STATISTICS 578 - REGRESSION ANALYSIS
Course Information

Instructor: Professor Doug Wiens
CAB 429, ph. 492-4406
e-mail: doug.wiens@ualberta.ca

Lectures: *Tentatively* Tue, Thu 3:30 - 4:50 CAB 457
Office hours: whenever I'm in my office,
or by appointment

Source materials

There is no required textbook. Major references will be:

1. Introduction to Linear Regression Analysis; Montgomery & Peck; Wiley (QA 278.2 M78 1982). On reserve in Cameron library.

2. Nonlinear Regression Analysis and Its Applications; Bates &Watts; Wiley (QA278.2 B329 1988). On reserve in Cameron library.

3. Modern Applied Statistics with S; Venables & Ripley; Springer (QA 276.4 V46 2002). On reserve in Cameron library.

4. Robust Statistics - Theory and Methods; Maronna, Martin & Yohai; Wiley (QA 276 M376 2006). On reserve in Cameron library.

   Some other useful supplementary references are:

5. Applied Regression Analysis; Draper & Smith; Wiley (QA 276 D76 1998). On reserve in Cameron library.

6. Nonlinear Regression; Seber & Wild; Wiley (QA 278.2 S443 1989).

7. The Elements of Statistical Learning; Hastie, Tibshirani & Friedman; Springer (Q 325.75 F75 2001).

8. Robust Regression and Outlier Detection; Rousseeuw & Leroy; Wiley (QA278.2 R864 1987).

Selected papers from the recent literature may also be studied.

Course web site

Lecture notes, assignments and other materials are posted on the course web site. Go to *www.stat.ualberta.ca* and follow the links.

Prerequisite material

It is assumed that students have *successfully* taken a course in Regression at the level of STAT 378, a further course in Statistics at the 400 level, and in mathematical theory at the level of STAT 512. Students who have not taken the prerequisite courses should obtain my permission to attend this course, and will be expected to fill in the background material on their own.

Assessment

Assignments:	30% (Includes 6% for writing quality)[1]
Mid term exam:	30% (Exams are closed book, no notes)
Final exam:	40% (Three hours)
	(Deferred final exams 0900 Saturday, May 12)

[1] One-fifth of the grade on each assignment will be based on the quality of the writing. The criteria include neatness, legibility and the use of proper syntax and grammar, as well as the clarity and completeness of your technical arguments. See 'Technical Writing' on the course web site for help.

Implementing the grading system

At the end of term I will have a record of each student's raw grades for all assignments, projects and exams. I will then compute a term results summary based on these raw grades, and rank everyone in order of merit. After deciding whether the class as a whole is average, above average or below average, I shall determine what percentage of the class should fall into each of the possible grades, and assign the grades accordingly. These grades will reflect my judgements, which will be based on my assessments of both absolute achievement and relative performance in the class.

There is no pre-determined algorithm for converting raw scores to grades. However, **active participation in classroom discussions, including asking and answering questions, is expected of all students. The extent to which this has been achieved will be considered when scores are converted to grades**.

There is another benefit to class participation, beyond its intrinsic value. I am regularly asked to write letters on behalf of students who are applying for awards, or for admission to further study. If I have had no interaction with you, I can report only your grade, and that beyond that I know nothing about you. Such a letter will surely not be very helpful.

General comments

This is a graduate course in which mathematical and statistical theory are blended at a relatively high level. Some possibly helpful tips:

- Rewrite your notes as soon as possible after each lecture. Writing up material in one's own words is the best way to see if the material has been understood.

- If you find that you don't understand what has gone on in class, *see me right away.* Don't start drifting from one lecture to another, understanding less each time.

- On assignments: Don't hand in your rough work! Do the assignment and then rewrite it at least once - neatly, with an adequate amount of clear explanation. The rewriting stage is the most important one for finding errors in one's work, and for deepening one's understanding of it. *Assignments are graded not only for technical correctness, but for elegance of presentation as well.*

- YOU ARE EXPECTED TO WRITE UP YOUR OWN WORK IN YOUR OWN WORDS, using full sentences and proper English grammar. More generally:

  The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at www.ualberta.ca/secretariat/appeals.htm) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

Students who require accommodations in this course due to a disability affecting mobility, vision, hearing, learning, or mental or physical health are advised to discuss their needs with Specialized Support and Disability Services, 2-800 Students' Union Building, 492-3381 (phone) or 492-7269 (TTY).

Policy about course outlines can be found in Section 23.4(2) of the University Calendar.

Winter 2007 course outline; important dates		
#	**DATE**	**COMMENTS**
1	T Jan 9	Regression models, matrix formulation, vector spaces
2	R Jan 11	Gram-Schmidt theory, regression LSEs
3	T Jan 16	Regression MLEs under Normality; confidence sets and LR tests
4	R Jan 18	Testing theory in Normal models, Lack of Fit test, acetylene data
5	T Jan 23	Multicollinearity, Ridge regression, Weighted and Generalized Least Squares
6	R Jan 25	Logistic regression
7	T Jan 30	Influence measures
8	R Feb 1	Nonlinear models, Gauss-Newton method
9	T Feb 6	Likelihood regions **Asst. 1 due**
10	R Feb 8	Starting values; lubricant example
	T Feb 13	**Midterm Exam**
11	R Feb 15	Hypothesis testing
M - F Feb 19 - 23 READING WEEK		
12	T Feb 27	Splines and other bases
	R Mar 1	REVIEW
13	T Mar 6	Kernel smoothing; Local regression
14	R Mar 8	Generalized additive model; Projection pursuit
15	T Mar 13	Gauss-Markov Theorem; Introduction to robustness
16	R Mar 15	Huber's ψ_c; Computing M-estimates **Asst. 2 due**
17	T Mar 20	Asymptotics; Inferences; Pseudovalues
18	R Mar 22	Minimax M-estimation
19	T Mar 27	Random regressors; Breakdown (+ course evaluations)
20	R Mar 29	Influence; Generalized M-estimation
21	T Apr 3	One-step GM-estimation
22	R Apr 5	MM-estimation
	F Apr 6	**Good Friday**
	M Apr 9	**Easter Monday**
23	T Apr 10	Classical regression designs
24	R Apr 12	Robust regression designs **Asst. 3 due**
Wed Apr 25		**Final Exam 2-5 p.m.**

PLEASE FILL OUT THIS PAGE AND RETURN IT TO ME

NAME:

E-MAIL ADDRESS: (Please e-mail it to me: doug.wiens@ualberta.ca)

DEGREE PROGRAM:

AREA OF SPECIALIZATION:

Please list the STAT and MATH courses you have previously taken. Include the names or topics of the courses, if they were not taken here.

Please list the STAT and MATH courses you are taking this year.

Why are you taking this course?