

## Psychology 9542B. Multilevel Modeling (MLM) (Winter 2019)

### COURSE OUTLINE

*Instructor:* Paul F. Tremblay, Ph.D.

*email:* [ptrembla@uwo.ca](mailto:ptrembla@uwo.ca)

*phone (office):* 519 661-2111 ext 85644

*office:* SSC 6336

*office hours:* by appointment

*Lectures:* Tuesdays, 9:00 am to 12:00 noon, Room SSC 8438-8440.

*Start date:* Tuesday, January 8, 2019.

#### I. COURSE DESCRIPTION

This course serves as an introduction to theory, design, and application of multilevel modeling, and it is ideal for students who plan to do research with group level data (e.g., peer groups, teams in organization or sports, dyads such as couples or twins, surveys with clustered data, neighbourhoods, and classrooms, and experiments with multiple stimuli such as words in linguistic studies) or multi-observation studies (e.g., daily diary studies, longitudinal designs, experimental designs with multiple repeated stimuli). Students should have some training in multiple regression and would benefit from experience in analysis of variance and structural equation modeling. Course topics include a review of traditional regression procedures, research design with multilevel structures, the basic two-level regression model (and extension to three-levels), methodological and statistical issues including power analyses, models with longitudinal data, models with dichotomous, categorical or count outcomes and structural equation models with multiple data levels and mediation.

My overall objective is to provide students with the necessary knowledge to apply MLM to research through hands-on individualized projects tailored to their research interests and needs. Students will have the opportunity to analyze their own data, to use large data sets provided in the course, or to conduct simulation studies. Mplus and SPSS Mixed Models are used for demonstration in the course but students are free to work with other programs such as R (package lme4). Prerequisite: must have taken Psychology 9540 (Research Design) or equivalent course.

#### II. COURSE READINGS

Textbook:

Hox, J. J., Moerbeek, M., & van de Schoot, R. (2018). *Multilevel Analysis. Techniques and Applications. Third Edition*. New York: Routledge.

A few key articles (see lecture schedule) will also be used. These will be available in the course OWL site.

### III. METHOD OF EVALUATION

**40%: 4 lab/assignments.** You will have two weeks to complete an assignment (due at the beginning of class). These assignments will include data analysis, reporting, interpretation, discussion of results, and other questions. My official rules regarding late assignments include a 5% deduction per 24 hours, and assignments that are more than one week late will not be accepted for partial marks. If you anticipate any problems meeting deadlines please contact me prior to the due date.

*Rules about working in groups.* I am supportive of students working in groups to conduct the analyses and discuss the assignments. However, you are required to write your own report with no duplication from your colleagues' work. The assignments will often require you to choose a subset of variables, and to make decisions about plausible strategies.

**10%: Participation.** Attending lectures and preparing and emailing me a question following each lecture about related or unclear content material. I will prepare a Q & A write-up from these.

**50%: Individual project.** You will be required to conduct analyses for an individual multilevel modeling project or write a research proposal with a power analysis in Mplus. You will have the choice to use a large data set that I will provide, providing one yourself (approved by the instructor), or creating a simulation data set as part of a research proposal (I will explain this option in class). Please have your research idea approved by me by Feb 12. The project will have three components:

- a one-page research proposal outlining your project worth 5% (due March 5)
- a 20-min presentation of your project worth 15% (Apr 2 or Apr 9)
- a final write-up of the project worth 30% (due April 16)

#### **Individual Project**

The main requirement is a multilevel design with observations at level-1 nested in a level-2 unit (e.g., students nested within classrooms, repeated observations nested within people). The second requirement is that you have at least one level-1 predictor and one level-2 predictor. The third requirement is that you use a model building approach in which you start with a simple intercept-only model and add your predictors in subsequent models. Note that for those using repeated measures, you have the option to model time using a latent growth modeling approach. If you want to do something different such as a Monte Carlo study or a confirmatory factor analysis/structural equation model combining level-1 and level-2 data please discuss your idea with me.

1. **Research idea (due Feb 12).** Have your idea approved by me by Feb 9. No write-up necessary. The main goal is to decide on your design in general and your data set. You can discuss your idea with me in class, or by email, or we can set up a meeting.

2. **Research proposal (due March 5; 5%).** A two-page max description of your project outlining your objectives, hypotheses, research design, description of data, and description of variables/measures.
3. **Presentation (April 2 or April 9; 15%).** You will have 20 minutes (max) to do your presentation followed by a 5-10 min discussion. Two students will be assigned to comment and to ask questions first followed by questions from the rest of the class. You will be rated on the material in your slideshow (10%) as well your presentation itself (5%; ability to present and explain clearly). Your slides will be due the same day.
4. **Paper (due April 16, one week after the last class; 30%).** Your paper should generally be written as a manuscript for publication. Your introduction can be less elaborate than in publication manuscript, but you should include a rationale, objectives and hypotheses and a brief review of the literature. The text should be no longer than 20-25 double spaced pages and you should include tables and or figures. One good way to present your analyses is by using a table describing the models that you ran. See for example the tables in the Peugh (2010) article.

#### IV. STATEMENT OF ACADEMIC OFFENCES

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: [http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_grad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf)

All required papers may be subject to submission for textual similarity review to the commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

## V. LECTURE SCHEDULE

	Date	Topic	Readings
1	Jan 8	Overview and review of multiple regression models  Mplus. Review of basic syntax and discussion of other software	Hox et al. Ch. 1  Skim the Mplus manual throughout the course. Chapter 9 is the main chapter for multilevel modeling.
2	Jan 15	Overview of MLM logic and design	Hox et al. Ch. 2  Nezlek, J. B. (2008). An introduction to multilevel modeling for social and personality psychology. <i>Social and Personality Psychology Compass</i> , 2(2), 842-860.
3	Jan 22	The Basic Two-Level Regression Model	Hox et al. Ch. 2, 3  Peugh, J. L. (2010). A practical guide to multilevel modeling. <i>Journal of School Psychology</i> , 48, 85-112.
4	Jan 29	The Basic Two-Level Regression Model (and extensions to three-levels)	Hox et al. Ch. 2, 3, 4  Peugh (2010)  Peugh, J. L. (2014). Conducting three-level cross-sectional analyses. <i>Journal of Early Adolescence</i> , 34, 7-37.
5	Feb 5	Methodological and Statistical Issues	Hox et al. Ch. 2, 3, 4, 13  Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. <i>Psychological Methods</i> , 12, 121-138.
6	Feb 12	Analyzing Longitudinal Data	Hox et al. Ch. 5, 16  Peugh (2010). (start p. 100)  Hoffman, L., & Stawski, R. S. (2009). Persons as contexts: evaluating between-person and within-person effects in longitudinal analysis. <i>Research in Human Development</i> , 6, 97-120.
	Feb 19	Reading Week (no lecture)	

	<b>Date</b>	<b>Topic</b>	<b>Readings</b>
7	Feb 26	Analyzing Longitudinal Data	Hox et al.Ch. 5, 16
8	Mar 5	Repeated Measures (Stimuli) Cross-Classified Designs	Hox et al.Ch. 9  Locker, L., Hoffman, L., & Bovaird, J. A. (2007). On the use of multilevel modeling as an alternative to items analysis in psycholinguistic research. <i>Behavior Research Methods</i> , 39, 723-730.  Hoffman, L., & Rovine, M. J. (2007). Multilevel models for the experimental psychologist: Foundations and illustrative examples. <i>Behavior Research Methods</i> , 39, 101-117.
9	Mar 12	Dichotomous, Categorical, Count Data	Hox et al.Ch. 6, 7
10	Mar 19	Sample size, power, Monte Carlo	Hox et al.Ch. 12
11	Mar 26	MLM and SEM	Hox et al.Ch. 14, 15  Preacher, K. J. et al. (2010). A general multilevel SEM framework for assessing multilevel mediation. <i>Psychological Methods</i> , 15, 209-233.
12	Apr 2	Advanced topics: Dyads  Presentations	Kenny, D. A., & Kashy, D. A. (2010). Dyadic data analysis using multilevel modeling. In J. J. Hox & J. K. Roberts (Eds.), <i>Handbook of Advances Multilevel Analysis</i> (pp.335-370). New York: Routledge.
13	Apr 9	Presentations	