BABS 550 — Application of Statistics in Management
Program: Full-time MBA 2020
Course Outline DRAFT

COURSE INFORMATION

Division: Operations and Logistics

Term/period: Period 1

Instructor: Greg Werker

Email: *greg.werker@sauder.ubc.ca*

Office: HA 479

Office hours: *By appointment*

Section meeting times:

001 Tue/Thu 10am – 12pm HA133
002 Tue/Thu 8am – 10am HA132

Course duration: *Sep 4 – Oct 13, 2018*

Classroom location: 001 – HA 133 002 – HA 132

Course Website: Canvas

BRIEF COURSE DESCRIPTION

Data — raw quantitative and qualitative information about companies, customers, employees, or pretty much anything — is everywhere. In order to make good business decisions we must know how to utilize data. This course assumes you have a solid understanding of types of data, basic inferential methods, and ways to present data (e.g., from the MBA prep course). In this brief module we will cover several of the more common statistical models you will encounter in your careers. The goal of BABS 550 is not to teach you to be a statistician, but rather an intelligent and critical consumer of statistics. In order to do so, we will be working with data and conducting analyses while also focusing on topics such as when to trust data, what assumptions are reasonable, what a model actually does for us, and how not to be fooled by misleading conclusions.

COURSE GOALS

To give students the skills necessary to acquire, work with, interpret, and present data. And to encourage critical thinking when consuming data, graphs, summaries, and conclusions.

LEARNING OBJECTIVES

Students will be able to:

- Identify which graphs and which tools/methods are appropriate for different types of data and for different situations.

- Create clear and accurate graphical representations of data.

- Apply basic statistical tools — including hypothesis tests, confidence intervals, and regression models — to interpret data and reach reasonable conclusions.

- Understand the assumptions underlying various methods/models, and to recognize when assumptions are violated to the extent that a particular method is not appropriate.

- Recognize the extent of their abilities with data utilization tools, and therefore be able to correctly judge when it is appropriate to call in an expert.

COURSE MATERIALS & REQUIREMENTS

My notes will be posted on Canvas. There is no mandatory textbook, however, an introductory statistics reference

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(including a section on regression) is recommended. Many such references exist; here are a few suggestions:

- Introductory statistics textbooks:

    o Sharpe NR, De Veaux RD, Velleman PF, Berkowitz J. *Business Statistics, A First Course, 1st Canadian Edition (or any other edition).* Pearson Canada Inc. 2015.

    o Moore DS & McCabe GP. *Introduction to the Practice of Statistics (any edition).* Freeman.

- Online textbooks:

    o Statistics at Square One, Ninth Edition, TDV Swinscow (Revised by MJ Campbell)   BMJ Publ. Group 1997 http://resources.bmj.com/bmj/readers/statistics-at-square-one/

    o HyperStat Online Statistics Textbook http://davidmlane.com/hyperstat/

    o Online Statistics: An Interactive Multimedia Course of Study http://onlinestatbook.com/

- Regression (more advanced):

    o Kutner M, Nachtscheim C, Neter J, Li W. *Applied Linear Statistical Models.* McGraw-Hill 2004.

Technology:

Statistical tools in Excel — Analysis Toolpak (Windows / Mac) or Statplus LE (Mac) — are sufficient for most of the calculations in this class (and they're free if you have Excel). If you would like to use more powerful statistics software, some of the more popular choices are R, Stata, Minitab, or SPSS.

Mini Cases and other materials:

Several mini cases and other materials or links will be posted on Canvas.

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ASSESSMENT SUMMARY

Class Participation	*10%*
Pre-class questions (6)	*12%*
Homework (2)	*30%*
Chart assignment (1)	*8%*
Exam	*40%*

ASSESSMENT DESCRIPTION

Class participation:

After each of the ten classes you will assign yourself a score as follows:
- 0 = Absent.
- 0.5 = Arrived late and/or returned late after the break. Or on time, but not really paying attention.
- 1.0 = On time and actively participating.

Prep questions:

A number of classes have a brief "prep" question due at 8:00am (posted and submitted on Canvas). Prep questions must be completed individually.

Homework and Chart Assignment:
Two homework assignments must be completed individually… while it is ok to discuss the HW with classmates, solutions must be entirely your own work. HW will be posted at least one week prior to the due date on Canvas, and must be submitted on time to receive credit.
- HW1 — *due Sunday, Sep 16, by 11pm.*
- Chart assignment — *due Sunday, Sep 30, by 11pm.*
- HW2 — *due Sunday, Oct 7, by 11pm.*

Exam:

The final exam (date/time TBD) covers all material from class, lecture notes, prep questions, mini cases, and assignments. Students must take the exam at the scheduled time unless arrangements have been made with the RHL Office.

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SCHEDULE

	Date	Topic	Readings & Assignments
1	Sep 4	**Introduction** What is Statistics? Data sources, sample size, hypothesis tests, P-value, evidence. One-sample z-test.	**Q1** due at 8:00am Read: The Brinery: Intro, I, and II
2	Sep 6	**Confidence Intervals**: The problem with p-values, confidence intervals, relation to hypothesis tests, examples. Normal distribution and central limit theorem (CLT).	**Q2** due at 8:00am Read: The Brinery III
3	Sep 11	**Hypothesis Tests**: What is a hypothesis. Two sample z-tests and confidence intervals. One sample t-test; normal distribution vs. t-distribution.	**Q3** due at 8:00am Read: The Brinery IV, V
4	Sep 13	**Comparison of Means**: Data sources, sample size, t-tests and one-way ANOVA, assumptions, and conclusions.	**HW1** due Sunday, Sep 16, at 11:00pm Read: The Brinery VI
5	Sep 18	**Categorical Data**: Chi-square Tests, counts, joint and marginal distributions, hypothesis tests with no corresponding interval. Also Data Reduction techniques… factor analysis, cluster analysis. Experimental vs Observational data.	**Q4** due at 8:00am
6	Sep 20	**Simple Linear Regression**: Observational data; association, correlation, & causation; residuals, assumptions; transformations.	**Q5** due at 8:00am
7	Sep 25	**Multiple Regression**: Hypotheses; parsimony, multicollinearity, comparing models; hypothesis tests; variable selection.	**Q6** due at 8:00am
8	Sep 27	**More Regression**: Outliers, leverage, influential points; higher order terms & dummy variables; logistic regression. Regression practice cases. Also paired t-test.	**Chart assignment** due Sunday, Sep 30, at 11:00pm
9	Oct 2	**Advanced topics:** Various topics possibly including prediction algorithms, neural networks, machine learning, and the role of humans in tweaking these methods.	Read: Who Controls your Facebook Feed
10	Oct 4	**Putting your statistics skills to use:** Model assumptions, ethics, when to hire a statistician, reading a scientific article, time series data, drawing a picture. Basic review.	**HW2** due Sunday, Oct 7, at 11:00pm

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TEACHING & LEARNING ACTIVITIES

This data utilization course requires some basic understanding of data, statistics concepts, and Excel. Students are advised to be familiar with the material in the Sauder Online Statistics Preparatory Course, in particular, introductory topics such as types of data, where data come from, presenting data in charts, conducting simple hypothesis tests, and creating confidence intervals.

The "prep" assignment for each lecture is an important introduction to some of the material we will cover during that lecture. Please plan to spend some time thinking about and completing these small assignments. During class there will be Excel demonstrations. If you would like to follow, please bring your laptop. During these "lids up" periods, you may also wish to just watch and take notes; I always post the completed spreadsheets afterward.

COURSE AND INSTITUTIONAL POLICIES

Attendance: As per RHL policy on Professionalism, Attendance and Behaviour, students are expected to attend 100% of their scheduled classes. Students missing more than 20% of scheduled classes for reasons other than illness will be withdrawn from the course. Withdrawals, depending on timing, could result in a "W" or an "F" standing on a student's transcript. Students must notify their instructors at the earliest opportunity if they are expected to miss a class due to illness. A medical note from a licensed, local doctor is required if more than 20% of scheduled classes for a course are missed due to illness. Students are required to notify the Student Experience Manager if they are absent from two or more classes due to illness.

Tardiness: As per RHL policy on Professionalism, Attendance and Behaviour, students are expected to arrive for classes and activities on time and fully prepared. Late arrivals may be refused entry at the discretion of the instructor or activity lead. Students arriving halfway through a scheduled class, or later, will be treated as absent for that class.

Electronic Devices: As per RHL policy on Professionalism, Attendance and Behaviour, laptops and other electronic devices (cellphones, tablets, personal technology, etc.) are not permitted in class unless required by the instructor for specific in-class activities or exercises. Cellphones and other personal electronic devices must be turned off during class and placed away from the desktop. Students who fail to abide by the RHL "lids down" policy will be asked to leave the room for the remainder of the class. Research has shown that multi-tasking on laptops in class has negative implications for the learning environment, including reducing student academic performance and the performance of those sitting around them.

ACADEMIC INTEGRITY

All UBC students are expected to behave as honest and responsible members of an academic community. Failure to follow appropriate policies, principles, rules and guidelines with respect to academic honesty at UBC may result in disciplinary action.

It is the student's responsibility to review and uphold applicable standards of academic honesty. Instances of academic misconduct, such as cheating, plagiarism, resubmitting the same assignment, impersonating a candidate, or falsifying documents, will be strongly dealt with according to UBC's procedures for Academic Misconduct. In addition to UBC's Academic Misconduct procedures, students are responsible for reviewing and abiding by RHL's policy on Academic Integrity.

LATE ASSIGNMENTS
Late submissions will not be accepted and will receive a zero.