STA365: APPLIED BAYESIAN STATISTICS (WINTER 2020/21)

Instructor: Daniel Simpson

Office Hours: Wednesday 6-7pm (Excluding week 1)
Friday 4-5pm
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/winter2021/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 Quercus. 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:

Wednesday 15:00–17:00 Online
Friday 15:00–16:00, Online

Please note: ***All lectures will be recorded.*** *This may include any and all video, audio, or text (including DMs you may think are private!).* They will be available soon after the lecture. **Please do not share these videos with people outside of the class.**

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	20%	Friday 5 February	Due 12:00pm (Midday)
ASSIGNMENT 1	30%	Friday 5 March	Due 12:00pm (Midday)
HOMEWORK 2	20%	Friday 26 March	Due 12:00pm (Midday)
ASSIGNMENT 2	30%	Friday 16 April	Due 12:00pm (Midday)

Extension policy:
2020 is a challenging year for all of us and, in light of that, this course will have a generous (but not endless) extension policy. It will typically not be difficult to get a one week extension as long as it is requested **at least one day before** the due date. I will only grant longer extensions in extreme and exceptional circumstances, but I am happy to talk to any student about their assessment schedule and I will be as flexible as I can be within the constraints at hand..

If you have accessibility requirements that involve more time to do assessments please let me know via email early in the semester and we can come up with a workable assessment plan.

Re-grading policy:

Regrading requests should only be made for genuine grading errors, and should be initiated by typing a complete explanation of your concern (together with your full name, student number, and e-mail address) and **emailing 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. The remarks will occur at some point before the final marks are settled.

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.

Academic Integrity

The University treats cases of plagiarism and cheating very seriously. It is the students' responsibility for knowing the content of the University of Toronto's Code of Behaviour on Academic Matters. All suspected cases of academic dishonesty will be investigated following procedures outlined in the above document.

If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see http://academicintegrity.utoronto. ca/). Here are a few guidelines regarding academic integrity:

- You may consult class notes/lecture slides during tests and projects, however sharing or discussing questions or answers with other students is an academic offence.
- Students must complete all assessments individually. Working together is not allowed.
- Paying anyone else to complete your assessments for you is academic misconduct.
- Sharing your answers/work/code with others is academic misconduct.
- Looking up solutions to test problems online or in textbooks and copying what you find is an academic offence.
- All work that you submit must be your own! You must not copy mathematical derivations, computer output and input, or written answers from anyone or anywhere else. Unacknowledged copying or unauthorized collaboration will lead to severe disciplinary action, beginning with an automatic grade of zero for all involved and escalating from there. Please read the UofT Policy on Cheating and Plagiarism, and don't plagiarize.

Intellectual Property

Course materials provided on Quercus, such as lecture slides, assignments, tests and solutions are the intellectual property of your instructor and are for the use of students currently enrolled in this course only. Providing course materials to any person or company outside of the course is unauthorized use. This includes providing materials to predatory tutoring companies.

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.