

# SDS 384-11

Theoretical Statistics  
Spring 2018

mon/wed 11-12:30 , Phr 2.116

**Professor**  
**Office Hours**  
**Office**  
**Email**

Purnamrita Sarkar  
Wed 1-2 p.m. @ GDC 7.504  
GDC 7.504  
`purna.sarkar@austin.utexas.edu`

## Syllabus

### Course Description

This course provides an introduction to theoretical frequentist Statistics. The first half of the course covers concentration of measure and U statistics, etc. The second half introduces basics from empirical processes, asymptotic testing and applications including bootstrap, subsampling, kernel regression etc.

We will cover

- Consistency of parameter estimates
  - Stochastic Convergence
  - Concentration inequalities
  - Asymptotic normality of estimators
- Empirical processes, VC classes, covering numbers
- Asymptotic testing
- Examples of network clustering with a bit of random matrix theory
- Bootstrap, Nonparametric regression and density estimation

**Prerequisites** Students are expected to have a good familiarity with Calculus and undergraduate probability.

### Textbook

This course is designed to be self-contained, and there is no required textbook. Two textbooks that you may find useful is:

- Asymptotic Statistics, Aad van der Vaart. Cambridge. 1998.
- Convergence of Stochastic Processes, David Pollard. Springer. 1984. Available on-line at <http://www.stat.yale.edu/pollard/1984book/>

## Course website

<https://psarkar.github.io/sds384.html>

**Evaluation** Grading - 5 homeworks (75% ), Final Exam (25% )

**Homework** will be assigned biweekly and due in class. You can work in groups of 2-3 students. Please note down everyone's names on the homework when you turn it in.

**Exam** There will be one in class final exam.

**Requests for Regrade:** Clerical requests will be corrected without hassle. Other regrading requests must be submitted in writing within 2 days of the assignment/exam return. Be aware that the entire assignment/exam will be subject to regrading, and grades may go up or down.

## Students with Disabilities

Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 512-471-6259, <http://www.utexas.edu/diversity/ddce/ssd/>.

## Religious Holy Days

By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

## Scholastic Honesty

We expect students to behave with integrity. Students found Cheating on exams or homework will receive a score of zero for that exam or assignment, and may be subject to additional disciplinary action. For more information on the University of Texas scholastic dishonesty policy, see the 2006-2007 General Information Catalog, Appendix C.

## Campus Safety

Please note the following recommendations regarding emergency evacuation from the Office of Campus Safety and Security, 512-471-5767, <http://www.utexas.edu/safety>:

- Occupants of buildings on The University of Texas at Austin campus are required to evacuate buildings when a fire alarm is activated. Alarm activation or announcement requires exiting and assembling outside.
- Familiarize yourself with all exit doors of each classroom and building you may occupy. Remember that the nearest exit door may not be the one you used when entering the building.
- Students requiring assistance in evacuation should inform the instructor in writing during the first week of class.
- In the event of an evacuation, follow the instruction of faculty or class instructors.
- Do not re-enter a building unless given instructions by the following: Austin Fire Department, The University of Texas at Austin Police Department, or Fire Prevention Services office.

- Behavior Concerns Advice Line (BCAL): 512-232-5050
- Further information regarding emergency evacuation routes and emergency procedures can be found at: <http://www.utexas.edu/emergency>.
- *SPECIAL NOTE:* Please be aware that SB 11, concerning the concealed carrying of handguns on campus, does not take effect until August 2016. The possession of a firearm, illegal knife, or prohibited weapon on the grounds of an educational institution is currently a third-degree felony in Texas.