Syllabus

Contents

Introduction

Instructor

👤 Joshua Murray

🏛 Drop-in office hours

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Course details

📅 Wednesday

📅 January 12–April 8, 2022

🕐 3:00PM-5:00PM

🏛 Online

Tutorials

📅 Wednesday

🕐 5:00PM-6:00PM

(various sections)

TA names to be posted
on Quercus

In this course, we will work our way through a series of models and methods which are used broadly in practice. From the course calendar:

> Advanced topics in statistics and data analysis with emphasis on applications. Diagnostics and residuals in linear models, introduction to generalized linear models, graphical methods, additional topics such as random effects models, designed experiments, model selection, analysis of censored data, introduced as needed in the context of case studies.

As statisticians we are usually working as part of a larger team where communication is of utmost importance. We will therefore put a particular emphasis on model interpretation, model criticism, and model selection. Throughout we will think carefully about how to display our model results through tables and visualization.

Course Prerequisites

- STA303H1/(STAC67H3, STAC51H3); CSC108H1/ CSC110Y1/ CSC120H1/ CSC148H1/ CSCA08H3/ CSCA48H3/ CSCA20H3/ CSC108H5/ CSC148H5
- Material from the second year statistical theory courses which are prerequisites to STA302 will be drawn on extensively
- Knowledge of programming with R is essential

Course Content

- Reproducible Data Analysis
  - A review of working with R/Rstudio
  - Principles of tidy data
  - Reproducible documents with R

- Generalized Linear Models with Maximum Likelihood Estimation
    - Applications, model interpretation and selection
- Model Selection
    - Penalized regression methods
- Linear Mixed effects models
    - Mixed models, Maximum Likelihood Estimation and REML
    - Hierarchical data structures
    - Longitudinal data
    - Applications
- Generalized Linear Mixed Models
    - Random effects models for non-gaussian data
    - Model interpretation
- Non-linear regression methods
    - Generalized Additive Models
- Survival Analysis
    - Censored data
    - Parametric event time distributions

Class Format

We will meet online on Wednesdays from 3:00PM-5:00PM with a tutorial from 5:00PM to 6:00PM. We will use Zoom for our lectures and a link will be posted on Quercus. Students are required to have a working webcam.

Statistical Software

This course will rely heavily on the use of the R prgramming language and the Rstudio Integrated Development Environment. R is a free programming language that can either be downloaded onto your personal computer or used in the cloud

This class will make use of UofT Jupyterhub for accessing R/Rstudio on the cloud.

If you wish to install a local version of R/Rstudio, you can follow the two steps below:

1. The base R framework is available for download at http://cran.r-project.org for Windows, Mac and Linux operating systems.

2. After installing R you can download and install the free Rstudio desktop version here

Course Materials

The course will not adhere closely to any single text. Any specific readings will be posted on the website/Quercus module for the given week. We will make use of the following textbooks from time to time:

- Statistical Models, Cambridge University Press; Illustrated edition by Davison.
- Linear Models with R, Second Edition

Student Assessment

All assessments for this course will take place remotely. All assessed work will be described and available both on the class website and in Quercus. All assessed work will be submitted on Quercus before the given deadline. **Assignments and quizzes must be done individually**.

1. 4 short in class quizzes worth 10% of the final grade. These quizzes will take place live on Quercus during the last 30 minutes of class (see schedule). Only your top 3 quiz grades will count towards to your final mark.
2. 5 Assignments worth 60% of the final grade. For each assignment, you will be required to submit a reproducible RMarkdown file (.Rmd extension) with your code as well as a knitted RMarkdown document as your data analysis report.
3. A short (1 page) written reflection worth 5% of the final grade. A brief summary of your experience in the course. What did you learn and what was your favorite/least favorite material from the course?
4. Final Exam worth 25% of the final grade.

Item	Description	Value
In-class quizzes	4 in class quizzes	10%
Assignments	5 assignments	60%
Written reflection	Short reflection of class experience	5%
Final Exam	Date TBD	25%

Missed Assessments

- Your top 3 quizzes will count towards your final grade, meaning you can miss at most one quiz without penalty.

- Please be cautious if you are trying to upload your answers for your quiz/final assessment at the last minute, you might miss the deadline. There will be a penalty of 20% for those who submit up to an hour past the deadline.

- Late assignments will be accepted but subject to a 20% penalty per day late.

- If you miss an assessment for any medical reasons, please reach out to me as soon as possible and we can schedule a makeup assessment.

- If the final assessment is scheduled by the teaching team and you miss this assessment for any reason then you will be given one opportunity complete a makeup assessment scheduled during the final assessment period. If you do not complete the final assessment then your grade for the final assessment will be 0.

- This course follows the University of Toronto's Policies on missed assessments and requires students to complete the Absence Declaration on ACORN if an assessment is missed due to illness. In addition to completing this absence declaration form you must fill out the missed assessment notification form. Once you have filled out this form, both you and me will receive an email as both notification and confirmation.

- Any requests to have marked assignment/quiz re-evaluated must be made in writing by email to me within 48 hours after the grades are released. You must title your email ("STA442 grade re-valuation request"). The request must contain a justification for consideration. Be sure to include your official name and student number for identification purposes. The teaching team should process regrading requests within two weeks of the requested date. Please note that the teaching team reserves the right to review a part of the whole of your assignment. Hence, your marks may go down, up or remain the same.

Office Hours

- TAs will hold office hours through Zoom (links posted on the Quercus course page). The office hour schedule will be posted on Quercus. It is recommended that you visit during office hours whenever you have a question about the material. It is more important than ever in an online class to have material clarified as quickly as possible. Please post your questions at least three hours before the due date. Don't wait until the last minute to ask your questions!

Academic Integrity

Academic integrity Academic integrity is fundamental to learning and scholarship at the University of Toronto. Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the University of Toronto degree that you earn will be valued as a true indication of your individual academic achievement, and will continue to receive the respect and recognition it deserves. Familiarize yourself with the University of Toronto's Code of Behaviour on Academic Matters available at https://www.academicintegrity.utoronto.ca/perilsand-pitfalls

Accessibility Needs

The University of Toronto offers academic accommodations for students with disabilities. If you require accommodations, or have any accessibility concerns about the course, the classroom, or course materials, please contact Accessibility Services as soon as possible: accessibility. services@utoronto.ca or http://accessibility.utoronto.ca.

Schedule

STA-442H1

		Lecture Content	Tutorial	Assignment Due	Quiz
January 12	Class Introduction/Reproducible Research	✔	✔	✔	✔
January 19	Linear Models Review	✔	✔	✔	✔
January 26	Logistic Regression	✔	✔	✔	✔
February 2				✔	✔
February 9					✔
February 16				✔	✔
February 23	NO CLASS READING WEEK				✔
March 2					✔
March 9				✔	✔
March 16					✔
March 23				✔	✔
March 30					✔
April 6				✔	✔

STA 442H1: STA-442H1 (Winter 2022)

[University of Toronto](#)   [Department of Statistical Sciences](#)

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📅 Wednesday   🕐 3:00PM-5:00PM

🏛 Online

This site created with the [Academic theme](#) in [blogdown](#) and [Hugo](#).

 [View the source at GitHub.](#)