



**STAT 5470 - Applied Robust Statistics,  
2019/2020, Term 1  
Instructor: Matías Salibián-Barrera**

**Time and Place:** Tuesday/Thursday 2:00-3:30 pm, ESB 4192

**Course description:** Robust statistical methods beyond location and linear regression. The goal of this course is to discuss the problem of detecting and dealing with atypical observations in a range of applied models beyond the simplest location and regression ones. Methods will be illustrated on concrete examples, and the focus will be on the additional information that can be gained by using robust estimators in these models, and the challenges (including computational ones) that remain to be solved satisfactorily.

**Prerequisites:** A course on linear regression and a basic course on multivariate analysis.

**Textbook/course materials:** Although the course does not have a formal textbook, the following book will be a useful reference: “Robust Statistics: Theory and Methods (with R)”, 2nd Edition Ricardo A. Maronna, R. Douglas Martin, Víctor J. Yohai, Matías Salibián-Barrera, Wiley, ISBN: 978-1-119-21466-3 (2019) 464 Pages, <https://www.wiley.com/go/maronna/robust>

**Topics:** Goals and the general setting; Functionals; "bias", breakdown point and influence functions; very brief discussion of robust location/scale and linear regression estimators (M, S, MM, tau-estimators); regularized linear models; non-parametric regression (kernel smoothers, splines, additive models); GLM/GAM; multivariate analysis, outlier detection / depth, PCA, functional data analysis, FPCA. If time permits we may discuss open problems in the area.

**Assessment:** Students will be responsible for producing typeset lecture notes from class meetings (each student will take notes only on designated classes). These lecture notes will be graded by the instructor and by other students in the class. Rubrics on the grading criteria will be made available at the beginning of the course.