

IMT 3420: Stochastic Models in High Dimensions

Second semester, 2022

Instructor:

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Class web page:

<https://cursos.canvas.uc.cl/courses/51272>

Class meeting times:

Mon & Wed 10:00 am – 11:20 am
Room BC 23

Office hours:

Wednesday 11:30 am – 12:30 pm
(or by appointment)

Please note: Announcements and other information about the class will be posted regularly on the Canvas web page.

Course description:

IMT 3420 is focused on the various tools and techniques of high-dimensional probability along with their applications in data science and statistical learning. Topics covered include basic concentration inequalities, concentration of measure via entropic techniques and isoperimetric inequalities, random matrices, random projection methods, generic chaining, VC dimension, and the Rademacher complexity. Various applications in statistical learning will be considered, including sparse linear models in high dimensions, graphical models for high-dimensional data, non-parametric estimation, and approximation by neural networks. More information can be found on the class web page.

Grading policy:

The final grade will be based on attendance, homework assignments, a mid-term exam (see below for dates), and a final take-home exam.

Homework assignments	25%
Midterm exam	35%
Final exam	35%
Attendance	5%

Homework assignments:

Homework problems will be handed out on a regular basis. Discussion of homework assignments with other students is encouraged, but what is handed in should be your own work. The instructor will be available during office hours to further address questions on the course material and assignments.

Important dates:

Midterm exam	TBA
Final exam	TBA

References:

R. Vershynin. *High-Dimensional Probability: An Introduction with Applications in Data Science*. Cambridge University Press, 2018.

M. J. Wainwright. *High-Dimensional Statistics: A Non-Asymptotic Viewpoint*. Cambridge University Press, 2019.

L Devroye, L Györfi, and G Lugosi. *A Probabilistic Theory of Pattern Recognition*. Springer, 1996.

The following set of online notes is also a good reference for some of the material we will be covering this semester:

<https://web.math.princeton.edu/~rvan/APC550.pdf>