

COURSE INFORMATION

Course title:	Advanced Predictive Business Analytics		
Course code:	BABS 508	Credits:	1.5
Session, term, period:	2021W2, Period 3	Class location:	HA 337
Section(s):	BA1	Class times:	Mon/Wed 2-4PM
Course duration:	Jan 4 to Feb 12, 2022	Pre-requisites:	BABS 507
Division:	Operations and Logistics	Co-requisites:	N/A
Program:	MBAN		

INSTRUCTOR INFORMATION

Instructor:	Katherine Sunderland, MPH		
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Teaching assistant:	Karthik Narayanan		
Office hours:			
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COURSE DESCRIPTION

In this course, students will learn the theory and methods necessary to build an accurate model to predict responses for future observations using data that an analyst is likely to see in the real world. Students will learn: how to handle real-world data issues, techniques for assessing model assumptions and ways to address their violation, principal components analysis (PCA) for data reduction, as well as methods for describing, validating and simplifying a model. Multiple linear regression, logistic regression and Poisson regression will be introduced in the context of generalized linear models. Students will be required to use R or RStudio for statistical computing.

COURSE FORMAT

Class time will consist of lectures, discussions and activities. Students will complete homework assignments and the group project outside of class time. Respect and professionalism is expected in all interactions related to the course both inside and outside the classroom.

LEARNING OBJECTIVES

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

1. State a model statistically, identifying each predictor with one or more component variables and identify and interpret each regression parameter
2. Describe the pitfalls of missing data in the real-world setting and describe methods for handling missing data
3. Identify when to employ linear, logistic or poisson regression
4. Identify the pitfalls of traditional variable selection methods and employ Principal Components Analysis for data reduction
5. Explain what overfitting is and how to prevent it
6. Employ methods for validating regression assumptions or modifying the model to meet the assumptions
7. Describe and validate a fitted model
8. Work effectively in teams to analyze and interpret data to make accurate predictions
9. Use the R statistical software package to perform data analyses

ASSESSMENTS

Summary

<u>Component</u>	<u>Weight</u>
Assignments (2)	40%
Group Project (2 deliverables)	50%
Attendance and participation	<u>10%</u>
Total	<u>100%</u>

Details of Assessments

Assignments (40%)

There will be two individual assignments, each worth 20%. Assignments should be submitted electronically through Canvas. Work will be graded based on correctness and depth of understanding and interpretation.

Assignment #1:

- Due on Monday January 10, 2022 at 11:59 pm PT

Assignment #2:

- Due on Monday January 17, 2022 at 11:59 pm PT

Group Project (50%)

Students will be randomly assigned by Canvas into a group of 3 students to build and validate a predictive model and interpret it in the form of a report. There are 2 deliverables for this project.

Deliverable #1 (20% weight):

- Due on Monday January 31, 2022 at 11:59 pm PT

Student teams will receive a dataset to define their modeling goals, prepare and describe their data, assess modelling assumptions and address any violations. The group leader will submit the assignment electronically through Canvas on behalf of the group.

Deliverable #2 (30% weight):

- Due on date TBD

Student teams will apply the work from deliverable #1 to finalize, describe and validate their predictive model and share their findings in the form of a report.

Team members will receive the same grade for the project with two exceptions. If it can be reasonably demonstrated that a team member has conducted themselves in a grossly unprofessional manner or has not contributed to the project, the instructor will reserve the right to deduct up to 50% from the project's score from the student's grade. Students are encouraged to manage conflict themselves in a professional and respectful manner (see participation component). The instructor is available to help if necessary.

Class Participation (10%):

Participation will be assessed based on professionalism. This includes, getting to class on time, participation in class activities and discussions, and professional and respectful interactions with students and the instructor in all topics related to the course, both inside and outside of class, e.g. when working on group projects.

LEARNING MATERIALS

There is no mandatory textbook for this course, however, the instructor will be using the following recommended textbook as a source. It is quite dense and, in many cases, outside the scope of this course. However, it covers a wide range of real-world data situations and is an excellent reference for any data analyst working with regression models.

Recommended:

Harrell F.E. (2015). Regression Modeling Strategies With Applications to Linear Models, Logistic and Ordinal Regression, and Survival Analysis, 2nd Edition. Springer.

Also recommended for a more thorough discussion of generalized linear models:

Dunn P.K. & Smyth G.K. (2018). Generalized Linear Models With Examples in R. Springer.

Both textbooks are available electronically from the library.

Required statistical software:

R or RStudio will be required these can be downloaded for free at the following websites:

Download R at: <https://cran.r-project.org/>

Download RStudio at: <https://rstudio.com/products/rstudio/download/>

Required course website and learning technology:

- Canvas
- iClicker Cloud (see below)

Use of iClicker Cloud for Class Participation Assessments:

iClicker Cloud will be used for taking attendance and for students polls.

Follow the link for instructions on setting up iClicker Cloud for Students:

<https://lthub.ubc.ca/guides/iclicker-cloud-student-guide/>

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](#). 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.

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.

If a student is required to self-isolate (e.g., while waiting for test results), they should follow the steps above (stay home, email instructor(s) and program manager, submit an [Academic Concession Request & Declaration Form](#), and follow BC Health Guidance.

Students who are required to quarantine, should get in touch with their Program Manager to discuss the possibility of academic concessions for each impacted course. The Program Manager will work closely with your instructors to explore options for you to make up the missed learning.

COVID-19 Safety in the Classroom:

Masks: Masks are **required** for all indoor classes, as per the BC Public Health Officer orders. For our in-person meetings in this class, it is important that all of us feel as comfortable as possible engaging in class activities while sharing an indoor space. For the purposes of this order, the term “masks” refers to medical and non-medical masks that cover our noses and mouths. Masks are a primary tool to make it harder for COVID-19 to find a new host. You will need to wear a medical or non-medical mask for the duration of our class meetings, for your own protection, and the safety and comfort of everyone else in the class. You may be asked to remove your mask briefly for an ID check for an exam, but otherwise, your mask should cover your nose and mouth. Please do not eat in class. If you need to drink water/coffee/tea/etc, please keep your mask on between sips. Students who need special accommodation are asked to discuss this with the program office.

Seating in class: To reduce the risk of COVID-19 transmission, please sit in a consistent area of the classroom each day. This will minimize your contacts and will still allow for the pedagogical methods planned for this class to help your learning.

Visit the following website for the most recent updates regarding COVID-19 protocol on campus:
<https://students.ubc.ca/campus-life/returning-to-campus>

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

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.

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ACKNOWLEDGEMENT

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

COURSE SCHEDULE

All Classes are synchronous
(Subject to change with class consultation)

Class	Date	Topic	Readings or Activities	Assessments due
1	January 5, 2022 (Wed)	General aspects and methods for fitting regression models	In-class exercises	

2	January 7, 2022 (Fri)*	Methods for fitting regression models; Data considerations: Privacy, cleaning, missing data	In-class exercises	
3	January 10, 2022 (Mon)	Multivariable modelling strategies	In-class exercises	Assignment #1 Due Monday January 10, 2022 at 11:59 pm PT
4	January 12, 2022 (Wed)	Multivariable modelling strategies; Maximum likelihood estimation	In-class exercises	
5	January 17, 2022 (Mon)	Describing, validating and simplifying a model	In-class exercises	Assignment #2 due Monday January 17, 2022 at 11:59 pm PT
6	January 19, 2022 (Wed)	Logistic regression	In-class exercises	
7	January 24, 2022 (Mon)	Logistic Regression	In-class exercises	
8	January 26, 2022 (Wed)	Case Study	In-class exercises	Group project deliverable #1 due Monday January 31, 2022 at 11:59 PM
9	January 31, 2022 (Mon)	Poisson Regression	In-class exercises	
10	February 2, 2022 (Wed)	Topics related to the group project	Work on group project	
	February 7 - 12, 2022	Exam Week		Group project final deliverable – To be scheduled by RHL Office

* Please note that there is no class on January 3rd due to the New Year's Day statutory holiday. The make-up class will be held on February 7th from 2pm-4pm.