STA365: APPLIED BAYESIAN STATISTICS (WINTER 2019/20)

Instructor: Daniel Simpson

Office Hours: Tuesday 3-4pm (Excluding week 1)
Thursday 3-4pm
Other times by appointment only

Email: simpson@utstat.toronto.edu

Communication: In general, I am not able to answer questions about the course material by e-mail. Before you send an e-mail, make sure that you are not asking for information that is already on the course web site, or questions about the course material or assignments that are more appropriately discussed in tutorial or during office hours. If you do not get a response, this may be why. Questions about the course material can be posted on the class Piazza board, which can be found at piazza.com/utoronto.ca/winter2020/sta365. This will be monitored by myself and the TAs.

E-mail is appropriate for private communication. Use your utoronto.ca account to ensure that your message doesn't automatically go to my Junk folder. I will generally answer e-mail within one business day.

Announcements will be posted on Blackboard. Please check there regularly. If an urgent matter arises, I may contact the entire class by e-mail. In order to receive these messages, please make sure that your ROSI account has your utoronto.ca e-mail.

Lectures:
Tuesday 13:00–15:00 PB B150
Thursday 14:00–15:00, PB B150

Accessibility Needs: The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom, or course materials, please contact Accessibility Services as soon as possible: disability.services@utoronto.ca or http://studentlife.utoronto.ca/accessibility.

Assessment:

	WEIGHT	DATE	TIME
HOMEWORK 1	5%	Tuesday 21 January	Due 12:00pm (Midday)
HOMEWORK 2	5%	Tuesday 4 February	Due 12:00pm (Midday)
MIDSEMESTER EXAM	30%	Tuesday 11 February	In lecture slot
HOMEWORK 3	5%	Tuesday 10 March	Due 12:00pm (Midday)
HOMEWORK 4	5%	Tuesday 24 March	Due 12:00pm (Midday)
FINAL EXAM	50%	Set by Faculty	

If your exam mark is better than your test mark, the exam weight will be 65% and the test weight will be 15%.

The test will be written in a room other than the lecture room (location to be announced). Practice problems will be posted on the web for each chapter. The practice problems are to help you prepare for the tests and exam and are not to be handed in. The homeworks will each use R and Stan. You will not need to know R or Stan syntax on the exams, but you will need to interpret output from R and Stan.

If the test is missed for a valid reason, you must provide appropriate documentation, such as the University of Toronto Medical Certificate, University of Toronto Health Services Form, or College Registrar's Letter. You must submit this documentation within one week of the test. If documentation is not received in time, your test mark will be zero. If a test is missed for a valid reason, its weight will be shifted to the final exam.

No late assignments will be accepted without documentation of a valid reason.

Any requests to have marked work re-evaluated must be made in writing within two weeks of the date the work was returned to the class. The request must contain a justification for consideration.

Re-grading policy:

Regrading requests should only be made for genuine grading errors, and should be initiated by writing or typing a complete explanation of your concern (together with your full name, student number, and e-mail address) on a separate piece of paper, and giving this together with your original unaltered homework/test paper to the instructor within two weeks of when the graded item was first available. Warning: your mark may end up going down rather than up.

Textbook and slides:
- This course is loosely based on the **third edition** of Bayesian Data Analysis, by Andrew Gelman, John Carlin, Hal Stern, David Dunsion, Aki Vehtari, and Donald Rubin.
- Information about Stan can be found in the Stan Reference Manual (which is the place to go for information about the language) https://mc-stan.org/docs/2_21/reference-manual/index.html and the Stan Functions Reference, which is the place to go for information about specific distributions in Stan https://mc-stan.org/docs/2_21/functions-reference/index.html

- Further information will be contained in slides, handouts, and specific references that will be available on Quercus before classes.

Computing:
- The course will be run using the R computing environment and will use RStudio and RMarkdown extensively.
- The course will also use the Stan probabilistic programming language (http://mc-stan.org/), which can be installed via the rstan R package. Installation tips can be found here: https://github.com/stan-dev/rstan/wiki/RStan-Getting-Started
- You are strongly encouraged to use RStudio (https://www.rstudio.com), which is a free IDE for R.
- All instructions in the course will assume that you have the latest version of both RStudio and R installed. We will not answer any R related questions unless both of these things are true.

Course outline:
This course will cover practical and theoretical aspects relevant to Bayesian statistics. The course will cover some of the following topics:
- One parameter and multiparameter models
- Bayesian linear regression
- Bayesian multilevel models
- Modelling non-representative data with multilevel regression and post-stratification
- Nonlinear modelling
- Model checking and comparison
- The Stan probabilistic programming language.