

**STAT 497 (MAST 679/MAST 881), Sec. I**  
Topics in Statistics  
*Winter 2019*

**Instructor:** Dr. L. Popovic, Office: LB 921-07 (SGW), Phone: 514-8482424, Ext. 5254  
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**Text:** *"Large Deviation Techniques and Applications"*, by A. Dembo and O. Zeitouni, Springer.  
*"Large Deviations"*, by F. den Hollander, AMS Fields Institute Monographs.

**Term Exam:** There will be no written exam. Each student is required to give a presentation on selected topics at the end of the semester.

**Final Grade:** The final grade will be based on the presentation and several assigned homework assignments.

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

**Topics Covered:** The theory of large deviations studies probabilities of events which, in a large sample, are exponentially rare in the number of samples. We will cover standard methods including large deviations for i.i.d. sequences, correlated variables, and occupation measures. This theory has found many applications in finance and risk management, simulation and sampling, as well as operations research and statistical mechanics. The main part of the course will cover: Introduction to large deviations, the large deviations principle, Sanov's theorem and method of types, Cramer's theorem, Gartner-Ellis theorem, concentration inequalities, large deviations for Markov chains. We will also discuss the application of the theory to constructing efficient sampling mechanisms, such as importance sampling. The prerequisites for the course are basic probability theory and stochastic processes.

**Academic Integrity and the Academic Code of Conduct**

This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: [concordia.ca/students/academic-integrity](http://concordia.ca/students/academic-integrity)." [Undergraduate Calendar, Sec 17.10.2]