MSiA 410 – Generating Business Value with Data Analytics

Winter 2023

Professor Joel Shapiro
jshapiro@kellogg.northwestern.edu

Teaching Assistant: Adam Sandler
adamsandler2021@u.northwestern.edu

Time: Tuesdays 9:00 – 11:50 am
Location: Krebs

Introduction

The last 10-15 years have seen the rise of the data scientist, the creation of the term "data analytics" and a surge of interest in modeling, machine learning, and artificial intelligence. Why has the business world, in particular, gone data-crazy? For some, the allure is in the amount of data available to us – after all, digital technologies allow us to capture and analyze huge amounts of information at relatively low cost. For others, the allure is in the speed at which intelligence can be deployed. But those who succeed in today's data-rich environment are those who focus NOT on speed and volume, but on how data can *yield business value*.

This class will help MSiA students:

- better understand how analytics can fuel businesses' decision-making processes,
- develop strategies to use analytics to solve important business problems,
- recognize differences in analytical decision-making in varying business contexts, and
- help businesses achieve their goals by becoming a more effective analytics practitioner and communicator

We will focus specifically on three domains in this class:

1. **Business decision-making.** We will examine how to identify high-value analytics opportunities and how businesses can achieve their goals with the use of rigorous analytics techniques. We will examine successes and failures to tease out key lessons.
2. **Enhancing the value of analytics.** A successful analytics professional doesn't just analyze data – so how can you ensure that you and your practice are materially relevant to a business?
3. **Analytics communication.** Every analytics practitioner / data scientist must be able to communicate his/her ideas, projects, methods, results, and business impact clearly and concisely to multiple audiences. Businesses regularly struggle with poor communication among data teams and business teams. Being a great analytics communicator helps a business succeed and ensures that the data team's analyses are used and valued.

How to Succeed in this Class

Success in this class requires flexible and open thinking, a willingness to engage, think, speak, critique, and be critiqued, and a willingness to try and occasionally fail or be wrong. There are very few "right answers" when using analytics for business decision-making. Uncertainty in business situations is always present, and always makes the use of data challenging. If you choose to sit quietly in class, you will miss valuable learning opportunities.

Assignments and Grading

The graded assignments in this class include the following, all of which are explained in detail on Canvas. Individual assignments are to be done without collaboration or assistance from others. Working together on individual assignments or sharing answers is prohibited and may result in disciplinary measures, including reductions in grades.

Assignment	**Group or Individual**	**Pts (% of Final Grade)**
HW1: Fly or Drive?	Group	5
HW2: Elective Surgery Scheduling	Individual	10
HW3: Managing Value at FinGain, parts 1&2	Individual	15
HW4: IPFA	Group	15
HW5: Hack-a-thon Follow-Up	Individual	5
HW6: Demand Forecasting with A.I.	Group	15
HW7: Bears Concession Pricing	Individual	15
Recurring: Class Participation / attendance	Individual	20
Total		100

Course Material

Readings

- The Discipline of Business Experimentation, HBR article, December 2014

Homework

- All homework assignments will be provided in Canvas

Cases

- Predicting Consumer Tastes with Big Data at Gap, HBSP case #517115-PDF-ENG
- Vanderbilt University Medical Center: Elective Surgery Schedule, HBSP case #W15166-PDF-ENG
- Demand Forecasting with A.I.: Building the Business Case (Professor will supply)
- Child Welfare and Predictive Analytics: Safety in Numbers? (Kellogg case #5-418-752, Professor will supply)
- Allstate, Advisor Pro, and the High Stakes of Interpreting Ambiguous Data (Kellogg case #5-420-760, Professor will supply)
- Data Science at Target, HBSP case #118016-PDF-ENG

Course Schedule

There are 4 categories of assignments:

- "HW" is a graded submission, either individual or group, as denoted in the syllabus.
- "Case" is a reading / case study that you must read and prepare for class discussion. For all Cases, I have provided a set of questions to guide your preparation.
- "Prep" is an ungraded – but required – individual activity (such as some light analysis), that will ensure you are adequately prepared for the next class.
- "Reading" is typically an article or book. Note that some readings might not be explicitly discussed in class, but simply offer additional perspectives or contexts.

Week 1

Introduction to Generating Business Value	**Due next class**
• Introduction / syllabus review • Generating business value with analytics	• HW1: Fly or Drive? • Read: The McKinsey Way, pp1-45.

Week 2

Model Building, Great Analytics Communication	**Due next class**
• Review HW1 • Models in business decision-making • Becoming a great analytics communicator	• Case: GAP, Inc • HW2: Elective Surgery Scheduling

Week 3

Value Management with Analytics	**Due next class**
• Discuss HW2 • GAP case discussion • Value Management	• HW3: Managing Agency Value at FinGain, parts 1&2

Week 4

Prediction as a Foundation of Value Generating Business Rules	**Due next class**
• Review HW3 • How prediction yields business value • Using analytics to generate business rules • Guest Speaker	• HW4: IPFA • Prep: Hack-a-thon preparation assignment

Week 5

Prediction Deep-Dive	**Due next class**
• Review HW4 • Hack-a-thon!  *Fire up your favorite statistical software program and logistic regression chops to compete for prizes and glory!*	• HW5: Hack-a-thon follow-up • Reading "The Discipline of Business Experimentation"

Week 6

Prediction Deep-Dive, **Evaluative Analytics and Experimentation**	**Due next class**
• Review HW5 • From predictive to evaluative analytics, business experimentation • Journey analytics	• HW6: Demand Forecasting with A.I.

Week 7

Experimentation and Quasi-Experimentation	**Due next class**
• Review HW6 • Ensuring the right experiment • Quasi-experimental techniques and implications • Guest Speaker	• Case: Allstate, Advisor Pro, and the High Stakes of Interpreting Ambiguous Data • Find 2-3 real-world examples where analytical or algorithmic bias or ethics was implicated. Be prepared to informally describe the example to the class.

Week 8

Quasi-Experimentation in Practice, **Algorithmic Bias for Business Leadership**	**Due next class**
• Allstate Case discussion • Algorithmic bias • Guest Speaker	• Case: Child Welfare and Predictive Analytics: Safety in Numbers? • HW7: Chicago Bears' Concession Pricing

Week 9

Quasi-Experimentation in Practice, Creating Strong Organizations with Analytics	**Due next class**
• Review HW7 • Discuss DCFS case • Guest Speaker	• Case: Data Science at Target

Week 10

Creating Strong Organizations with Analytics	
• Discuss Target Case	• *Enjoy spring break!*