Mel and Enid Zuckerman College of Public Health
University of Arizona

SYLLABUS
CPH 687 Theory of Linear Models
SPRING 2015

Time: MW, 1:00 – 2:15 pm

Location: Drachman A119

Instructor: Z. John Daye, PhD
Drachman Hall (bldg. 202) A226
1295 N. Martin Ave
PO Box 245211
Tucson, AZ 85724
(520) 626-3507

Office Hours: TBA

Webpage: https://sites.google.com/site/zhongyindaye/teaching/cph-687-theory-of-linear-models-spring-2015

Course Description: The course will cover linear and quadratic forms, Gauss-Markov theorem, linear hypothesis tests, confidence and prediction regions, and analysis of variance. Results of linear algebra and random vectors will be reviewed. If time permits, additional topics from nonparametric regression, asymptotic expansions, robust statistics, etc. may be introduced.

Course Prerequisites: Theory of Statistics (STAT 566/MATH 566), Linear Algebra (at the level of MATH 413).

Course Learning Objectives: The course builds a solid foundation in the theory of linear models for Ph.D. students in Statistics/Biostatistics. At the end of the course, the students will be prepared to

1. Understand and be proficient at theoretical developments in the analysis of linear models, including linear and quadratic forms, least squares, linear hypothesis testing, analysis of variance, etc.
2. Apply the results from linear model theory in advanced topics, such as nonparametric models, multivariate analysis, high-dimensional inference, etc.
3. Read statistical/biostatistical papers involving linear model theory on their own.

Course Notes: Lecture notes will be given during the class.

Required Book:

- G.A.F. Seber, A.J. Lee (2003). Linear Regression Analysis.

Reference Books:

1. M. Bilodeau, D. Brenner (1999). Theory of Multivariate Statistics.
2. R. Christensen (2002). Plane Answers to Complex Questions: The Theory of Linear Models.
3. F.A. Graybill (2000). Theory and Application of the Linear Model.

4. D.A. Harville (1997). Matrix Algebra from a Statistician's Perspective.
5. B. Jorgensen (1993). Theory of Linear Models.
6. R. Myers, J. Milton (2001). A First Course In The Theory of Linear Models.
7. K.B. Petersen, M.S. Pedersen (2012). The Matrix Cookbook. (www2.imm.dtu.dk/pubdb/p.php?3274)
8. C.R. Rao (1973). Linear Statistical Inference and Its Applications.
9. S.R. Searle (1997). Linear Models.
10. G.A.F. Seber (2008). A Matrix Handbook for Statisticians.

Course Requirements: Successful completion of homework assignments and presentation/explanation of solutions in class, examinations (2 midterms and a final), oral presentation of a paper, and active class participation.

Grading/Student Evaluation: Reading and homework assignments will be given routinely. Students will present problem solutions in class. Partial credits will be given on exams, so always show your work and be as neat and clear as possible. At the end of the semester, students will give a 20-min oral presentation on a scientific paper in Statistics/Biostatistics that relates to or extends the theory of linear models.

Grades will be assigned as follows:
Midterm 1: 20%
Midterm 2: 20%
Final: 30%
Presentation of problem solutions: 15%
Oral presentation of a paper: 15%

Final grades are based on the following point system:
A = 90 - 100%
B = 80 - 89%
C = 70 - 79%
D = 60 - 69%
E = 59% or less

Class Attendance/Participation: All holidays or special events observed by organized religions will be honored for those students who show affiliation with that particular religion. Absences pre-approved by the UA Dean of Students (or Dean's designee will be honored.)

Course Schedule:

- *Reading and homework problems will be given during the lecture and on webpage.*

(Syllabus may be subject to change.)

Week	Date	Lecture	Assignments
1	1/14	Introduction	
2	*1/19* 1/21	*Mon 1/19, Martin Luther King – no class* Linear Algebra I	
3	1/26 1/28	Linear Algebra II Linear Algebra III	
4	2/2 2/4	Random Vectors I Random Vectors II	
5	2/9 2/11	Multivariate Distributions I Multivariate Distributions II	
6	2/16 2/18	Midterm Review Midterm 1	**MIDTERM 1 (2/18)**
7	2/23	Linear Regression I	

	2/25	Linear Regression II	
8	3/2 3/4	Linear Regression III Hypothesis Testing I	
9	3/9 3/11	Hypothesis Testing II Confidence Intervals I	
10	3/16 3/18	*Spring recess – no class*	
11	3/23 3/25	Confidence Intervals II Midterm Review	
12	*3/30* 4/1	Midterm 2 Straight-Line Regression I	**MIDTERM 2 (3/30)**
13	4/6 4/8	Straight-Line Regressoin II Polynomial Regression I	
14	4/13 4/15	Polynomial Regression II Analysis of Variance I	
15	4/20 4/22	Analysis of Variance II Final Review	
16	4/27 4/29	Class Presentations	
17	5/4 5/6	Class Presentations	**FINAL EXAM** (take home, due 5/4)

Communications: You are responsible for reading emails sent to your UA account from your professor and the announcements that are placed on the course web site. Information about readings, news events, your grades, assignments and other course related topics will be communicated to you with these electronic methods. The official policy can be found at: http://www.registrar.arizona.edu/emailpolicy.htm

Disability Accommodation: If you anticipate issues related to the format or requirements of this course, please meet with me**.** I would like us to discuss ways to ensure your full participation in the course. If you determine that formal, disability-related accommodations are necessary, it is very important that you be registered with Disability Resources (621-3268; drc.arizona.edu) and notify me of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations. The official policy can be found at: http://catalog.arizona.edu/2012%2D13/policies/disability.htm

Academic Integrity: All UA students are responsible for upholding the University of Arizona Code of Academic Integrity, available through the office of the Dean of Students and online: The official policy found at: http://deanofstudents.arizona.edu/codeofacademicintegrity

Classroom Behavior: (Statement of expected behavior and respectful exchange of ideas)
The Dean of Students has set up expected standards for student behaviors and has defined and identified what is disruptive and threatening behavior. This information is available at: http://deanofstudents.arizona.edu/disruptiveandthreateningstudentguidelines

Students are expected to be familiar with the UA Policy on Disruptive and Threatening Student Behavior in an Instructional Setting found at: **http://policy.arizona.edu/disruptive-behavior-instructional** and the Policy on Threatening Behavior by Students found at: **http://deanofstudents.arizona.edu/sites/deanofstudents.arizona.edu/files/Disruptive_threat_bklt_2012.pdf**

Grievance Policy: Should a student feel he or she has been treated unfairly, there are a number of resources available. With few exceptions, students should first attempt to resolve difficulties informally by bringing those concerns directly to the person responsible for the action, or with the student's graduate advisor, Assistant Dean for Student and Alumni Affairs, department head, or the

immediate supervisor of the person responsible for the action. If the problem cannot be resolved informally, the student may file a formal grievance using the Graduate College Grievance Policy found at: http://grad.arizona.edu/academics/policies/academic-policies/grievance-policy

Grade Appeal Policy: http://catalog.arizona.edu/2012-13/policies/gradappeal.htm

Syllabus Changes: Information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate.

Plagiarism: What counts as plagiarism?

- Copying and pasting information from a web site or another source, and then revising it so that it sounds like your original idea.
- Doing an assignment/essay/take home test with a friend and then handing in separate assignments that contain the same ideas, language, phrases, etc.
- Quoting a passage without quotation marks or citations, so that it looks like your own.
- Paraphrasing a passage without citing it, so that it looks like your own.
- Hiring another person to do your work for you, or purchasing a paper through any of the on- or off-line sources.