

Stat 335: Generalized Linear Models

SECTION — 78207-78208

Instructor Information

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Office Hours: Sunday - 2:00-3:00 pm and by appointment.

Class Information

Lecture: Sunday 3:00 pm- 5:00 pm and Tuesday 3:00 pm- 5:00 pm

Classroom: 2b 48

Prerequisites

Students should possess a background that includes regression and analysis of variance models, as well as the statistical theory of maximum likelihood methods.

Course Description

Generalized Linear Models (GLMs) are a flexible class of models that extend linear regression to accommodate response variables that have error distribution models other than a normal distribution. They are widely used in statistical modeling and machine learning for analyzing relationships between variables when the assumptions of ordinary linear regression are not met.

Course Objectives

By the end of this course, student will be able to:

- Review: some matrix algebra, some important distributions, quadratics forms, some statistical inferences methods (estimation, hypotheses testing), model fitting and some principles of statistical modeling, simple linear regression, comparing the means of two groups.
- Exponential family and generalized linear models.
- Sampling distribution for score statistics, sampling distribution for the deviance.
- Normal Linear Models.
- Binary Variables and logistic Regression.
- Nominal and ordinal logistic Regression.
- Poisson Regression and log-linear models.
- Clustered and Longitudinal Data

Textbook, Calculators, & Software

Textbook: *An Introduction to Generalized Linear Models*, by Annette J. Dobson and Adrian G. Barnett, 4th edition, 2018, CRC Press, Taylor Francis Group, Chapman Hall.

Other Learning Materials:

- *Generalized Linear Models: with Applications in Engineering and the Sciences*, by Raymond H. Myers, Douglas C. Montgomery, G. Geoffrey Vining, and Timothy J. Robison, 2nd Edition, 2010, Wiley.
- *Generalized Linear Models with Examples in R*, by Peter K. Dunn, Gordon K. Smyth, 2018, Springer.
- *Foundations of Linear and Generalized Linear Models*, by Alan Agresti, 2015, Wiley.

Software: The examples in this course will use the R programming language, available at www.r-project.org. See also www.rstudio.com for a nice development environment. For your homework, there is no restriction on the software that you use, but I will not be able to help you with software other than R. For an introduction to R, see <http://data.princeton.edu/R/> (if you have no experience with R, I would recommend going through this in its entirety). Also see <http://www.cookbook-r.com/> for instructions on how to carry out some common tasks in R.

Phone and Device Policies

Following the Statistics Department guidelines, all electronic devices should be turned off and put away during class. Use of such devices can result in dismissal from class. If there is an issue which requires you to need a phone in class, discuss this with your instructor.

Class Attendance and Participation

It is essential to your success in this course that you attend each lecture and participate in the discussions. Therefore, you are expected to attend each lecture and to show up on time. Should you need to miss a class for any reason, you are to contact the instructor in a timely manner. Reasons for missing lecture must be documentable and presented, if requested. You are responsible for any material covered, any work assigned, or any course changes made during the lecture. *Do not* expect the instructor to provide notes from any class that you might miss. More than three unexcused absences from lectures could result in receiving an 'F' in the course. Furthermore, excessive lateness will also count as an absence. If you are dismissed from lecture due to problems during the lecture, e.g. disruptive behavior or unauthorized cell phone use, then this dismissal will be recorded as an absence.

Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

For at least two hours a week, faculty and teaching staff are available to provide student consultations and academic advice.