COURSE SYLLABUS
STAT 7610
Theory of Nonparametric Statistics

Meeting Times: TR 9:35 - 10:55 in Scot Lab 241 (SLE 241)
Instructor: Professor Omer Ozturk
Email: omer@stat.osu.edu
Office: 321 Cockins Hall, Ph: 292-3346
Office Hours: MW: 2:00-3:00 or stop by if I am in.

Text:*Robust Nonparametric Statistical Methods* by Hettmansperger and McKean, CRC Press. Second Edition
Supplemental Text: *Nonparametric Statistical Methods Using R* by Kloke and McKean, CRC Press.

Grading Policy: Course grade will be assigned based on homework assignments, one midterm and a final exam.
Homework: 30%
Midterm exam: 30%, around October 22, 2015
Final Exam: 40%, December 11, 8:00am-9:45am

Prerequisite: This is a theory course. A good knowledge of statistical inference (6802) and notion of convergence on distribution and probability are required. Some knowledge on regression (6450) are essential. Familiarity with linear models would be helpful.

Course Objectives: Students who complete this course will learn:

- Differences among parametric, nonparametric, semiparametric and robust inferences.
- Geometric structure of the sub-spaces to construct appropriate nonparametric inference for one-, and two- sample problems.
- U-statistics and projection theory to find the asymptotic distribution of dependent variables.
- Rank regression theory to fit a linear model to a p-dimensional subspace and to test general linear hypothesis in linear models.
- Theoretical properties of weighted rank regression models to construct robust test and estimators for regression models.

Topics to be covered from Robust Nonparametric Statistical Methods:

Chapter 1: One-sample problems: Location functionals, geometry of inference in the one-sample location model, inference based on L_1 norm, inference based on Wilcoxon signed-rank norm, one-sample U-statistics.

Chapter 2: Geometry of two sample problems. Two-sample U-statistics. Mann-Whitney-Wilcoxon and related tests.
Chapter 3: Linear models, geometry of inference in liner models. Rank regression, estimation, testing, residual analysis.
Chapter 4: Experimental designs: R-fit of one-way design, rank-based test for $H_0 : \mu_1 = \cdots = \mu_k$, test of general contrast, multiple comparison procedures.
Chapter 5: Bounded influence and high breakdown estimators.
Elective: If time permits we look at some other topics of interests.

Additional references:
1- Randles and Wolfe (1994) *Introduction to the Theory of Nonparametric Statistics*–Krieger Publishing.
2- Hettmansperger, T. P. (1994) *Nonparametric Inference Based on Ranks*– Krieger Publishing.
3- Lehmann, E.L. (1975) *Nonparametrics: Statistical Methods Based on Ranks* – Holden-Day.
4- Hajek, J. Sidak, Z. (1999). Theory of Rank Tests–Academic Press.
5- Serfling J, R.(1980). Approximation Theorems of Mathematical Statistics.
6- Gibbons, J., D., and Chakraborti, S. (2003). Nonparametric Statistical Inference, Marcel Decker, New York.