Ohio State University

Fisher College of Business

Bus Mgt 3333 Prescriptive Data Analysis

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**Course Description**

Data analytics comes in three varieties – descriptive, predictive and prescriptive. Prescriptive data analysis is concerned with identifying the best course of action to take in response to what is known about the business and its environment. Prescriptive analytics moves beyond the summary and discovery of interesting data patterns as in descriptive analysis, and the prediction of future events assuming that the basic nature (i.e., the correlational structure) of the data stays the same. Prescriptive analysis aims to analyze and predict interventions by management and others that are expected to have an effect on the outcomes of interest. Prescriptive analysis seeks to generally determine causal effects and identify optimal decisions. It’s domain is broader than the statistical analysis of data.

The course material will be taught within an experiential learning environment. Students will develop skills in translating business objectives, threats and opportunities into actionable data collection and analysis. Students will also become be exposed to and become proficient with concepts spanning primary data creation using experiments and surveys, to the analysis of pre-existing, secondary data. Throughout, students will be asked to program their own data analysis using the R statistical language.

**Computing**

A remote computing website has been established for the class at:

<https://remotelab.fisher.osu.edu/portal/desktop/index.html>

Log in with your OSU id, and you will be able to click on the class icon for running R.

**Schedule**

The first half of the course will be devoted to the creation and analysis of primary data using a conjoint case competition sponsored by Sawtooth Software (2017 link below):

<http://www.sawtoothsoftware.com/about-us/news-and-events/news/1716-announcing-the-2017-academic-consulting-challenge>

We will be using Sawtooth's "Discover" software to field a conjoint study for analysis (<https://discover.sawtoothsoftware.com/)>. Please create an account on this website using the access code WZH9-2UPV-3897.

Week 1: Introduction to conjoint, experimental design and survey design.

Readings:

* Orme chapters 1-5
* 7Summits Appendix A
* Specifying Your Market's Boundaries
* Multiple Perspectives
* An Integrated Approach
* Big data: are we making a big mistake?

HW: Determine the attributes and levels needed for analysis, and describe how your choice is informed by the business objectives of the firm. What analysis would you like to present?

Week 2: Text analysis – insight into how your customers think about you. Introduction to market segmentation and the concept of an explanatory variable.

Readings:

* + Orme chapter 6
  + No Brand Segmentation? Let's Not Rush to Judgment
  + The Effectiveness of Demographic and Psychographic Variables for Explaining Brand and Product Use
  + Conceptualizing and Measuring User Wants: Understanding the Source of Brand Preference
  + Sentence-Based Text Analysis for Customer Reviews

HW: Exploration of customer review data.

Week 3: Survey design – Screening questions, attitudes, beliefs, scaling, definitions, behavioral correlates, demographics.

Readings:

* Dealing with Differences
* Multivariate Analysis of Multiple Response Data
* Monetizing Ratings Data for Product Research
* The Dimensionality of Customer Satisfaction Survey Responses and Implications for Driver Analysis
* Fennell, Geraldine, Greg M. Allenby, Sha Yang and Yancy Edwards (2003) "The Effectiveness of Demographic and Psychographic Variables for Explaining Brand and Product Use," *Quantitative Marketing and Economics*, 1, 223-244.

HW: Questionnaire development

Week 4: Hierarchical Bayes - Extended models of behavior, determinants of demand.

Readings:

* The Effect of Media Advertising on Brand Consideration and Choice
* Benefit-Based Conjoint Analysis
* Price Promotions in Choice Models

HW: Analysis of Robotics vacuum data.

Week 5: Experimental design – orthogonal designs, linear and non-linear models, efficiency.

Readings:

* Orme Chapter 7
* Use and Abuse of Regression
* Optimal Design in Discrete Attribute Spaces by Sequential Experiments

HW: Evaluation of design from Sawtooth's Discover software

Week 6: Demand simulation - Profit/loss functions for business, translating to outcomes of interest, competitive reaction.

Readings:

* Using Extremes to Design Products and Segment Markets
* Valuation of Patented Product Features

HW: Economic value of innovations.

Week 7: Presentations – Selection of the winning team to compete in the Sawtooth competition. March 15-16, 2018

The second half of the course will focus on the analysis of secondary data, including the dataset from Chase bank and other publically available datasets. The weekly homeworks follow the textbook material from Angrist and Pischke.

Week 8: Intro to regression using matrices

Readings: 7 Summits Appendix B

Week 9: Randomized trials - A/B testing

Reading & HW : Angrist and Pischke, Chapter 1

Week 10: Regression and statistical matching

Reading & HW: Angrist and Pischke, Chapter 2

Week 11: Instrumental variables – simple IV estimation using cross-tabulated data, regression

Reading & HW: Angrist and Pischke, Chapter 3

Week 12: Regression discontinuities – known and probabilistic (2SLS)

Reading & HW: Angrist and Pischke, Chapter 4

Week 13: Differences-in-differences – control groups

Reading & HW: Angrist and Pischke, Chapter 5

Week 14: Review and take-home final.

**Textbooks**

Allenby, Greg M. and Jeff D. Brazell (2016) Seven Summits of Marketing Research: Decision-Based Analytics for Marketing's Toughest Problems, self-published, <http://fisher.osu.edu/7Summits>.

Angrist, Joshua D. & Jörn-Steffen Pischke (2014) Mastering Metrics: The Path from Cause to Effect. Princeton University Press.

Orme, Bryan K. (2005) Getting Started with Conjoint Analysis (3rd Edition).  Research Publishers, LLC.

**Grading**

The course grade will be based on a set of homework assignments and two course projects – one for the conjoint case competition and another for the analysis of secondary data. There will not be an in-class final exam.

**Software**

All homework and course projects will be done using the R statistical software package (<https://www.rstudio.com/)>. R is the most widely used software in commercial and academic data analytics. Students will be asked to code their analysis from scratch and report on the validity of their code with their own simulated data. The R software package “markdown” will be used to organize and submit homework assignment.

**Class Participation**

Class attendance is mandatory so that students can learn from other students and effectively learn in teams, when appropriate. The class is very “hands-on” and students are expected to actively engage with each other and the instructor in each class session.

**Academic Misconduct**

Please be informed that I will follow Faculty Rule 3335-5-54, which requires that ``all instances of what he or she believes may be academic misconduct" be reported to the University Academic Misconduct Committee. Academic misconduct is a serious threat to the integrity and value of your diploma.

**References**

Allenby, Greg M. and Jeff D. Brazell (2016) Seven Summits of Marketing Research: Decision-Based Analytics for Marketing's Toughest Problems, self-published, <http://fisher.osu.edu/7Summits>.

Allenby, Greg M. (2014) "Dealing with Differences," in *Marketing Insights*, May/June 2014, 10-11.

Allenby, Greg M., Jeff D. Brazell, John R. Howell and Peter E. Rossi (2014) "Valuation of Patented Product Features," *Journal of Law and Economics*, 57, 3, 629-663.

Allenby, Greg M. and Peter E. Rossi (2006) "Hierarchical Bayes Models" in The Handbook of Marketing Research, Rajiv Grover and Marco Vriens, editors. Sage Publications.

Allenby, Greg M. and James L. Ginter (1995) "Using Extremes to Design Products and Segment Markets," *Journal of Marketing Research*, 32, 392-403.

Angrist, Joshua D., and Jörn-Steffen Pischke. *Mastering'metrics: the path from cause to effect*. Princeton University Press, 2014.

Box, George EP. "Use and abuse of regression." *Technometrics* 8.4 (1966): 625-629.

Büschken, Joachim and Greg M. Allenby (2016) "Sentence-Based Text Analysis for Customer Reviews," *Marketing Science*, forthcoming.

Büschken, Joachim, Thomas Otter and Greg M. Allenby (2013) "The Dimensionality of Customer Satisfaction Survey Responses and Implications for Driver Analysis," *Marketing Science*, 32(4), 533-553.

Edwards, Yancy D. and Greg M. Allenby (2003) "Multivariate Analysis of Multiple Response Data," *Journal of Marketing Research*, 40, 321-334.

Fennell, Geraldine and Greg M. Allenby (2014) "Conceptualizing and Measuring User Wants: Understanding the Source of Brand Preference," *Customer Needs and Solutions*, 1:23–39.

Fennell, Geraldine and Greg M. Allenby (2006) "Multiple Perspectives: Marketing Needs to Unambiguously Articulate its Role as a Business and Societal Function," *Marketing Research*, 18, 4, 26-31.

Fennell, Geraldine and Greg M. Allenby (2004) "An Integrated Approach: Market Definition, Market Segmentation and Brand Positioning Create a Powerful Combination," *Marketing Research*, 16, 4, 28-34.

Fennell, Geraldine, Greg M. Allenby, Sha Yang and Yancy Edwards (2003) "The Effectiveness of Demographic and Psychographic Variables for Explaining Brand and Product Use," *Quantitative Marketing and Economics*, 1, 223-244.

Fennell, Geraldine and Greg M. Allenby (2003) "Specifying Your Market's Boundaries," *Marketing Research*, 15, 2, 32-37.

Fennell, Geraldine and Greg M. Allenby (2002) "No Brand Segmentation? Let's Not Rush to Judgment," *Marketing Research*, 14, 1, 14-18.

Hardt, Nino, Alex Varbanov and Greg M. Allenby (2016) "Monetizing Ratings Data for Product Research," *Marketing Science*, forthcoming.

Harford, Tim. "Big data: A big mistake?." *Significance* 11.5 (2014): 14-19.

Howell, John R., Sanghak Lee and Greg M. Allenby (2015) "Price Promotions in Choice Models," *Marketing Science*, 35, 2, 319-334.

Joo, Mingyu, Michael L. Thompson and Greg M. Allenby (2016) "Optimal Design in Discrete Attribute Spaces by Sequential Experiments," working paper.

Kim, Dong Soo, Roger A. Bailey, Nino Hardt and Greg M. Allenby (2016) "Benefit-Based Conjoint Analysis," *Marketing Science*, forthcoming.