Stat 591B:
Concentration Inequalities and Empirical Process Methods
for High-Dimensional Statistics
Autumn 2017

Time:	12:00 - 1:30 T Th (lecture)
Place:	Padelford C301
Professor:	Jon A. Wellner
Office:	B320 Padelford
Phone:	543-6207
e-mail:	jaw@stat.washington.edu
Office Hours:	1:30 - 3:30 MWF; or by appointment
Textbooks:	Boucheron, Lugosi, and Massart (2013).
	Concentration Inequalities. Oxford.
Prerequisites:	Stat 581-2-3 or Stat 521-2-3, or comparable,
	and an interest in high-dimensional statistics.

Grading: (Cr/NC)	Homework:	40%
	Project:	60%
Course Web site:	http://www.stat.washington.edu/	
	/jaw/COURSES/EMPIR/591.17/591-f17.html	

Homework: Homeworks will be roughly once every two weeks ... and will cover theory, methods, and computations supplementing the lecture material. Here is the tentative schedule for the homeworks:

HW1: handed out 5 October; due 19 October.
HW2: handed out 19 October; due 2 November.
HW3: handed out 2 November; due 16 November.
HW4: handed out 16 November; due 30 November.

Class projects: Typical projects might include:

- Read a theory paper and write 5-10 pages on the results of the paper, the methods used, and the *problems remaining*.

- Evaluate the use of concentration inequalities in a statistics or probability paper of interest to you.

- Survey a set of concentration inequalities or empirical process methods not covered in the lectures.

Those of you taking the course for credit should decide on a potential project by Tuesday, October 17. Projects related to your current research are encouraged. Please write a one-two paragraph proposal describing your project to be submitted in class on Tuesday, October 17. I will schedule presentations of projects for the last two weeks of the quarter.

Other books and sources:

- Bühlmann and Van de Geer (2011). *Statistics for High-Dimensional Data.* Springer.
- Giné and Nickl (2016). *Mathematical Foundations of Infinite-Dimensional Models.* Cambridge U. Press.
- Talagrand, M. (2005). *The Generic Chaining.* Springer.
- Talagrand, M. (2014). *Upper and lower bounds for stochastic processes.* Springer.
- Ledoux, M. (2001). *The Concentration of Measure Phenomenon.* American Mathematical Society.
- Massart (2007). *Concentration Inequalities and Model Selection.* Springer.
- Koltchinskii, V. (2008). Oracle inequalities in empirical risk minimization and sparse recovery problems. *Lectures from the 38th Probability Summer School held in Saint-Flour*, Lecture Notes in Mathematics **2033**, École d'Été de Probabilités de Saint-Flour. Springer.
- Van der Vaart, A. W. and Wellner, J. A. (1996). *Weak Convergence and Empirical Processes.* Springer.
- Van de Geer (2000), *Empirical Processes in M-Estimation.* Cambridge University Press.
- de la Pena and Giné (1999). *Decoupling.* Springer.
- Bakry, Gentil, and Ledoux (2014). *Analysis and Geometry of Markov Diffusion Operators.* Springer

- Ghosal, S. and van der Vaart, A. W. (2917). *Fundamentals of Nonparametric Bayesian Inference.* Cambridge University Press, Cambridge.

Policies regarding phones and computers: Cell phones should be turned of (or set to vibrate only) during class. Likewise for laptop computers. Use class time to understand the lectures and take part in discussions.