

### COURSE INFORMATION

Course title:	Application of Statistics in Management		
Course code:	BABS 550	Credits:	1.5
Session, term, period:	2023S1	Class location:	HA 132
Section(s):	DD1, DD2	Class times:	DD1 Tu/Th 2-4pm DD2 Tu/Th 10am-12pm
Course duration:	June 5 to July 7, 2023	Pre-requisites:	n/a
Division:	Operations and Logistics	Co-requisites:	n/a
Program:	MMDD		

### INSTRUCTOR INFORMATION

Instructor:	Julia Yan		
Phone:	604 822 0322	Office location:	HA 468
Email:	<a href="mailto:julia.yan@sauder.ubc.ca">julia.yan@sauder.ubc.ca</a>	Office hours:	DDT Th 12:30pm-2pm, HA 132

Teaching assistants: Shivangi Khanna, Shubhii Chavan

### COURSE DESCRIPTION

We live in an increasingly data-rich world. This course focuses on using data to make good business decisions, and involves the fundamentals of data exploration, visualization, and common statistical methods. The emphasis will be on (i) being an informed and critical consumer of statistics, (ii) understanding core statistics concepts both quantitatively and qualitatively, (iii) applying the material in complex, real-world settings.

All methods will be illustrated with applications (from Netflix, Craigslist, CitiBike, Instacart, and more), and we will use real data whenever possible.

### COURSE FORMAT

The course is structured as ten lectures. Some lectures require you to think about and complete a review question prior to the class.

There is an optional tutorial on Thursdays at lunchtime.

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 methods are appropriate for different types of data and situations
2. Understand the strengths and limitations behind various methods, metrics, and experimental designs.
3. Use visualization and key statistical tools (confidence intervals, hypothesis tests, and regression) to interpret data, tell stories, and draw conclusions.

## ASSESSMENTS

### Summary

<u>Component</u>	<u>Weight</u>
Prep Questions (4)	10%
Clicker Questions (~10)	5%
Homework (3)	40%
Final exam	40%
Attendance / Participation	5%
Total	<u>100%</u>

### Details of Assessments

#### Prep Questions:

Lectures 2, 3, 4, and 8 are associated with prep questions that are due immediately before class. The first three prep questions reinforce the material of Lectures 1, 2, and 3, respectively. The last prep question involves concepts that were covered throughout the course.

#### Homework:

There are three homework assignments, each of which will be posted at least one week prior to the due date on Canvas.

#### Collaboration:

You are encouraged to work with classmates on prep questions and homework to enhance your learning experience. This means you may discuss problems and solution approaches. *However, your answers must represent your own work and must be in your own words.*

#### Clicker Questions:

Lectures will have brief multiple-choice questions (conducted on iClicker) throughout class. Any form of participation will receive quarter credit, and the correct answer will receive full credit.

#### Exam:

The final exam (date/time TBD) covers all material from class: lecture notes, prep questions, clicker questions, and homework. The final exam is completely open-notes: slides, personal notes, textbook, Excel spreadsheets are all allowed. Students must take the exam at the scheduled time unless arrangements have been made with the RHL Office.

#### Attendance and Participation:

Students who display repeated tardiness and/or absences will lose 0.5% for each late arrival and 1% for each missed class.

## LEARNING MATERIALS

Slides will be posted on Canvas.

There is a free, optional textbook available at this link: <https://www.openintro.org/book/os/>

Most computations can be done in Excel using the Analysis Toolpak. See Canvas for Excel instructions.

## 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. Regrade requests should be submitted within 72 hours of grades being posted, by email to the instructor. Grades can go up or down following a regrade request.

### *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](#). 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](#).

### *Code Plagiarism*

Code plagiarism falls under the UBC policy for [Academic Misconduct](#). Students must correctly cite any code that has been authored by someone else or by the student themselves for other assignments. Cases of "reuse" may include, but are not limited to:

- the reproduction (copying and pasting) of code with none or minimal reformatting (e.g., changing the name of the variables)
- the translation of an algorithm or a script from a language to another
- the generation of code by automatic code-generations software

An "adequate acknowledgement" requires a detailed identification of the (parts of the) code reused and a full citation of the original source code that has been reused.

Students are responsible for ensuring that any work submitted does not constitute plagiarism. Students who are in any doubt as to what constitutes plagiarism should consult their instructor before handing in any assignments.

### *Use of Chatbots*

Chatbots are not permitted in this class. Note that chatbots tend not to be reliable for math, so they might lead you astray. The spreadsheets we work on in class basically automate the calculations for you anyway.

## 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.

### *COVID-19 Policies for Attendance & Academic Concessions:*

If a student feels unwell, they should stay home and send a courtesy email to each impacted instructor and cc their program manager. The student should also submit an [Academic Concession Request & Declaration Form](#).

If a student suspects possible COVID-19 infection, they should use the BC Ministry of Health's [self-assessment tool](#), to help determine whether further assessment or testing for COVID-19 is recommended.

### *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*

Devices such as laptops, tablets, and cell phones are not permitted to be used in class unless directed by the instructor for in-class activities. 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 laptops in class has negative implications for the learning environment, including reducing their own grades and the grades of those sitting around them.

### *Citation Style*

Please use the American Psychological Association (APA) reference style to cite your sources.

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 [DO NOT MODIFY THIS PARAGRAPH]**

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>.

### *Respect for Equity, Diversity, and Inclusion*

The UBC Sauder School of Business strives to promote an intellectual community that is enhanced by diversity along various dimensions including status as a First Nation, Metis, Inuit, or Indigenous person, race, ethnicity, gender identity, sexual orientation, religion, political beliefs, social class, and/or disability. It is critical that students from diverse backgrounds and perspectives be valued in and well-served by their courses. Furthermore, the diversity that students bring to the classroom should be viewed as a resource, benefit, and source of strength for your learning experience. It is expected that all students and members of our community conduct themselves with empathy and respect for others.

### *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.

#### **COPYRIGHT**

All materials of this course (course handouts, lecture slides, assessments, course readings, etc.) are the intellectual property of the instructor or licensed to be used in this course by the copyright owner. Redistribution of these materials by any means without permission of the copyright holder(s) constitutes a breach of copyright and may lead to academic discipline and could be subject to legal action. Any lecture recordings are for the sole use of the instructor and students enrolled in the class. In no case may the lecture recording or part of the recording be used by students for any other purpose, either personal or commercial. Further, audio or video recording of classes are not permitted without the prior consent of the instructor. Students may not share class Zoom links or invite others who are not registered to view sessions.

#### **ACKNOWLEDGEMENT**

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the x<sup>w</sup>məθk<sup>w</sup>əyəm (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)

Class	Date	Topic	Readings or Activities	Assessments due
1	June 6	<b>Introduction.</b> Fundamentals of data (types, visualization, summary statistics) and probability (Normal distribution, z-scores).	<i>OpenIntro</i> Ch 1.1, 1.2, 2.1, 2.2, 3.1, 3.5, 4.1	
2	June 8	<b>Confidence Intervals.</b> Central limit theorem. One- and two-sample confidence intervals. Sample size.	<i>OpenIntro</i> Ch 1.3, 3.3, 5.1, 5.2, 6.1	<b>Prep Q1</b> due at beginning of class
3	June 13	<b>Hypothesis Tests (Proportions).</b> One-sample and two-sample z-tests.	<i>OpenIntro</i> Ch 5.3, 6.1, 6.2	<b>Prep Q2</b> due at beginning of class
4	June 15	<b>Hypothesis Tests (Means).</b> One-sample and two-sample t-tests. Challenges of hypothesis testing.	<i>OpenIntro</i> Ch 7.1, 7.2, 7.3, 7.5	<b>Prep Q3</b> due at beginning of class  <b>HW1</b> due Sunday, June 18, at 11:00pm
5	June 20	<b>Simple Linear Regression.</b> Quantitative response variables. Correlation, interpretability, residuals, R-squared.	<i>OpenIntro</i> Ch 8.1, 8.2, 8.4	
6	June 22	<b>Multiple Linear Regression.</b> Parsimony, multicollinearity, overfitting. Hypothesis testing for regression, variable selection.	<i>OpenIntro</i> Ch 8.4, 9.1, 9.2	<b>HW2</b> due Sunday, June 25, at 11:00pm
7	June 27	<b>More Regression.</b> Categorical explanatory variables. Variable transformations.	<i>OpenIntro</i> Ch 8.3, 9.3	
8	June 29	<b>Logistic Regression.</b> Binary response variables. Interpretability, accuracy.	<i>OpenIntro</i> Ch 9.5	<b>Prep Q4</b> due at beginning of class
9	July 4	<b>Statistics in Practice.</b> Case study (Duolingo) and discussion of current issues.		
10	July 6	<b>Review Session.</b> Review problems, questions & answers.		<b>HW3</b> due <b>Friday</b> , July 7 at 11:00pm
Exam	TBD			<b>Exam</b>