



Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 604-291-3112 or csdo@sfu.ca

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Instructor: [Dr. Nancy Heckman](#)

### **Prerequisite:**

Any Statistics graduate student should have sufficient knowledge. For anyone else interested in the course, please contact the instructor.

### **Textbook:**

There is no text for the course. I will have extensive notes posted on the web, in addition to some books placed on reserve.

### **Description**

The course gives an introduction and overview of smoothing methods and functional data analysis. Smoothing methods such as loess and smooth.spline (available in Splus/R) have become extremely popular for the exploratory analysis of regression data. The area has also been an active one for theoretical research. The usefulness of this smoothing approach has sparked the development of a new area, functional data analysis (FDA). In FDA, our data consist of not one, but several sets of regression data, one set from each sampling unit.

The course will involve some computing and data analysis using existing R/matlab functions. I'll cover some theory, the level depending on the class.

Course web site: the site can be reached from <http://www.stat.ubc.ca/~nancy/teaching/>.

There, you will find material from the previous times I taught the course. In Stat 890, I will cover regression, and a larger amount of functional data analysis than in 2005-6.

### **Outline:**

1. General issues in smoothing methods in regression (bias-variance trade-off, choice of smoothing parameter, effective number of parameters, the problems with high-dimensional data)
2. Specific methods of smoothing (kernel, spline, local polynomial, penalized regression)
3. In FDA: connections between penalized regression and mixed effects models.
4. In FDA: principal components analysis, discriminant analysis and functional regression.

### **Grading Scheme: (tentative)**

Homework: 70%

Projects: 30%

No exams

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*Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.*