

Syllabus: Stat 325/425 - Data Analysis and Linear Models (Fall 2007)

(Based on Dr. Jiayang Sun's previous teaching)

Class Web Site <http://stat.case.edu/~junfeng/325-425.html>.

Class Schedule 2:45-4:00 pm (Tuesday and Thursday) at Yost 300.

Instructor Junfeng Liu; jxl322@case.edu; Office: Yost 233. (Tele) (216)368-2246. Office hours: Tu,Th (4-5pm), or by appointment.

Teaching Assistant (<http://stat.case.edu/~peng>) Peng Liu, Yost 230, 368-0416, peng.liu@case.edu. Office hours: 12:30-2:30 pm Wednesday, 10:00am-12:00pm Friday @ Yost 234 (368-2656). Other TA's hours: (<http://stat.case.edu/tutor-schedule.htm>)

Course Outline Stat 325/425 introduces classical and modern applied statistics. Students who have some exposure to statistics but do not have much real data analysis experience are encouraged to take this course. Stat 325/425 covers exploratory data analysis for univariate (response only) observations with or without single or multiple covariates, graphical methods and data summarization, and model-fitting using R/S-plus computing language. Main topics include simple and multiple regression, transformation, model selection, diagnostics, robust procedures, ANOVA and analysis of covariance and interpretation of results. Some non-traditional approaches and biases in sampling and data analysis will be discussed at the end of semester if time allows. Lectures include case studies, computer demonstration and group discussion.

Prerequisite Matrix Algebra such as Math 201 and Some Basic Statistics such as STAT207/208 (or STAT 243, or STAT 312, or one of EPBI 431/441/458).

Text Books Required: Weisberg, Sanford (2005). Applied Linear Regression, 3rd edition. Wiley; ISBN: 0-471-66379-4.

References

- ◇ R.G. Miller, R.J. Miller and B.W. Brown (1996). Beyond ANOVA: Basics of Applied Statistics, CRC Press; ISBN: 0412070111.
- ◇ J. Faraway (2004). Linear Models with R, CRC Press; ISBN: 1584884258.
- ◇ S. Chatterjee, A. Hadi and B. Price (2006). Regression Analysis By Example. 4th Edition. Wiley.
- ◇ Ryan, Thomas P. (1997). Modern Regression Methods. Wiley.

- ◇ Draper, Norman R. and Harry Smith (1998). Applied regression analysis. 3rd ed. Wiley.
- ◇ B. Ripley and W. Venables (1999). Modern Applied Statistics with S-PLUS (Statistics and Computing). Springer-Verlag.
- ◇ R. Heiberger and B. Holland (2004). Statistical Analysis and Data Display; An Intermediate Course with Examples in S-PLUS, R, and SAS. Springer.

Grades Homework assignments (6) and group discussion will be counted 50% towards the final grade. A final project will be counted 50% towards the final grade. No late homework will be accepted. The minimal score to pass the course is 60 out of 100 scale. Official final exam date: Dec 11, 2007.

Attendance Role will not be taken. However, poor attendance may have an adverse affect on grades. Missing classes due to instructor are to be made up by lecture or giving detailed lecture notes to students.

Table 1: Lecture Plan (♠=out of town)

Date	Contents	
(28-Aug, 30-Aug)	Syllabus, introduction, data 1	Basics, data 2
(04-Sep, 06-Sep)	Inference under Normal theory, Lab 1	EDA
(11-Sep, 13-Sep)	Nonnormality	Dependence [♠]
(18-Sep, 20-Sep)	Regression (1) Models[♠]	Regression (2) Fitting
(25-Sep, 27-Sep)	Regression (3) Property	Regression (4) Gauss-Markov
(02-Oct, 04-Oct)	Regression (5) C. ellipsoid and Prediction	Regression (6) Test, Lab 2
(09-Oct, 11-Oct)	Model selection (1)	Model selection (2)
(16-Oct, 18-Oct)	Model selection (3)	Wrap up before Break
(23-Oct, 25-Oct)	Fall Break	Special models
(30-Oct, 01-Nov)	Multiple comparison I	Multiple comparison II, Lab 3
(06-Nov, 08-Nov)	Polynomial regression	Model diagnostics (1)
(13-Nov, 15-Nov)	Model diagnostics (2)	Model correction: GLS and WLS
(20-Nov, 22-Nov)	Transformation	Thanksgiving
(27-Nov, 29-Nov)	Robust estimation	MA and AR processes
(04-Dec, 06-Dec)	Biases and correction	Extension and review
(11-Dec, 13-Dec)	Final	

Table 2: Homework Assignments

Assignment date	Due date	Questions
(13-Sep)	(27-Sep)	TBA
(27-Sep)	(11-Oct)	TBA
(11-Oct)	(25-Oct)	TBA
(25-Oct)	(06-Nov)	TBA
(06-Nov)	(27-Nov)	TBA
(27-Nov)	(11-Dec)	TBA