Instructor Information

Michael R. Wagner is an Associate Professor of Operations Management. He can be reached at mwagner@uw.edu (please use this email rather than messaging me via Canvas). Office hours are Thursdays 1:00-2:00 in Paccar 442.

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

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

Computer Software

We will be using Tableau and R in this class. These software packages are both available in the computer lab in Paccar 190. This software is also 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)
I will assume that students are proficient with using Microsoft Excel (e.g., modules 1-3 on the Foster Excel for Business online course, available on Canvas); in particular, it will be assumed that students know how to use functions in Excel, as well as basic pivot table functionality (useful concepts for both Tableau and R).

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. They are due one week after they have been assigned – 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. However, each student must submit his/her own solution. These assignments are due by the beginning of class on their posted due date and must be electronically submitted through the class website on Canvas. Late assignments will not be accepted.

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. 3 progress reports, due October 17, November 5, and November 19.
2. A 15-20 minute presentation to the class on December 3 or 5 (randomly assigned)
3. A 5-10 page writeup, due December 3.
4. Peer evaluations of your group members, due December 5.
I recommend that your group find and use a cleaned data set for this project to avoid extensive cleaning. Further details will be discussed in class.

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 held in the computer lab, 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 50%
2. Project 40%
3. Quizzes 10%

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

Course Website

All course materials will be distributed electronically through the Canvas website. Case assignments are to be submitted electronically through this website (by their due dates!).

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**

(subject to revision)

**Thursday, September 26, 2019**
- Lecture 1: Introduction to Business Analytics: Tools for Big Data

**Tuesday, October 1, 2019**
- Lecture 2: Data Visualization
  - Topics: types of visualizations, best practices, lying with visualizations, historical visualizations

**Thursday, October 3, 2019**
- Lecture 3: Tableau 1/3
  - Topics: connecting to data, introductory visualizations, maps, dashboards, stories

**Tuesday, October 8, 2019**
- Lecture 4: Tableau 2/3
  - Topics: calculated fields, table calculations, and other analyses

**Thursday, October 10, 2019**
- Lecture 5: Tableau 3/3
  - Topics: data interpreter, pivot, (custom) split, nulls

**Tuesday, October 15, 2019**
- Lecture 6: Introduction to R
  - Topics: elementary calculations, reading data into R, table, tapply
- Tableau Assignment Due

**Thursday, October 17, 2019**
- Lecture 7: The Statistical Sommelier
  - Topics: linear regression, training versus testing data
- Reading Assignment: Chapter 1, Section 1.1 and Chapter 21, Section 21.1
- Project Progress Report #1 Due

**Tuesday, October 22, 2019**
No class – I will be away at a conference

**Thursday, October 24, 2019**
- Lecture 8: Modeling the Expert
  - Topics: logistic regression, confusion matrix, ROC curve
- Reading Assignment: Chapter 1, Section 1.2 and Chapter 21, Section 21.2
- Climate Change Assignment Due
Tuesday, October 29, 2019
- Lecture 9: The Framingham Heart Study
  - Topics: logistic regression
- Reading Assignment: Chapter 7 (all)

Thursday, October 31, 2019
- Lecture 10: Predicting Supreme Court Decisions
  - Topics: classification trees and random forests
- Reading Assignment: Chapter 1, Section 1.3 and Chapter 21, Section 21.3
- Lending Club Assignment Due

Tuesday, November 5, 2019
- Lecture 11: Movie Recommendations at Netflix
  - Topics: hierarchical clustering, dendrogram
- Reading Assignment: Chapter 13 (all) and Chapter 21, Section 21.4
- Project Progress Report #2 Due

Thursday, November 7, 2019
- Lecture 12: Wine Market Segmentation
  - Topics: k-means clustering
- Vandalism on Wikipedia Assignment Due

Tuesday, November 12, 2019
- Lectures 13: Blackjack
  - Topics: simulation
- Reading Assignment: Chapter 6 (all)

Thursday, November 14, 2019
- Lecture 14: Google Search
  - Topics: markov chains
- Reading Assignment: Chapter 11 (all)
- Market Segmentation for Hubway Assignment Due

Tuesday, November 19, 2019
- Lecture 15: Airline Revenue Management
  - Topics: optimization
- Reading Assignment: Chapter 17 (all)
- Project Progress Report #3 Due

Thursday, November 21, 2019
- Lecture 16: The Ethics of Analytics
  - Topics: various
  - Reading Assignment: Chapter 3 (all)

Tuesday, November 26, 2019
- Lecture 17: IBM’s Watson
  - Topics: various
- Reading Assignment: Chapter 3 (all)

Thursday, November 28, 2019
No class - Thanksgiving
Tuesday, December 3, 2019
- Project Presentations
- All Project Writeups Due

Thursday, December 5, 2019
- Project Presentations