UNIVERSITY OF TORONTO

Term : Winter
Year : 2022
Campus : St. George

STA 365: (Applied) Bayesian Statistics

Professor: Boris Babic	Time: W 3-5pm, F 3-4pm
Email: boris.babic@utoronto.ca	Location: KP 108
Office: phil, 433 JHB | stat, 9086 700 University	Office hours: Mondays 2-3pm
TAs:	
Colin Decker: colin.decker@utoronto.ca	Colin's office hours: TBD
Morris Greenberg: morris.greenberg@mail.utoronto.ca	Morris's office hours: TBD

Course Description
This will be a first course in Bayesian statistics. The goal of this course is to develop sophisticated tools for probability modeling and data analysis from the Bayesian perspective. Key topics covered include single and multi parameter inference, linear regression, mixture models, hierarchical and mixed effects models, and Monte Carlo approximations.

Materials
The course is loosely based on the following textbooks:
Gelman et al., Bayesian Data Analysis,
Hoff, A First Course in Bayesian Statistics,
Robert, The Bayesian Choice.

Assignments and important dates
Grades will be based on the following:

First Homework	20% (Distributed Friday January 28; due Friday February 4)
First Assignment	30% (Distributed Friday February 25; due Friday March 4)
Second Homework	20% (Distributed Friday March 18; due Friday March 25)
Second Assignment	30% (Distributed Friday April 1; due Friday April 8)

Assignments must be submitted via Quercus by 11:59pm on the day they are due. I recommend typing your assignments in LaTeX (using Overleaf, if you do not have a distribution on your system). If you are handwriting your assignments, please be sure to write legibly, and upload a high quality scan. Illegible responses will be ungraded and marked as incomplete.

Prerequisites
Sufficient background (one course or equivalent) in probability, statistics, calculus, and linear algebra.

Communication
I will in general not answer questions about the course material by e-mail. If you have questions: check the web-site; check the course discussion page; contact your TAs, or come to office hours.

Submitting Assignments and Late Policy
Assignments must be submitted online by 11:59pm on the day they are due. If you need to request an extension, contact your TAs.

Students with Disabilities

If you think you may need accommodation for a disability, please contact me or accessibility services as soon as possible (studentlife.utoronto.ca/as).

Plagiarism
Work submitted for a grade in this course must be your own.

Topics

Subjective Probability and Betting

Exchangeability

Single Parameter Inference

Estimator Optimality

Hypothesis Tests

The Normal Model

The Multivariate Normal Model

Hierarchical Models

Mixture Models

Linear Regression

Generalized Linear Models

Mixed Effects

Missing Data

Monte Carlo Approximations