in Business. On-line resources in this respect are ubiquitous but feel free to ask me if you want specific recommendations.

## **Grading**

ICA (15%), homework (15%), midterm (35%), final (35%).

As per Core MBA rules, the average GPA for the class will be no higher than 3.5. The mode grade will be an AB, up to a quarter of the students will receive an A, and a quarter of the students will receive a grade of B or below. For future reference, a B in a core course means that your performance was very good.

The midterm will take place on October 26th, in class, while the final will take place on December 5th.

Group problem sets will be assigned on a weekly basis. Your team is your ICA group. The problems are meant to make you practice/replicate what I will show you in class. While I only need to receive one set of answers per group, each group member must make sure that they fully understand the tasks it contains. Being ready for my exams means first and foremost understanding the homework fully. Several of my exam questions will be variations on homework assignments and will require the use of Excel. Assignments are due at the start of lecture on the due date. No late assignment will be accepted, barring a documented emergency or an exception within the University's guidelines.

For issues pertaining to academic conduct and the honor code, please refer to the Wisconsin MBA Honor Code.

## **Teaching assistants**

Each section will have its own teaching assistant. TAs are responsible for grading weekly assignments. But their number-one responsibility is to assist you as you work on these assignments and, when the time comes, help you be ready for my exams – which I, alone, will grade.

TAs are available to take your questions by email and in individual and group meetings. I cannot encourage you enough to take advantage of this option.

## List of topics and associated resources

### 1. Preliminaries

- (a) SH Intro chapters 2, 5, 7, 9 (both), 19
- (b) KA inference
  - i. Introduction to the normal distribution
  - ii. Standard error of the mean
  - iii. Confidence interval 1
  - iv. Hypothesis testing and p-values
- (c) KA regression
  - i. Fitting a line to data (Excel!!!!)
  - ii. Squared error of regression line (\*)

### 2. From probability to statistics, and back

- (a) My RE notes (section 3.1 only)
- (b) KA probability
  - i. Random variables
  - ii. Expected Value
  - iii. Law of large numbers
- (c) KA inference
  - i. Central limit theorem
  - ii. Sampling distribution of the sample mean
  - iii. Chi-square probability distribution (\*)
- (d) Critical values for key distributions

### 3. Hypothesis testing

- (a) SH Intro chapters 17, 18, 19, 20, 22
- (b) SH Linear regression chapter 1 (review chapter, nice check-point)
- (c) KA inference
  - i. Confidence interval 1
  - ii. Hypothesis testing and p-values
  - iii. T-statistic confidence interval
  - iv. Hypothesis test for difference for means

- v. Contingency table chi-square test
  - (d) The bootstrap (pages 1-4 only, don't worry about the R talk, we'll implement the bootstrap approach with Excel in class)
4. Regression analysis: a primer
    - (a) SH Linear regression chapters 2, 3, 4, 5 (\*, don't worry about the SPSS talk in there)
    - (b) KA regression
      - i. Fitting a line to data (Excel!!!!)
      - ii. Correlation and causality
      - iii. R-squared or coefficient of determination
  5. Regression analysis for categorical variables
    - (a) Stata probit example
  6. Model selection
    - (a) Kocherlakota's brilliant piece (\*, a bit off topic and heavy on the economics)
  7. Time-series analysis
    - (a) Time-series notes I like (\*, time series deserves its own course, use these notes to preview what it entails)
  8. Data-mining
    - (a) A very nice chapter on classification
  9. Monte-carlo simulations