UNIVERSITY OF MINNESOTA

School of Public Health

Course Syllabus

PubH 8452
Advanced Longitudinal Data Analysis
Spring 2008

Credits:	**3**
Meeting Days:	**Monday and Wednesday**
Meeting Time:	**Monday 9:05-11:00 AM, Wednesday 9:05-9:55 AM**
Meeting Place:	**MoosT 1-103**
Instructor:	**Dr. Xianghua Luo**
Office Address:	**Mayo A455**
Office Phone:	**612-624-2158**
Fax:	**612-626-0660**
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Office Hours:	**Wednesday 10:00-11:30 AM**
Course Website:	**http://www.biostat.umn.edu/~xianghua/teaching/ph8452/index.html**

I. Course Description

Methods of inference for correlated outcome variables, with a special emphasis on repeated measurements in medical studies. Linear/nonlinear models with either normal or non-normal error structures. Random effects. Transitional/marginal models. (Note that this course was listed as PubH 8433 in previous years.)

II. Course Prerequisites

- Theory of statistical inference (estimation and testing, asymptotics) at or above the level of Stat 8101-2. Stat 8111-2 is recommended.
- Linear models (linear algebra, least square, multivariate normal distribution) (Stat 8311 required).
- Familiarity with a statistical software to carry out the computation (including data analysis and simulation). R is highly recommended and will be used throughout by the instructor. While it is possible to achieve similar results in, for example, Stata, no technical support is provided from the instructor.

III. Course Goals and Objectives

After taking the course, the students are expected to:

- understand the theory, assumptions and properties of various statistical methods for the analysis of longitudinal data.
- be able to carry out the appropriate analyses (including exploratory) of longitudinal data using suitable statistical software and present the results.

IV. Methods of Instruction and Work Expectations

Mostly there will be lectures. The notes will be distributed in the classroom prior to the lecture and will also be available on the course website afterward. Additional reading materials will be distributed as needed.

Work expectations include homework, a final project and a presentation (see below).

V. Course Text and Readings

Textbook (Required)

Diggle, Heagerty, Liang and Zeger (2002), Analysis of Longitudinal Data, 2nd Edition, Oxford University Press.

Readings (Optional)

- Hedeker and Gibbons (2006). Longitudinal Data Analysis. Johns Wiley & Sons, Inc. ISBN-10: 0-471-42027-1. ISBN-13: 978-0-471-42027-9.
- Fitzmaurice, Laird and Ware (2004). Applied Longitudinal Analysis. John Wiley and Sons. ISBN: 0-471-21487-6.
- McCullaph and Nelder (1989). Generalized linear models. 2nd Edition, Chapman and Hall. ISBN: 0-412-31760-5.
- Littell, Milliken, Stroup, Wolfinger, and Schabenberger (2006). SAS for Mixed Models, 2nd Edition. SAS Press. ISBN-10: 1-59047-500-3. ISBN-13: 978-1-59047-500-3.
- Verbeke and Molenberghs (2000). Linear Mixed Models for Longitudinal Data. Springer. ISBN: 0-387-95027-3.
- Molenberghs and Verbeke (2005). Models for Discrete Longitudinal Data. Springer. ISBN-10: 0-387-25144-8. ISBN-13: 978-0387-25144-8.
- Brown and Prescott (2006). Applied Mixed Models in Medicine. 2nd Edition. ISBN-10: 0-470-02356-2. ISBN-13: 978-0-470-02356-3.

VI. Course Outline/Weekly Schedule

Lectures

The following topics will be covered

- Introduction
- Exploratory Data Analysis
- General Linear Models
- General Linear Models: Case Study
- Linear Mixed Models
- Linear Mixed Models: Case Study
- Generalized Linear Models, Quasi-likelihood and Estimating Functions
- GEE Variants and Case Studies
- Likelihood Models for Repeated Binary Data
- Modeling Approaches: Marginal, Random Effects and Transition Models
- Generalized Linear Mixed Models
- Transition Models and Marginalized Models
- Time-Dependent Variables
- Missing Data in Longitudinal Studies

Homework

There will be approximate one homework every three weeks (4 in total). All assignments will involve computing, including data analysis and possibly simulations.

Presentation

- For students registered at A-F scale (PhD students in Biostatistics or Statistics), make a presentation on an "advanced" topic, i.e., present a journal paper.
- For other students (registered at S/N), classroom participation.

Exams

There are no exams.

VII. Evaluation and Grading

Homework (66.7%), presentation (33.3%). A letter grade will be determined as follows:

		B+	87-89%	C+	77-79%	D+	67-69%
A	93-100%	B	83-86%	C	73-76%	D	63-66%
A-	90-92%	B-	80-82%	C-	70-72%	F	0-62%

For those enrolled S/N, a letter grade of C or better must be achieved to receive an S.

Incomplete Grade

A grade of incomplete “I” shall be assigned at the discretion of the instructor when, due to extraordinary circumstances, the student was prevented from completing the work of the course on time. The assignment of an incomplete requires a written agreement between the instructor and student specifying the time and manner in which the student will complete the course requirements. In no event may any such written agreement allow a
period of longer than one year to complete the course requirements.

University of Minnesota Uniform Grading and Transcript Policy

A link to the policy can be found at onestop.umn.edu.

VIII. Other Course Information and Policies

Grade Option Change (if applicable)

For full-semester courses, students may change their grad option, if applicable, through the second week of the semester. Grade option change deadlines for other terms (i.e. summer and half-semester) can be found at onestop.umn.edu.

Course Withdrawal

Students should refer to the Refund and Drop/Add Deadlines for the particular term at onestop.umn.edu for information and deadlines for withdrawing from a course. As a courtesy, students should notify their instructor and, if applicable, advisor of their intent to withdraw.

Students wishing to withdraw from a course after the noted final deadline for a particular term must contact the School of Public Health Student Services Center at sph-ssc@umn.edu for further information

Student Conduct, Scholastic Dishonesty and Sexual Harassment Policies

Students are responsible for knowing the University of Minnesota, Board of Regents' policy on Student Conduct and Sexual Harassment found at www.umn.edu/regents/polindex.html.

Students are responsible for maintaining scholastic honesty in their work at all times. Students engaged in scholastic dishonesty will be penalized, and offenses will be reported to the Office of Student Academic Integrity (OSAI, www.osai.umn.edu).

The University’s Student Conduct Code defines scholastic dishonesty as “plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; or altering, forging, or misusing a University academic record; or fabricating or falsifying of data, research procedures, or data analysis.”

Plagiarism is an important element of this policy. It is defined as the presentation of another's writing or ideas as your own. Serious, intentional plagiarism will result in a grade of "F" or "N" for the entire course. For more information on this policy and for a helpful discussion of preventing plagiarism, please consult University policies and procedures regarding academic integrity: http://writing.umn.edu/tww/plagiarism/.

Students are urged to be careful that they properly attribute and cite others' work in their own writing. For guidelines for correctly citing sources, go to http://tutorial.lib.umn.edu/ and click on “Citing Sources”.

In addition, original work is expected in this course. It is unacceptable to hand in assignments for this course for which you receive credit in another course unless by prior agreement with the instructor. Building on a line of work begun in another course or leading to a thesis, dissertation, or final project is acceptable.

If you have any questions, consult the instructor.

Disability Statement

It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have a documented disability (e.g., physical, learning, psychiatric, vision, hearing, or systemic) that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities are encouraged to contact Disability Services to have a confidential discussion of their individual needs for accommodations. Disability Services is located in Suite180 McNamara Alumni Center, 200 Oak Street. Staff can be reached by calling 612/626-1333 (voice or TTY).