Course Syllabus

Visiting professor : Garrett Fitzmaurice

Course	Biostatistics		
Credit	1	Method of Teaching	Lecture

Objective

Title for lectures is "Modeling Longitudinal and Multilevel Data".

The emphasis of this course is on understanding basic concepts and methods and how they can be applied in the health sciences.

Outline

The aim of the course is to review methods for the analysis of longitudinal and multilevel data. Topics include a general introduction to linear mixed effects models, and extensions of generalized linear models, to longitudinal and multilevel data. The course is intended for all students interested in epidemiology, biostatistics and public health.

Class Schedule   (90 minutes each)

Day 1 (January 7, 2020)

1. **Linear Mixed Models for Longitudinal Data**   (9:00am-10:30am)

   Readings: FLW, Chapters 1, 2, and 8.

2. **Smoothing Longitudinal Data using Penalized Splines**   (11:00am-12:30pm)

   Readings: FLW, Chapter 19.

Day 2 (January 8, 2020)

3. **Generalized Linear Models for Longitudinal Data Part 1**

   (Marginal Models and Generalized Estimating Equations)   (9:00am-10:30am)

   Readings: FLW, Chapters 11, 12, and 13.

4. **Generalized Linear Models for Longitudinal Data Part 2**

   (Generalized Linear Mixed Models)   (11:00am-12:30pm)

   Readings: FLW, Chapters 14 and 16.

Day 3 (January 9, 2020)

5. **Introduction to Multilevel Data**   (9:00am-10:30am)

   Readings: GH, Chapters 1 and 11; FLW, Chapter 22 (Sections 22.1-22.2).

6. **Multilevel Linear Models**   (11:00am-12:30pm)

   Readings: GH, Chapters 12 and 13 (Sections 13.1-13.2); FLW, Chapter 22 (Section 22.3).

Day 4 (January 10, 2020)

7. **Multilevel Generalized Linear Models** (9:00am-10:30am)

   Readings: GH, Chapters 14 and 15; FLW, Chapter 22 (Sections 22.4-22.5).

8. **Non-Nested Data: Cross-Classified and Multiple-Membership Structures** (11:00am-12:30pm)

   Readings: GH, Chapter 13 (Section 13.5).

Written Examination (January 10, 2020): (1:30-3:00pm)

We may add seminars by Japanese teachers for each to assist students with difficulty in language/background knowledge

Texts

Fitzmaurice, G.M., Laird, N.M., and Ware, J.H. (2011). Applied Longitudinal Analysis, 2nd Ed. Wiley & Sons. (FLW)

Gelman, A. and Hill, J. (2007). Data Analysis Using Regression and Multilevel/Hierarchical Models. Cambridge University Press. (GH)

Related readings

Will be made available prior to the lecture.

Achievement evaluation

There will be a written final exam about conternts in the class upon completion of the course.