

## **MATH 675/677 Applied Regression Analysis Fall 2004**

**Instructor: Dr. Peng**

**Office: Hume Hall 317**

**Tel. #: 915-1204**

**Class time: TBA**

**Location: Hume Hall 331**

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### **Reference books:**

**(0) Linear Regression Analysis by George A. F. Seber and Alan J. Lee.**

**(1) Applied Regression Analysis by J.O.Rawlings, S.G.Pantula and  
D.A. Dickey**

**(2) Semiparametric regression by D.Ruppert, M.P.Wand and  
R.J.Carroll**

**Packages: S-Plus, SAS and**

**Goal: This course is intended to introduce the theory of linear regression analysis. The focus is on the basic theory and the package-based analysis. Students are expected to understand the concepts, the methodology and are able to perform analysis for real data sets with computer packages.**

### **Contents to be covered:**

#### **Chapter 1: Linear Regression and Distribution Theory**

**1.1 Least Squares Estimation and the properties**

**1.2 Unbiased estimator of sigma-square**

**1.3 Distribution theory**

**1.4 Maximum likelihood estimation**

**1.5 Estimation with linear restrictions**

**1.6 Generalized linear squares**

**1.7 Bayesian estimation and Robust Regression**

#### **Chapter 2: Hypothesis testing**

**2.1 Likelihood ratio test**

**2.2 F-test**

**2.3 Multiple correlation coefficient**

**Chapter 3: Confidence intervals and regions.**

**3.1 Simultaneous interval estimation**

**3.2 Confidence Bands for the regression surface.**

**3.3 Prediction intervals and bands for the response**

**Chapter 4: Straight line regression**

**4.1 The straight line**

**4.2 The straight line through the origin**

**4.3 Weighted least squares for the straight line**

**Chapter 5: Polynomial regression**

**5.1 Polynomials in one variable**

**5.2 Piecewise polynomial fitting**

**5.3 Polynomial regression in several variables.**

**Chapter 6: Analysis of Variance**

**6.1 One-way classification**

**6.2 Two-way classification (unbalanced)**

**6.3 Two-way classification (Balanced)**

**Chapter 7 Departure from underlying assumptions**

**7.1 Bias**

**7.2 Incorrect variance matrix**

**7.3 Effect of outliers**

**7.4 Nonnormality**

**7.5 Collinearity**

**Chapter 8 Diagnosis and remedies**

**8.1 Residuals**

**8.2 Nonconstant variance and serial correlation**

**8.3 Departure from normality**

**8.4 Detecting and dealing with outliers**

**8.5 Diagnosing Collinearity**

**Course Evaluation: There will be a midterm exam and a three-hour comprehensive final exam. There will also be written homework. The course grade will be determined by the following percentages:**

**\_ Midterm exam 30% \_ Homework grades 30% \_ Final exam 40%**

**VERY IMPORTANT:**

**1. If a test is missed for ANY reason, a grade of zero will be given. There will be absolutely NO make-up tests given for ANY reason.**

**2. Class attendance is expected of all students. If a student is absent for any reason, the student bears full responsibility for all subject matter and procedural information discussed in class.**

**3. There will be no makeup quizzes given for any reason. A grade of 0 will be assigned for each missed quiz. Quizzes may be given without advance notice from the instructor.**

**4. Any person who must miss a scheduled exam because of an official university function must reschedule with the instructor to take the exam at a time BEFORE the exam is scheduled to be given. NO OTHER rescheduling will be allowed. Official documentation must be provided.**

**5. An "I" grade will not be given without the permission of the Department of Mathematics.**

**6. Students must show all work for each test question and arrive at a correct answer. It is intended that NO PARTIAL CREDIT will be given on any test question.**

**7. If a student wishes to discuss the grading policy or the testing policy, or wishes to have any conversation regarding the instructor of the course, please make an appointment with the course supervisor in the Department of Mathematics.**

**8. Any student having three or more final examinations scheduled for the same day will arrange with the instructor to take the 12-noon examination or the 7:30 p.m. examination on some other mutually satisfactory date. Please note that only the 12:00 noon and the 7:30 p.m. examination may be rescheduled for this reason.**

**9. Every student must take the final examination at the time scheduled. No exception will be made. Check now to note the date and time of our final exam.**

**ACADEMIC NEEDS: It is the responsibility of any student with a disability who requests a reasonable accommodation to contact the Office of Student Disability Services (915-7128). That office through the student will then make contact to the instructor of this class. The instructor will then be happy to work with the student so that a reasonable accommodation of any disability can be made.**

**SPECIAL NOTE:** Each instructor will notify the class regarding the policy of leaving class early or coming into the classroom late. Students must take the responsibility of telling the instructor in advance that they must leave early and must discuss with the instructor immediately after class if they entered the classroom after class began.

**Cheating:** The following statement is the policy of the Department of Mathematics regarding cheating:

**Offenses:** Cheating on any exam, quiz, and work to be completed in class, theft, or attempted theft of exam questions or possession of exam questions prior to the time for examination shall all be offenses subject to appropriate penalties.

**Penalties:** The penalty for commission of any offense set out above is failure in the course and, subject to the approval of the Chancellor, dismissal or suspension from the university.