

## **RMTD 484**

### **Hierarchical Linear Modeling**

Instructor: Meng-Jia Wu, Associate professor  
Classroom: Lewis Towers, Room 410  
Class time: Mondays, 1:30-4:00pm  
Office: Lewis Towers, Room 1040  
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#### **Course Description**

This course is designed for graduate students with considerable experience with linear modeling (e.g., regression, ANOVA, and dummy variables) and abilities to conduct statistical analyses using computer software. The major topics of this course include two-level models for continuous/categorical/count outcomes, three-level models, growth models, and centering. The assumptions and critical issues related to using hierarchical linear models will be discussed. The focus of this course is on estimating the coefficients and interpreting the results based on the multilevel models, along with understanding fundamental theories behind the modeling techniques. Students will have chances to critically examine contemporary social research using this technique.

#### **School of Education conceptual framework ([www.luc.edu/education/mission/](http://www.luc.edu/education/mission/))**

Our School's conceptual framework is "social action through education". This course contributes to this framework by equipping students with knowledge and experience in statistics used in quantitative research. Through conducting, interpreting, and reporting reliable social science studies, researchers can help further the scholarly understanding of the events and practices that influence the field of education. The ultimate outcome of this understanding is to ensure that that all individuals, no matter their ability, race, religion, socioeconomic status, age, or gender benefit from effective research.

#### **Course objectives**

Students are expected to understand

- the research designs where HLM most useful;
- the basic structure of HLM models, both nested and longitudinal;
- the similarities and differences between HLM models and other statistical models for nested and longitudinal data;
- the estimates of the coefficients from two-/three- level models;
- the role of error terms in the HLM model; and
- the data assumptions and requirements of HLM models

Students are expected to be able to

- use SPSS to create level 1 and level 2 data files for nested and longitudinal data (if using HLM 6 or earlier version) and import SPSS files into HLM program;

- analyze nested and longitudinal models in HLM program;
- examine the output from HLM program;
- interpret and write the results of the data analysis;
- exporting residual files from HLM program into SPSS; and
- critique a peer-reviewed journal article that uses HLM.

### **Required texts**

Raudenbush, S. W. & Bryk, A. S. (2002). *Hierarchical linear models*. Thousand Oaks, CA: Sage Publications.

HLM 7 manual: The PDF of the HLM 7 manual is available via the HLM 7 Manual option on the Help menu.

### **Strongly recommended**

Some concepts and examples from the following book are adopted in this class.

Hox, J. J. (2010). *Multilevel analysis: Techniques and applications* (2nd ed.). New York, NY: Routledge.

### **Recommended**

The following books are good resources:

Kreft, I. G. G. & de Leeuw, J. (1998). *Introducing multilevel modeling*. Thousand Oaks, CA: Sage Publications. (Available at <http://www.sagepub.com/book.aspx?pid=6341>)

Snijders, T. A. B. & Bosker, R. J. (1999). *Multilevel analysis*. Thousand Oaks, CA: Sage Publications. (Available at <http://www.sagepub.com/book.aspx?pid=6642>)

Singer, J. D. & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence*. New York: Oxford University Press. (Info at <http://gseacademic.harvard.edu/alda/>)

### **Technology**

The use of technology is a major requirement for this course. Students will use the computer packages SPSS and HLM 7 during class and complete assignments at home.

The student version of HLM 7 is available free from the website for Scientific Software International: <http://ssicentral.com/index.php/products/hml/free-downloads-hlm>

### **Course expectations**

Students are expected to use the Sakai website for accessing course materials and submitting assignments. Besides, students should check their LUC email account for important updates about the course. Furthermore, students are expected to use the statistical computing packages SPSS and HLM 7 to complete analyses both in and outside of class. Weekly readings should be finished either before or right after the class. Attending classes and submitting assignments on time are also expected.

## Evaluation

The final grade is based on points accumulated on homework assignments, final presentation, participation, and the final exam. The distribution of the proportion for each item is:

Assignments	60%
Final presentation	10%
Participation	10%
Final exam	20%

*Assignments:* There are totally six assignments. They are different in length. You can work individually or with another student in this class and submit a group work. You are encouraged to run the analyses and discuss the results orally with other students/groups. However, each student/group should write up the answers independently. **Do not circulate your final work through e-mails to avoid intentional or unintentional plagiarism.** Late work is not acceptable unless a prior arrangement has been made with the instructor. Late Assignment will automatically be worth half of their original point value. **Please note that there will be no makeup work for the points you lost in the assignments.**

*Final presentation:* This activity is designed for you to be able to talk about HLM studies conducted in your field. You will search and present the paper of your choice as if you were the researcher in that project. A specific guideline will be posted.

*Participation:* Class participation includes but is not limited to, attending class and submitting assignments on time, participating in-class activities and discussions, asking and answering questions, listening to and respecting the views, thoughts, and opinions of your classmates. If you must be absent from class because of illness or emergency, notify the instructor as early as possible. Miss more than one class throughout the semester may impact your final grade.

*Final exam:* An online exam will be given at the end of the semester. Students are expected to work on the exam independently. More details will be discussed in the class.

The grade ranges in terms of percentage are:

100.0-90.0 = A	84.9-80.0 = B+	69.9-65.0 = C+	54.9 and below = F
89.9-85.0 = A-	79.9-75.0 = B	64.9-60.0 = C	
	74.9-70.0 = B-	59.9-55.0 = C-	

**Loyola University Chicago  
School of Education  
Syllabus Addendum**

**Smart Evaluation**

Towards the end of the course, students will receive an email from the Office of Institutional Effectiveness as a reminder to provide feedback on the course. Students will receive consistent reminders throughout the period when the evaluation is open, and the reminders will stop once the evaluation is completed.

- The evaluation is completely anonymous. When the results are released, instructors and departments will not be able to tell which student provided the individual feedback.
- Because it is anonymous and the results are not released to faculty or departments until after grades have been submitted, the feedback will not impact a student's grade.
- The feedback is important so that the instructor can gain insight in to how to improve their teaching and the department can learn how best to shape the curriculum.

**Dispositions**

All students are assessed on one or more dispositional areas of growth across our programs: ***Professionalism, Inquiry, and Social Justice***. The instructor in your course will identify the dispositions assessed in this course and you can find the rubrics related to these dispositions in LiveText. *For those students in non-degree programs, the rubric for dispositions may be available through Sakai, TaskStream or another platform.*

Disposition data is reviewed by program faculty on a regular basis. This allows faculty to work with students to develop throughout their program and address any issues as they arise.

**LiveText**

All SOE students, *except those who are non-degree*, must have access to LiveText to complete the benchmark assessments aligned to the Conceptual Framework Standards and all other accreditation, school-wide and/or program-wide related assessments. You can access more information on LiveText here: [LiveText](#).

The expected behaviors for the specific dispositions for this class and the evaluation rubric are listed below:

<b>Area</b>	<b>Target</b>	<b>Acceptable</b>	<b>Unacceptable</b>
<b>Systematic Inquiry</b>	Candidate communicates effectively and appropriately with faculty and peers.	Candidate is working on communicating effectively and appropriately with faculty and peers.	Candidate is unable to communicate effectively and appropriately with faculty and peers.
<b>Responsibilities for General and Public Welfare</b>	Candidate's written work is appropriate	Candidate's written work is sometimes appropriate and	Candidate's written work is inappropriate

	and effective for the course.	effective for the course.	and ineffective for the course.
<b>Timeliness</b>	Candidate is able to meet all deadlines.	Candidate is sometimes able to meet all deadlines.	Candidate is unable to meet all deadlines.
<b>Accountability</b>	Candidate attends all classes and fulfills all professional obligations.	Candidate sometimes attends classes and fulfills professional obligations.	Candidate's attendance to class is inconsistent and is unable to fulfill all professional obligations.
<b>Collegiality</b>	Candidate is able to work with peers.	Candidate is sometimes able to work with peers.	Candidate is unable to work with peers.
<b>Integrity/Honesty</b>	Candidate respects the viewpoints of others.	Candidate sometimes respects the viewpoints of others.	Candidate has difficulty respecting the viewpoints of others.
<b>Integrity/Honesty</b>	Candidate recognizes potential conflicts and handles them appropriately.	Candidate sometimes recognizes potential conflicts and handles them appropriately.	Candidate has difficulty recognizing potential conflicts and handling them appropriately.
<b>Integrity/Honesty</b>	Candidates appropriately represent procedures, data, and findings – attempting to prevent misuse of their results.	Candidates represent procedures, data, and findings in a manner that is likely to allow the misuse of their results.	Candidates misrepresent procedures, data, and findings. There is minimal attempt to prevent misuse of their results.

### **Syllabus Addendum Link**

- [www.luc.edu/education/syllabus-addendum/](http://www.luc.edu/education/syllabus-addendum/)

This link directs students to statements on essential policies regarding *academic honesty, accessibility, ethics line reporting* and *electronic communication policies and guidelines*. We ask that you read each policy carefully.

This link will also bring you to the full text of our conceptual framework that guides the work of the School of Education – ***Social Action through Education***.

## Tentative schedule

R & B: Raudenbush, S. W. & Bryk, A. S. (2002); Hox: Hox, J. J. (2010).

Week	Dates	Topics	Related Readings *
1	8/26	Introduction to HLM	
2	9/2	~*~ Labor Day – no class ~*~	
3	9/9	HLM Software & Data Preparation	Hox: Ch. 1 HLM 7 Manual: Ch.2
4	9/16	Basic two-level model 1: Null Models & random intercept Models	Woltman, Feldstain, MacKay, & Rocch, 2012
5	9/23	Basic two-level model 2: Centering & interaction	R & B: Ch. 2 Hox: Ch. 2
6	9/30	Basic two-level model 3: Statistical assumptions & issues	R & B: Ch. 3 Hox: Ch. 2 HLM 7 Manual: Ch. 1
7	10/7	~*~Mid-semester break – no class ~*~	
8	10/14	Basic two-level model 4: Examples	Hox: Chs. 4 R & B: Chs. 4 & 9
9	10/21	Longitudinal HLM: Linear	R&B, Ch.6
10	10/28	Longitudinal HLM: Non-Linear	Hox, Ch. 5 HLM 7 Manual: Ch. 8
11	11/4	HGLM: Dichotomous Data & proportion	Hox, Ch. 6 HLM 7 Manual: Ch. 7
12	11/11	HGLM: Categorical & Count data	R & B: Ch. 10 Hox: Ch. 7
13	11/18	Three-Level models Cross-classified multilevel models	Hox, Ch. 9; R & B, Ch. 8 HLM 7 Manual: Chs. 3 & 4
14	11/25	Multilevel approach to meta-analysis/Other topics of interests	R & B: Ch. 7; Hox, Ch. 11
15	12/2	Presentations	
16	12/8	Final Exam Week	

\*More specific readings are listed in the end of the PPT slides for each topic.