

BIOS 667: Longitudinal Data Analysis

Fall 2019

Location and Time:

Class: 1:25-2:40 Monday and Wednesday, MC 1304

Instructor: Bahjat Qaqish

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Graders:

tba

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Text:

Fitzmaurice, Laird, and Ware (2011). Applied Longitudinal Analysis, 2nd edition. Wiley.

Supplemental Resources:

- Dobson & Barnett (2018) An Introduction to Generalized Linear Models, 4th edition. Chapman & Hall.
- McCullagh & Nelder (1989). Generalized Linear Models, 2nd edition. Chapman & Hall.
- Davidian, Marie (2005). Applied Longitudinal Data Analysis. Unpublished class notes (North Carolina State University, Stat 732).

Software:

- SAS (including IML, required)
- R (highly encouraged)

Topics:

- Background: Why special methods for LDA?
- The objectives of LDA.
- Background: A revision of ANOVA, linear and generalized linear models
- Background: Marginal, conditional and joint distributions

- The various types of models used in LDA, their application, interpretation and statistical inference.
- The role of study design and sampling schemes.
- Random-effects (mixed) models.
- Marginal models.
- Conditional models.
- Maximum-likelihood, generalized estimating equations, conditional likelihood and other methods of estimation.
- Regression diagnostics.
- Missing data.
- Sample size calculations.
- The use of simulation in LDA.

Prerequisite is BIOS 663. Knowledge of SAS and basic matrix algebra are assumed.

Learning Objectives:

- Gain an understanding of the basic ideas of longitudinal data analysis
- Hone skills in fitting and interpreting longitudinal data models for addressing scientific questions that arise in public health and medicine
- Gain skills in study design and sample size calculations for longitudinal studies

Copies of presentations used in class will be available online on Sakai. These notes either cover some material not contained in the textbook or are condensed summaries of the lectures. So, the assigned readings are very important.

Acknowledgements: I have drawn heavily on the work of professors and colleagues when creating the course, and in particular the work of professors: Liang and Zeger at Johns Hopkins, Fitzmaurice, Laird, Ware, and Williams at Harvard; Edwards, Helms, Muller, Stewart and Herring at UNC, Dividian at NC State.

Grades

Homework assignments and quizzes: 30%

Two Midterm Exams: dates tbd, 35%

Final Exam: 35%

Cooperation on homeworks and discussing them with anyone other than the instructor is **not allowed**.

The Graduate School uses the grades H (clear excellence), P (entirely satisfactory), L (low pass), and F (failure). Graduate students are expected to earn “P” grades, with remarkable performances rewarded with other grades from the scale as appropriate. Class participation may modify the association between the numeric average and assigned letter grade.

Honor Code:

It is expected that each student in this class will conduct him or herself within the guidelines of the UNC Honor System. All academic work should be done with the high level of honesty and integrity that this University demands. Suspected Honor Code violations will be reported to the UNC Dean of Students, who will investigate the case. These investigations typically involve lengthy hearings of the Honor Court, and as outlined in the Instrument of Student Judicial Governance, “The usual sanction for a first academic violation is definite suspension for at least one academic semester and a grade penalty of an ‘F’ for the course, a portion of the course, or the assignment.”