University of Manitoba
Department of Statistics

Winter Term 2015

STAT 7350 – Nonparametric Function Estimation

Course Title: Nonparametric Function Estimation (CRN: 26359)

Instructor: Alexandre Leblanc
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Course Schedule: From January 6 to February 26: Tuesday/Thursday from 10:00 to 11:30 am in 316 Machray Hall.

Office Hours: Tuesday from 1:30 to 3 p.m. and Friday from 10:30 a.m. to 12 p.m. (noon), or by appointment.

D2L: Any course material to be posted will be available on D2L.

Outline of Covered Topics:

The course will cover asymptotic (*i.e.* large sample) results and small sample techniques and arguments. We will approach inference from the frequentist perspective. Specific topics should include (not necessarily in this order):

- Distribution function and density estimation
  - the empirical distribution function
  - density estimation (kernel, Bernstein, etc.)
  - smooth distribution function estimation
  - quantile estimation
- Regression and smoothing
  - regressograms and nearest neighbour estimators
  - basic kernel estimator
  - local polynomial estimator
  - heteroscedastic smooth regression
- Conditional distributions and densities
  - conditional distribution estimation
  - conditional density estimation
  - quantile regression
- Other related topics

Textbook: Suggested textbook:

- Wasserman, L. (2006), *All of Nonparametric Statistics*, Springer.

This book can be downloaded in pdf format for free through the online catalogue of the University of Manitoba Libraries. Copies of the following textbooks have been placed on four-hour reserve at the Science Library:

- Silverman, B.W. (1986), *Density Estimation for Statistics and Data Analysis*, CRC Press.
- Wand, M.P. and Jones, M.C. (1995), *Kernel Smoothing*, CRC Press.

The instructor will also be borrowing additional material from other books and/or journal articles as required.

Breakdown of the Marks:

Assignments (2 or 3)	50%
Final Exam	50%

The Exam:

The Final Exam will be held in late February, on a date to be selected later by the Department of Statistics, and will be 3 hours in duration. It will include a take-home part that will require the use of *R*.

Assignments:

Assignments will be handed out at a rate of about one assignment per two/three weeks of class. Each student must hand in his or her own copy of each assignment with personalized solutions, including comments, discussions and interpretations. All assignments will require the student to use *R* and do some programming.

Note that actions will be taken against students who are found guilty of acts of academic dishonesty.

Assignments will be due in class on the day assigned. Late assignments will NOT be accepted.

Your assignments should conform to the following standards:

- Assignments are to be done on 8.5×11 paper, writing on one side only.
- Assignments are to be stapled.
- Write your name at the top of each page.
- Revise your assignments so they are reasonably free of grammatical and typographical errors.
- Make sure each step in your solutions is well justified: I mark what is written on paper and should not have to guess what you mean.
- Messy or unreadable assignments will be returned with a mark of zero.
- Assignments that are well presented and properly typesetted in LaTeX will get up to a 10% bonus.

This document is dated January 6, 2015.