

MATH 557: MATHEMATICAL STATISTICS II WINTER 2017

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Lectures: Wednesday, Friday 10:05 am – 11:25 am
Office Hour: Wednesday 12:00 pm – 2:00 pm (*other appointments available on request if necessary*)

Textbooks: Material will be drawn in part from the following recommended texts:
– *Statistical Inference* (2nd Ed) by G. Casella and R. L. Berger.
– *The Theory of Point Estimation*, by E. L. Lehmann and G. Casella.
– *Elements of Large-Sample Theory*, by E. L. Lehmann.
– *Asymptotic Statistics*, by A. W. van der Vaart.

Evaluation: The grade for the course will be determined via the maximum of:
(i) Four Assignments 20 %, Mid Term 20 %, Final 60 %, and
(ii) Four Assignments 20 %, Final 80 %.

TARGET SYLLABUS

1. Statistical Principles
 - (i) Frequentist assessment
 - (ii) Parametric, semiparametric and nonparametric models
 - (iii) Optimal decisions
2. Estimation via the Likelihood
 - (i) Likelihood and sufficiency
 - (ii) Maximum likelihood estimation: justification
 - (iii) Computation
 - (iv) Properties of maximum likelihood estimators
 - (v) Asymptotics: consistency and asymptotic normality
3. Principles of Inference
 - (i) Bias and variance
 - (ii) Minimum variance estimation and efficiency
 - (iii) Uncertainty representation
4. Bayesian Inference
 - (i) Motivation
 - (ii) Prior, posterior and predictive distributions
 - (iii) Computation
5. Hypothesis Testing
 - (i) The formulation of hypothesis testing
 - (ii) Neyman-Pearson and likelihood ratio principles
 - (iii) p -values and Fisherian testing
6. Extensions
 - (i) Generalized estimation: M-estimation and estimating equations
 - (ii) Robust estimation
 - (iii) Semiparametric inference
 - (iv) Nonparametric inference: frequentist and Bayesian
 - (v) Introduction to empirical processes

NOTES

- Assignments to be submitted in pdf via myCourses; late submissions may be penalized by up to 100 % of the marks available.
- There will no opportunity for make-up work in place of any aspect of the course assessment.
- In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

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/

[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]

3. *Instructors who may adopt the use of text-matching software to verify the originality of students' written course work must register for use of the software with Educational Technologies and must inform their students before the drop/add deadline, in writing, of the use of text-matching software in a course.*

[Approved by Senate on 1 December 2004]

If you need special examination arrangements, please contact the **Office for Students with Disabilities** at 514-398-6009.

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December 30, 2016