

EPIB 521

Regression Analysis for Health Sciences

Course Outline, 2021 Winter

Instructor Information

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Course Format

The course starts from Jan. 7, final exam is on Apr. 8.

Due to Covid-19 and the corresponding restrictions, the course will be delivered online. Considering students will physically be in different time zones, for the convenience of students and the consistency of the grading schemes, the course instructor will upload the course videos and associated annotated materials before every Tuesday and Thursday 8:35 am.

Three office hours every week will be available for all students (the video recording will be uploaded accordingly). However, students are always encouraged to email the instructor at any time, for any question, and the instructor will try to reply to the questions as soon as possible. However, the instructor is not supposed to answer questions from assignments, quizzes and final exam. Concerns, thoughts, complains are also welcomed. Please be communicative for a better results.

Office hours: Every Tuesday 8-9am Wednesday 9-10pm Friday 3-4pm
Office hour zoom link: <https://mcgill.zoom.us/j/8792235005>

N.B. All time indicated above and below is Montreal Time EST.

For this course, I am adopting flexible assessment strategies that create greater access for all students by incorporating principles of inclusive pedagogy. As such, I have taken into consideration the variety of learner needs and barriers that students may face in this course and have designed the assessments with these considerations in mind. Therefore, additional time has been built into the assessment strategy to address these potential barriers. Because of these modifications, individual time-based accommodations for students do not apply. There may be exceptional circumstances in which other disability-related accommodations may still be needed. If you feel this is the case for you, please reach out to OSD via email at exams.osd@mcgill.ca. They will assess the situation and coordinate with me when necessary.

Course Description

The aim of this course is to provide students with basic principles of regression analyses applicable to the health sciences so that they can understand and use appropriate statistical regression techniques for continuous and discrete data. Details can be seen in EPIB 521 2021 Calendar in the end. Roughly, the course will cover:

- Linear regression: regression for two or more explanatory variables, polynomial regression, dummy variables, inference for regression parameters, confounding and collinearity, effect modification and interaction, model-checking, model selection, prediction.
- Logistic regression: logistic regression for one or more variables, interpreting odds ratios, inference for logistic regression parameters, confounding and interactions in logistic regression, model building, goodness-of-fit.
- Brief overview of other regression models (extra materials): Applications of logistic regression (propensity score analysis), polytomous regression, Poisson regression, and survival analysis.
- Running analyses in R: All course modules will be accompanied by a software component. The statistical software used in the class is R (open source and free to download).

Prerequisite

EPIB 507

If you have not taken EPIB 507, and have not already obtained permission to register, then please see the instructor as soon as possible to determine if you have the necessary background to succeed in this course.

Textbook and Reference Texts

There is no required textbook. Suggested reference texts are the following (no need to buy these reference texts; all of the following eBooks are accessible via McGill library):

- Vittinghoff, E. et al. (2012). Regression methods in Biostatistics, second edition, Springer.
- Weisberg, S. (2005). Applied Linear Regression, third edition, John Wiley.
- David W. Hosmer and Stanley Lemeshow (2013), Applied Logistic Regression, 3rd Ed. Wiley.
- Kleinbaum, D.G., Klein, M. Logistic Regression. A Self-Learning Text, 3rd Ed., Springer.
- Kleinbaum, D.G., Klein, M. Survival Analysis. A Self-Learning Text, 3rd Ed., Springer.

EPIB 521 2021 Calendar

Class	Time	Topic
1	Jan. 7	Course outline, Correlation
2	Jan. 12	Simple linear regression, Intro to R
3	Jan. 14	Inference in simple linear regression
4	Jan. 19	Multiple regression and inference Hand out Assignment 1
5	Jan. 21	Categorical variables and polynomial regression
6	Jan. 26	Interaction
7	Jan. 28	Diagnostic tools
8	Feb. 2	Confounding and collinearity Assignment 1 Due , Hand out Assignment 2
9	Feb. 4	Goodness of fit
10	Feb. 9	Model selection
11	Feb. 11	Review of risk ratios, odds ratios
12	Feb. 16	Logistic regression Assignment 2 Due
13	Feb. 18	Logistic regression continued
14	Feb. 23	Goodness of fit and diagnostics in logistic regression Hand out Assignment 3
15	Feb. 25	Rate ratios, Poisson regression
16	Mar. 9	Poisson regression continued
17	Mar. 11	Intro to survival analysis
18	Mar. 16	Survival analysis continued Assignment 3 Due , Hand out Assignment 4
19	Mar. 18	Matching and conditional logistic
20	Mar. 23	Correlated data
21	Mar. 25	Correlated data continued
22	Mar. 30	Tools in data analysis Assignment 4 Due
23	Apr. 1	Final Review
24	Apr. 6	Final Review
	Apr. 8	Final Exam

The calendar is subject to change according to the undergoing situation

Grading Scheme

- 4 Assignments - 40% (10% each)
- Quizzes - 25%
- Final Exam - 35%

Assignments

Students have **2 weeks** to complete each of the assignment. Without other notice, they are due on the course starts time **8:35 am** of the dates designated on the Calendar. Assignments will mostly focus around running statistical analyses on real datasets.

Quizzes

Students have **24 hours** to complete the quizzes. Time starts counting from **8:35 am** on the dates indicated in the calendar. Each quiz is open-book, open internet, and will cover material from a few of the preceding lectures. The quizzes will give students an idea of the kinds of questions that will appear in the final.

Final

Final will be an open-book take-home examination. The exam will be posted on myCourses on **Friday April 9, 11:59 am noon**. students are required to submit their solutions as a single pdf file via myCourses before **Saturday April 10, 11:59 am noon**. Majority of the questions in the final is very similar to the types of questions on quizzes. One question in the final will require running statistical analyses on a real dataset using R – similar to assignment questions.

Students must complete and submit their OWN Assignments, Quizzes and Final Exam. If anyone is found to plagiarize, in any form, the grade will be 0. If more than half of the students were found to give the same wrong answers for a particular question, those students will be subject to a 10% mark off.

You must email me to ask for an extension before the deadlines of any assessments. A dated doctor noted must be provided and it will be examined by the

Exam Center of McGill.

The weight of that assessment will be added to your final. This is because the answer will be posted right after the deadline. For example, if you ask for an extension for a quiz, then your final will account for 40%, if you ask for another extension for an assignment, the weight of the final will be 50%.

Once the solutions have been posted, and if the student has not spoken to me about an extension, the instructor can NOT accept any late assessment and the score will be 0.

How to get the most from this course

The instructor will be covering a lot of material, and it will most likely appear to go by very fast. Please never hesitate to ask questions during office hours, or via email. You will get the most out of this course if you keep up with the material on a day-to-day basis and ask questions about what you do not understand right away, rather than waiting until later when it may become impossible to catch up.

Integrity statement

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded. The assignments, quizzes, and exams will be graded by the course instructor. McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (<http://www.mcgill.ca/students/srr/honest/>)