COURSE INFORMATION

Course title:	Application of Statistics in Management		
Course code:	BABS 550-300	Credits:	1.5
Session, term, period:	2019W1		
Sections, times:	Sunday 8:30am – 4:00 pm	*(Feb 2, Feb 23, Mar 8)*	
Course duration:	Feb 2 – Mar 22, 2020	Pre-requisites:	N/A
Division:	Operations	Co-requisites:	N/A
Program:	PMBA		

INSTRUCTOR INFORMATION

Instructor:	Greg Werker, PhD		
Phone:	604-827-0612	Office location:	HA 479
Email:	greg.werker@sauder.ubc.ca	Office hours:	*by appointment*

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 FORMAT

This course is structured as ten topics delivered over the three days. Before each class you are required to think about and complete a related "prep" question prior to the start of class. There are several assessments to help you practice the material prior to the exam.

LEARNING OBJECTIVES

By the end of this course, students will be able to:

1. Identify which graphs and which tools/methods are appropriate for different types of data and for different situations.
2. Create clear and accurate graphical representations of data.
3. Apply basic statistical tools — including hypothesis tests, confidence intervals, and regression models — to interpret data and reach reasonable conclusions.
4. Understand the assumptions underlying various methods/models, and to recognize when assumptions are violated to the extent that a particular method is not appropriate.
5. 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.

ASSESSMENTS

Summary

Component	Weight
Class Participation	10%
Prep questions (3)	12%
Homework (2)	30%
Chart assignment (1)	8%
Exam	40%
Total	100%

Details of Assessments

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.

These six scores will be combined to form your class participation grade; this grade may be adjusted up or down at the discretion of the instructor in extreme cases.

Prep questions:

Each Sunday there is a brief "prep" question due at 8:30am (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, Feb 9, by 11pm*.
- Chart assignment — *due Sunday, Mar 1, by 11pm.*
- HW2 — *due Sunday, Mar 15, by 11pm*.

Exam:

The final exam (Sunday, Mar 22) 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 Robert H. Lee Graduate School's Student Experience Team.

LEARNING MATERIALS

My notes will be posted on Canvas. There is no mandatory textbook, however, an introductory statistics reference (including a section on regression) is recommended. Many such references exist; here are a few suggestions:

- Greg's recommendation:
  - Sharpe NR, De Veaux RD, Velleman PF, Berkowitz J. *Business Statistics, A First Course, 2nd Canadian Edition (or any other edition).* Pearson Canada Inc. 2017.
- Free online (or you can order a print version):
  - Holmes A, Illowsky B, Dean S, Hadley K. *Introductory Business Statistics*. Openstax. 2019. https://openstax.org/details/books/introductory-business-statistics
- Other online textbooks:
  - 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/
  - HyperStat Online Statistics Textbook http://davidmlane.com/hyperstat/
  - Online Statistics: An Interactive Multimedia Course of Study http://onlinestatbook.com/
- Regression (more advanced):
  - 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.

COURSE-SPECIFIC POLICIES AND RESOURCES

Missed or late assignments, and regrading of assessments

Late submissions will not be accepted and will receive a grade of zero.

Academic Concessions

If extenuating circumstances arise, please contact the RHL Graduate School program office as early as reasonably possible, and submit an Academic Concession Request & Declaration Form https://webforms.sauder.ubc.ca/academic-concession-rhlee. If an academic concession is granted during the course, the student will be provided options by RHL, or by the instructor in consultation with RHL, per UBC's policy on Academic Concession.

POLICIES APPLICABLE TO COURSES IN THE ROBERT H. LEE GRADUATE SCHOOL

Attendance

Excepting extenuating circumstances, students are expected to attend 100% of their scheduled class hours. Absent students limit their own academic potential, and that of their classmates, and cause unnecessary disruption to the learning environment. Students missing more than 20% of the total scheduled class hours for a course (including classes held during the add/drop period) without having received an academic concession will be withdrawn from that course. Withdrawals, depending on timing, could result in a "W" or an "F" standing on the transcript.

Punctuality

Students are expected to arrive for classes and activities on time and fully prepared to engage. Late arrivals may be refused entry at the discretion of the instructor or activity lead. Students arriving later than halfway through a scheduled class will be treated as absent for that class.

Electronic Devices

We will be using Excel to run example models in class, so students are encouraged to bring a laptop. Each class will begin with "lids down", and the instructor will let students know when it is time to take out laptops. At all other times, laptops must be closed. Other devices such as tablets and cell phones are not permitted to be used in class; students who do not follow the school's policy in this regard may be required to leave the room for the remainder of the class, so that they do not distract others. Research shows that students' use of devices in class has negative implications for the learning environment, including reducing their own grades and the grades of those sitting around them.

Details of the above policies and other RHL Policies are available at:
http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,199,506,1625

UNIVERSITY POLICIES AND RESOURCES

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available on the UBC Senate website at https://senate.ubc.ca/policies-resources-support-student-success.

Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

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ACKNOWLEDGEMENT

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xwməθkwəy̓əm (Musqueam) people, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.

COURSE SCHEDULE

(Subject to change with class consultation)

#	Date	Topic	Readings or Activities	Assessments due
1	Feb 2	**Introduction** What is Statistics? Data sources, sample size, hypothesis tests, P-value, evidence. One-sample z-test.	Read: The Brinery	**Q1** due at 8:30am
2		**Confidence Intervals**: The problem with p-values, confidence intervals, relation to hypothesis tests, examples. Normal distribution and central limit theorem (CLT).		
3		**Hypothesis Tests**: What is a hypothesis. Two sample z-tests and confidence intervals. One sample t-test; normal distribution vs. t-distribution.		
4		**Comparison of Means**: Data sources, sample size, t-tests and one-way ANOVA, assumptions, and conclusions.		**HW1** due Sunday, Feb 9, at 11:00pm
5	Feb 23	**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.		**Q2** due at 8:30am
6		**Simple Linear Regression**: Observational data; association, correlation, & causation; residuals, assumptions; transformations.		
7		**Multiple Regression**: Hypotheses; parsimony, multicollinearity, comparing models; hypothesis tests; variable selection.		**Chart assignment** due Sunday, Mar 1, at 11:00pm
8	Mar 8	**More Regression**: Outliers, leverage, influential points; higher order terms & dummy variables; logistic regression. Regression practice cases. Also paired t-test.		**Q3** due at 8:30am
9		**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		**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, Mar 15, at 11:00pm