

# King Fahd University of Petroleum & Minerals

Mathematics & Statistics Department

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## STAT 435 - Linear Models

Term 162

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**Course Name** : (STAT 435) Linear Models.  
**Prerequisites** : (STAT 310) Regression Analysis.  
**Class Schedule** : UTR 9:00-9:50, Bld 7 Room 102.  
**Instructor** : **Name:** Monjed H. Samuh  
**E-mail:** monjedsamuh@kfupm.edu.sa  
**Website:** <http://faculty.kfupm.edu.sa/math/monjedsamuh/>  
**Office** : Bld 5 Room 410.  
**Office Hours** : UTR 10:00-11:50 or by appointment (via email).

**Textbook** A. J. Dobson and A. G. Barnett (2008). **An Introduction to Generalized Linear Models** (3<sup>rd</sup> ed.), Chapman & Hall/CRC.

### Recommended Texts

1. A. Agresti (2015). *Foundations of Linear and Generalized Linear Models*, John Wiley & Sons.
2. H. Madsen and P. Thyregod (2010). *Introduction to General and Generalized Linear Models*, Chapman & Hall/CRC.
3. R. H. Myers, D. C. Montgomery, G. G. Vining and T. J. Robinson, (2010). *Generalized Linear Models with Applications in Engineering and the Sciences* (2<sup>nd</sup> ed.), Wiley.
4. P. de Jong and G. Z. Heller, (2008). *Generalized Linear Models for Insurance Data*, Cambridge University Press.

**Course Objectives** To provide students with the knowledge of distribution theory, estimation and test needed to deal with linear/generalized linear statistical models to solve problems with multivariate data.

**Course Description** Selective review of multiple regression. Nonlinear Regression. Poisson and Logistic regression. Linear models. Multivariate Normal and the distribution of Quadratic forms. Link function (such as Identity, Log, Logit, power, Inverse). The generalized linear model. Estimation (Estimation of Full and less than Full rank models. OLS, GLS, Maximum likelihood and Quasi-likelihood. Fisher Scoring). Evaluation of Models (Including Deviance Residuals). Inference (Gauss-Markov theorem. Wald test). General mixed linear model. Computational aspects and Computer applications for categorical and continuous data.

This course covers main topics of the Casualty Actuarial Society (CAS) generalized linear models portion of the Statistics and Probabilistic Models professional exam (Exam S).

**Intended Learning Outcomes** After the completion of this course, students should be able to:

1. use appropriate linear/generalized linear statistical models to real world data.
2. make inferences for the above data.
3. use computers for modeling data.
4. deal with related matrix algebra efficiently.

**Software Package** Use **R** or **SAS**.

### Course Policies

- Please do the reading from the sections to be covered before coming to class each day. Your instructor will be planning class activities assuming you have done the reading.
- **Homework:** There will be two types of homework assignments.
  1. **Mini Homework:** these are problems which arise while lecturing. I will assign a mini homework almost every class day.
  2. **Major Homework:** these are set of problems assigned weekly.
- You may collaborate on homework, but you must write your submitted work in your own words. All steps are required, this includes showing calculations, derivations, and proofs.
- You have to devote to this class several hours per week of concentrated attention to understand the subject enough so that standard problems become routine. If you think that coming to class and reading the examples while also doing something else is enough, you're in for an unpleasant surprise on the exams.
- Attending classes is compulsory; according to the University regulations, 8 or more unexcused absences will earn you a grade of **DN**.
- In the event that a student has to miss a class, he is responsible to get caught up with the materials covered and homework assigned.
- All students are expected to be in the classroom on time. Being late will be treated as being absent.
- It is the **student's responsibility to observe the academic calendar for important dates.**
- It is the **student's responsibility to be knowledgeable about the rules and regulations that govern your study at the university.**
- I assume, the students come to class to learn, I come to class to teach.
  - We will be respectful of everyone in class.

- Mobiles should be turned off before the beginning of each class, no exceptions.
  - There will be no talking in class, except to ask instructor questions or share comments with the entire class. Talking is disruptive to the class and disrespectful to the Instructor.
  - There will be no texting, reading, eating, etc., while in class.
- Cheating will be dealt with according to the University rules.

## Grade Distribution

- Your final grade will depend on the following components with these proportions:
  - **Assignments and Quizzes (10%):** **Quizzes may not be announced in advanced.**
  - **Presentation (10%).**
  - **First Exam (20%).**  
7<sup>th</sup> Week: Mar. 24, 2017 (Thursday).
  - **Second Exam (25%).**  
13<sup>th</sup> Week: May 4, 2017 (Thursday).
  - **Final Exam (35%):** Comprehensive.  
As per the official schedule: **9:00 PM**, May 31, 2017 (Wednesday).
- You need to achieve at least 50% in order to pass the course.
- **Grading Scale**

Score	87-100	80-86	75-79	70-74	65-69	60-64	55-59	50-54
Grade	A+	A	B+	B	C+	C	D+	D