Statistical Methods II (STT 864)

Spring 2020

Instructor:	Haolei Weng	**Time:**	MW 12:40 – 14:00
Email:	wenghaol@msu.edu	**Place:**	A220 Wells Hall

Course Website: MSU D2L

Office Hours: C433 Wells Hall, Mon. & Wed. 14:30 – 15:30 or by appointment.

Grader: Haoxiang Feng (fenghaox@msu.edu)

Objectives: This course will introduce a wide range of generalized linear models (GLM), linear mixed models (LMM), and generalized linear mixed models (GLMM). The course aims to provide students with a rich toolbox of statistical methodologies to handle different types of data sets. Students are expected to achieve the following objectives:

- A good understanding of the basic statistical computation, estimation and inference techniques used in GLM, LMM, and GLMM.
- A solid grasp of practical model building and diagnostics methods.
- Be familiar with the functions in R for fitting various models, and understand the outputs.
- Be able to write R codes to produce results that are not directly available from R functions.
- Be able to perform a comprehensive statistical analysis of real data sets.

Prerequisites:

- Knowledge of linear regression models, mathematical statistics, linear algebra at Statistical Methods I (STT 863) level.
- Throughout the course, we use the programming language R for statistical computing and graphics. R (or RStudio) can be downloaded for free. A basic knowledge of R is expected from the beginning of the course.

Main References:

- Faraway, J. (2016). *Extending the Linear Model with R: Generalized Linear, Mixed Effects and Nonparametric Regression Models*, 2nd edition, Chapman & Hall/CRC.
- Hardin, J. and Hilbe, J. (2018). *Generalized Linear Models and Extensions*, 4th edition, Stata Press.
- McCulloch, Searle and Neuhaus (2008). *Generalized, Linear, and Mixed Models*, 2nd edition, Wiley-Interscience.

Tentative Course Topics:

- Review of linear regression models
- Binomial response models (e.g., Logistic regression)
- Count response models (e.g., Poisson regression)
- Multinomial response models (e.g., Multinomial logit model)
- Generalized linear models
- Analysis of contingency tables
- Linear mixed effect models
- Generalized linear mixed models

Grading: Homework (35%), One Project (30%), One Final Exam (35%).

- A tentative criterion for the final grade

$$4.0([90\%, 100\%]), \quad 3.5([80\%, 90\%)), \quad 3.0([70\%, 80\%)), \quad 2.5([60\%, 70\%)), \quad 2([0\%, 60\%))$$

- Grades might be curved before applying the above criterion.
- There will be a total of five or six homework assignments.
- Students should turn in their homework to the instructor in class. Solutions will be posted on D2L.
- The project will be assigned on Mar 16 and is due on April 26.
- NO late homework will be accepted unless extenuating circumstances are present.
- NO make-up exams except for excused absences.
- In the aforementioned two situations, discuss with the instructor in advance.

Important Dates:

First Class	12:40pm - 2:00pm, Jan 6, 2020
Martin Luther King Day	Jan 20, 2020
Last Day to Drop with no grade	Feb 26, 2020
Spring Break	Mar 2 - 6, 2020
Last Class	12:40pm - 2:00pm, Apr 22, 2020
Final Exam	12:45pm - 2:45pm, Apr 27, 2020
Grades Due	May 5, 2020

General:

- Regular class attendance is expected.
- Copying homework and all other forms of academic dishonesty are strictly forbidden. Discussing with fellow students is encouraged.
- For students with disabilities, please contact Resource Center for Persons with Disabilities at https://www.rcpd.msu.edu/.
- The instructor reserves the right to modify the syllabus as it is deemed necessary. Any such changes will be announced in class.