

## Course Syllabus and Schedule

- Instructor:* Professor Raghu Iyengar  
(215) 898-2391 (W)  
(215) 898-2534 (Fax)  
756 Jon M. Huntsman Hall, 3730 Walnut Street  
Philadelphia, PA 19104  
Email: [riyengar@wharton.upenn.edu](mailto:riyengar@wharton.upenn.edu)
- Administrative Coordinator:* Karen Ressler, [resslerk@wharton.upenn.edu](mailto:resslerk@wharton.upenn.edu)
- Office Hours:* By appointment
- Recommended Books:* *Data Science for Business*  
Foster Provost and Tom Fawcett, O'Reilly Media, August 2013  
An online version of this book can be accessed through O'Reilly's [Safari](#) service.
- R for Data Science*  
Hadley Wickham and Garrett Grolemund, O'Reilly Media, January 2017  
An online version of this book can be accessed through O'Reilly's [Safari](#) service.
- Required Bulkpack:* Contains readings.
- Prerequisites* MKTG 611 and STAT 613; Knowledge of an advanced statistical package like R, Python, Stata or SAS.
- Software:* I will distribute code in R but you may prefer to use another advanced package such as the ones mentioned above.
- Course Website:* Canvas
- Group Assignments:* (i) There will be 2 group assignments due during the semester.  
(ii) Group formation is discussed below.

## Course Objectives

Companies are currently spending millions of dollars on data-gathering initiatives, but few are successfully capitalizing on all this data to generate revenue and increase profit. Converting data into increased business performance requires the ability to extract insights from data through analytics.

This course covers the three pillars of analytics – descriptive, predictive and prescriptive – within the marketing context.

**Descriptive Analytics** examines different types of data and how they can be visualized, ultimately helping you communicate your findings and strengthen your team’s or organization’s decision making.

**Predictive Analytics** explores the use of data for forecasting. You will learn to utilize various tools, including regression analysis, to estimate relationships among variables and predict future behavior.

**Prescriptive Analytics** takes you through the final step — formulating concrete recommendations. These recommendations can be directed toward a variety of marketing actions, including pricing and social-platform outreach.

Students will be exposed to several methods such as linear regression, logistic regression, multinomial regression, machine learning methods (e.g., neural networks and Support Vector Machines). We will learn how to employ these methods for such managerial decisions as demand forecasting, pricing, and valuing customers.

Overall, you will develop a data analytics mindset, learn new tools, and understand how to convert numbers into actionable insights

## Course Materials and Approach

My overall philosophy is there is no better way of developing an understanding of marketing analytics than “learning by doing”. In the course we will use a variety of readings, cases and exercises. The readings and cases are contained in the course bulk pack. Lecture notes and any additional handouts will be made available through Canvas. Please read any assigned reading and cases before looking at the class videos.

### Comparison with Data and Analysis for Marketing Decisions (MKTG 712)

MKTG 852 will differ from MKTG 712 in the breadth and depth of coverage in three main areas (1) data collection, (2) predictive data analysis, and (3) stated choice experimentation / conjoint analysis.

- (1) Data collection: MKTG 712 devotes a significant amount of time to primary data collection (surveys, focus groups) including sessions on basic hypothesis testing (given the broader audience of MKTG 712). In contrast, MKTG 852 focuses on

quantitative analysis after data is collected, especially detailed customer-level transaction data and marketing mix data that the firm already has access to. Thus, MKTG 712 provides students with a broad perspective on the many venues for data collection using traditional marketing research methods; whereas MKTG 852 focuses on data analysis, especially of transaction data.

- (2) Data Analysis: MKTG 712 covers descriptive multivariate methods like clustering and factor analysis. It focuses little on predicting outcomes. In contrast, MKTG 852 goes much deeper into predictive analytics, specifically using machine learning models (e.g., random forests, neural networks, Support Vector Machines).
- (3) Stated choice experimentation / Conjoint analysis: MKTG 712 covers conjoint analysis from the perspective of a manager using the results. MKTG 852, in contrast, covers these methods in a lot more depth, from the perspective of a data analyst.

### **Assessment**

Your final grade will be based on class participation (case preparation and general contribution), written assignments, and a final examination. The evaluation is as follows:

A. Class Participation	10%
B. Group Assignments	40%
C. Final Examination (individual)	50%

Please note that **no late assignments will be accepted**. All written work is due on the specified date. The due dates for the assignments are listed on the course schedule. A more detailed outline of the evaluation procedure and requirements for A through C is included at the end of this document.

### **Group Formation**

Students must organize themselves into **groups of 3 to 5** people in order to do the group assignments.

## Schedule of Class Meetings

<i>Lecture #</i>	<i>Topic, Readings, Cases</i>
	<b>Descriptive Analytics</b>
1	<b>New Marketing Data and Better Science</b> Reading: “Data Science...”
2	<b>Business Experiments – Correlation vs Causation</b> Reading: “A Step by Step Guide...”
	<b>Predictive Analytics</b>
3	<b>Advanced Regression Models - I</b> Reading: Advanced Regression Models
4	<b>Advanced Regression Models - II</b>
	<b>Prescriptive Analytics / Applications</b>
	<b>Logistic Regression - I</b> Reading: Advanced Regression Models
5	
6	<b>Logistic Regression –II</b>
7	<b>Pricing Analytics-I</b> Reading: “A Conjoint Model for Quantity Discounts
8	<b>Pricing Analytics-II</b>
9	<b>Machine Learning Models - I</b>
10	<b>Machine Learning Models - II</b>
11	<b>Exam details to be announced</b>

## Assessment Details

### A. Contribution to Class Discussion (10%)

Given the online nature of the classroom, I will evaluate class participation based on how much students participate on Canvas discussions (see the Discussions tab on Canvas). You may discuss aspects of the class or augment our class discussion with your own examples. The discussions on Canvas is a way in which you can show engagement with the class.

### B. Group Assignments (40%)

The assignments will be put in Canvas. There will be two assignments. Deadlines will be strictly enforced. You will receive a 0 on an assignment if you submit after the

deadline.

- (1) Insights from Regression Analysis – This assignment will require students to describe the results from a regression analysis in terms of its managerial actionability. It will also allow students to appreciate the differences between correlational results and causation. 10% (Due Date: April 2nd, 11:30pm EST)
- (2) Models and Predictions – This assignment will require students to build prediction models for customer demand for car rentals using different types of models. They will compare the predictive accuracy of different models and explain why they differ. 15% (Due Date: April 20<sup>th</sup>, 11:30pm EST)

C. Individual-level Final Examination (50%) (details to be announced)

**Readings:**

- 1) Provost, Foster and Tom Fawcett (2013), “Data Science and its Relationship to Big Data and Data-driven Decision Making,” *Big Data*, 1, 1, 51-59.
- 2) Eric T. Anderson and Duncan Simester (2011), “A Step by Step Guide to Smart Business Experiments,” *Harvard Business Review*, 89, 3, 1-9.
- 3) Ascarza, Eva, Raghuram Iyengar and Martin Schleicher (2016), “The Perils of Proactive Churn Prevention Using Plan Recommendations: Evidence from a Field Experiment,” *Journal of Marketing Research*, 53, 1, 46-60.
- 4) Iyengar, Raghuram and Sunil Gupta (2006), “Advanced Regression Models,” in *The Handbook of Marketing Research*, Edited by Rajiv Grover and Marco Vriens, Sage Publications, Inc., 267- 287.
- 5) Iyengar, Raghuram and Kamel Jedidi (2012), “A Conjoint Model of Quantity Discounts,” *Marketing Science*, 31 (2), 334-350.
- 6) Iyengar, Raghuram, Christophe Van den Bulte and Thomas W. Valente (2011), “Opinion Leadership and Social Contagion in New Product Diffusion,” *Marketing Science*, 30 (2), 195- 712.