OPMGT 565 – Business Analytics: Tools for Big Data
Autumn Quarter 2021

Instructor Information

Michael R. Wagner is an Associate Professor of Operations Management. He can be reached at mrwagner@uw.edu (please use this email rather than messaging me via Canvas). Office hours are Tuesdays 4:30-5:30 via Zoom (https://washington.zoom.us/j/9288653565).

Course Description and Objectives

Business analytics are techniques that enterprises use to gain insight from their data and make better decisions. Many firms in a variety of industries use these techniques: Google, Amazon, Target, Coca-Cola, WalMart. These techniques are applicable to the many functional areas of business, such as operations, marketing, accounting, finance, etc. Furthermore, the modern abundance of data, "Big Data," underscores the value that analytics can provide a firm, be it non-profit, for-profit, or government.

In this course we will employ quantitative tools and sophisticated software (Tableau and R) to learn analytics. This course does not aim to produce experts in statistical analysis; rather, the aim is to provide students competency to interact with and manage a team of analytics professionals. Furthermore, this is not a technical or theoretical course; we will instead focus on the application of analytics techniques to real business situations, with the aim of creating insight and value.

The course goals are as follows:
1. Students should be able to think critically about business analytics, which includes selecting the right type of analysis for a given task.
2. Students should be able to identify opportunities for applying business analytics, in real business settings.
3. Students should be well equipped to become data-savvy managers.

To achieve the above goals, lectures will cover the major concepts and analytical tools. Case assignments will allow you to analyze different industry settings, analyze different company strategic problems, and identify key issues related to data and modeling.

Textbooks

1. The Analytics Edge, Bertsimas, O'Hair, Pulleyblank. Dynamic Ideas, 1st Edition, 2016. (**Required**)

2. An Introduction to Statistical Learning: with Applications in R, James, Witten, Hastie, Tibshirani. Springer, 2017. (Optional)

3. Machine Learning with R: Expert techniques for predictive modeling, Lantz, Packt Publishing, 2019. (Optional)

Computer Software

We will be using Tableau and R in this class. These software packages are both available remotely via Foster's virtual labs accessible at https://fsb-lab.foster.uw.edu. Student licenses to Tableau are freely available; R is free for everyone.
- Tableau can be downloaded at https://www.tableau.com/academic/students
- R can be downloaded at https://cran.fhcrc.org
  - R Studio (a graphical user interface) can be downloaded at https://www.rstudio.com/products/rstudio/download/ (get the free desktop version)

Please bring your laptop to class with Tableau and R installed.

Quizzes

There are 8 quizzes, all available on Canvas. These will either require you to submit a file to Canvas, or answer 1-2 multiple choice questions. See Canvas for additional details.

Assignments

There will be 5 case assignments – see Canvas for assignment details and due dates. Students are expected to work either individually or in groups on the cases. <u>However, each student must submit his/her own solution.</u> These assignments must be electronically submitted through Canvas by their due date – late assignments will not be accepted in the Canvas system.

Group Project

The final assignment of this course will consist of a group project where teams (of 4-5 students) will apply the techniques of the course to real data. There are four sets of deliverables:
1. 2 progress reports, due November 21 and 28.
2. A 15-20 minute presentation to the class on December 6 or 8 (randomly assigned)
3. A 5-10 page writeup, due December 6.
4. Peer evaluations of your group members, due December 8.

<u>I recommend that your group find and use a cleaned data set for this project to avoid extensive cleaning.</u> Further details will be discussed as the quarter progresses.

Participation

There will be numerous in-class activities, typically involving Tableau and R; it is expected that students will participate in these activities. It is also expected that you will arrive to class on time – late arrivals disrupt both the instructor and students. Finally, our class will be using computers extensively, so please do not write emails, surf the web, or perform any other non-class activity – it is noticeable and distracting to both the instructor and nearby students. If you must miss class, or know you will be late, please email me letting me know.

Grading

Student numerical grades will be calculated applying the following allocation in a simple weighted average:

1. Case Analyses	40%	
2. Project	40%	
3. Quizzes	10%	
4. Participation	10%	

The (required) target median GPA in this class is 3.4 – 3.6, and I will curve to this requirement.

Foster Code of Conduct

By being a student in this course you acknowledge that you are a part of a learning community at the Foster School of Business that is committed to the highest academic standards. As a part of this community, you pledge to uphold the fundamental standards of honesty, respect, and integrity, and accept the responsibility to encourage others to adhere to these standards.

Religious Accommodations Policy

Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at Religious Accommodations Policy. Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request form.

CLASS SCHEDULE AND TOPICS

0. Week of 9/29/21 – 10/3/21
- Course introduction (live via Zoom) on Wednesday, 9/30/21 (https://washington.zoom.us/j/9288653565) at 1:30pm

1. Week of 10/4/21 – 10/10/21
- Introduction to Tableau and Visualization Analytics
- Visualization Case (Tableau) and Quizzes 1.1-1.2 due by Sunday, 10/10/21 11:59pm

2. Week of 10/11/21 – 10/17/21
- Introduction to R
- Prediction Analytics: The Statistical Sommelier
- Prediction Case (Climate Change) and Quizzes 2.1-2.2 due by Sunday, 10/17/21 11:59pm

3. Week of 10/18/21 – 10/24/21
- Classification Analytics: Predicting Supreme Court Decisions
- Classification Analytics: The Framingham Heart Study
- Classification Case I (Vandalism on Wikipedia) and Quiz 3 due by Sunday, 10/24/21 11:59pm

4. Week of 10/25/21 – 10/31/21
- Classification Analytics: Modeling the Expert
- Random Forests
- Classification Case II (Lending Club) and Quiz 4 due by Sunday, 10/31/21 11:59pm

5. Week of 11/1/21 – 11/7/21
- Clustering Analytics: Movie Recommendations at Netflix
- Clustering Analytics: Wine Market Segmentation
- Clustering Case (Hubway) and Quizzes 5.1-5.2 due by Sunday, 11/7/21 11:59pm

6. Week of 11/8/21 – 11/14/21
- Introduction to Group Project (time set aside in class to create teams and start brainstorming)
- Simulation: Blackjack

7. Week of 11/15/21 – 11/21/21
- Markov Chains: Google Search
- Prescriptive Analytics: Airline Revenue Management
- Project Progress Report #1 due by Sunday, 11/21/21 11:59pm

8. Week of 11/22/21 – 11/28/21
- Free week to work on Group Project and enjoy Thanksgiving – office hours as usual
- Project Progress Report #2 due by Sunday, 11/28/21 11:59pm

9. Week of 11/29/21 – 12/5/21
- Future Trends of Analytics
- The Ethics of Analytics

10. Week of 12/6/21 – 12/12/21
- Group presentations on **both** Monday, 12/6 and 12/8 during the regularly scheduled class session (1:30-3:20pm) – the presentation is due 12/6 by 1:30pm

- Group writeup due 12/6 by 1:30pm, PST
- Peer evaluations due 12/8 by 5:00pm, PST