

MATH 598: TOPICS IN STATISTICS  
BAYESIAN INFERENCE, COMPUTATIONAL METHODS AND MONTE CARLO  
FALL 2020

Instructor : David A. Stephens (Burnside 1225)  
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Website: www.math.mcgill.ca/dstephens/598/  
Office Hours : TBA  
Texts : *The Bayesian Choice*, CP Robert.  
*Bayesian Core: A Practical Approach to Computational Bayesian Statistics*,  
J-M Marin and CP Robert.  
*Monte Carlo Statistical Methods*, CP Robert and G Casella.  
Prerequisites : MATH 556, MATH 557, MATH 533 or equivalents, or by permission of instructor.  
Restriction : Not open to students who have taken  
BIOS 691 *Bayesian Analysis in the Health Sciences*.

METHOD OF DELIVERY

The course will be delivered in a remote delivery format with three 50 minute live lecture slots per week that will be used to go over prepared course material that will be made available at the outset of the course. These lectures will be recorded and made available via the Lecture Recording System. There will also be two office hours that will not be recorded.

TARGET SYLLABUS

**Topics to be covered include:** Bayesian statistical inference and decision making; de Finetti's representation; parametric methods; conjugate models; hierarchical models; computational approaches to inference; Monte Carlo methods; bootstrap methods; Markov chain Monte Carlo methods; Metropolis-Hastings; advanced MCMC methods; sequential Monte Carlo; approximate Bayesian computation; non-parametric Bayesian inference; semiparametric Bayesian inference.

METHOD OF EVALUATION

Please note that the method of evaluation for this class will be **on the following basis only**<sup>‡</sup>:

- There will be eight short projects; grade will be calculated by taking the marks on the best six.

<sup>‡</sup>In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change. If you need special assessment arrangements or accommodations, please contact the **Office for Students with Disabilities** at 514-398-6009.

## MCGILL UNIVERSITY POLICY STATEMENTS

The following three statements are included in this course outline, in keeping with Senate resolutions:

1. *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**. For more information, see [www.mcgill.ca/students/srr/honest/](http://www.mcgill.ca/students/srr/honest/)*

*[Approved by Senate on 29 January 2003]*

2. *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.*

*[Approved by Senate on 21 January 2009]*

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David A. Stephens.  
June 18, 2020