W4315 Linear Regression Models

Spring 2012 MW 6:10 – 7:25pm in MATHEMATICS 417

Instructor: Yang Feng

- Course webpage `http://www.stat.columbia.edu/~yangfeng/teaching/w4315`
- Office: Room 1012, SSW Building (1255 Amsterdam Avenue, between 121st and 122nd street)
- Phone: (212) 851-2139.
- Email: yangfeng@stat.columbia.edu
- Office Hours: Wednesday 2:00 – 4:00pm.

TA information:

- Rachel Fan (ruixue@stat.columbia.edu). Office hours: Thursdays 1:30 - 3:30pm, 227 Mudd.
- Haolei Weng (hw2375@columbia.edu). Office hours: Mondays 3-5pm, 9th floor Lounge Room, SSW.

Grader: Chengcheng Liu (cl3001@columbia.edu)

Textbook: (Required) Applied Linear Regression Models 4th Ed., by Kutner, Nachtsheim, and Neter. McGraw-Hill, 2004.

(Recommended): Linear models with R, by Julian J. Faraway. Boca Raton :Chapman & Hall/CRC, 2005.

Prerequisite: Calculus; probability and statistics at the level of W4150, or W4105 and W4107 taken concurrently. Linear algebra.

Sample reference book on Probability: A first course in probability

Reference book in statistics: Introduction to Mathematical Statistics

Reference book in linear algebra: Linear Algebra and Its Applications

Syllabus: First half of the course is single variable linear regression.

- Least squares
- Maximum likelihood, normal model
- Tests / inferences
- ANOVA
- Diagnostics
- Remedial Measures

Second half of the course is multiple linear regression and other related topics .

- Multiple linear Regression
  - Linear algebra review
  - Matrix approach to linear regression

  - Multiple predictor variables
  - Diagnostics
  - Tests
  - Model Selection
- Other topics (If time permits)
  - Principle Component Analysis
  - Generalized Linear Models

Software: R will be used throughout the course and the assignments.

Homework: Weekly. Contains a mix of paper and computer problems. The assignments will be posted on the course page every Monday and due 8PM the next Monday unless stated otherwise. When submitting the homework, please place your homework in the W4315(2)-Inbox for the course at SSW 904, 1255 Amsterdam Ave. PLEASE DO NOT HAND IN THE HOMEWORKS IN CLASS. Graded homework will be placed in W4315(2)-OutBox. Late homework will receive a grade of zero. To compensate, the lowest homework score will be dropped. To receive credit on homework, you must show all work neatly, clearly label each problem, and staple the entire assignment together in correct order with your name printed. The homework will be graded, and each homework problem carries equal weight. You are allowed to work with other students on the homework problems, however, verbatim copying of homework is absolutely *forbidden*. Therefore each student must ultimately produce his or her own homework to be handed in and graded. Any questions regarding homework grades should first be taken up with the grader/TA; if these questions cannot be resolved with the grader/TA, then feel free to discuss them with the instructor.

Exams: There will be one in-class midterm exam, and a final exam. Both of them are closed book and closed notes. Both exams are required and there will be no make-up exams. Missed exams will receive a grade of zero. Non-graphing calculators may be used during the exams. Any questions regarding exam grades should be submitted in writing (a paper briefly stating where is the grading error with your signature and date, along with your exam) within one week of distribution of the graded exam. You must hand in the request to the instructor before or after class. Notice that any request will lead to the reevaluation of the whole exam and your total score may increase or decrease. While all numeric grades will be the raw grades, the final letter grades will be curved.

Honor Code: All exams and assignments in the course are to be completed in accordance with the Barnard Honor Code, regardless of whether or not you are a Barnard student.

Schedules and Grading Policy:

Homework (20%) ..... Due every Monday.
Midterm Exam (30%) ..... 6:10 – 7:25am, Wednesday, Mar 07, 2012.
Final Exam (50%) ..... 7:10 – 10:00pm, Monday, May 07, 2012.