Hierarchical Linear Models II

EDLD 629 – 4 Credits – CRN 36277
University of Oregon – College of Education - Department of Educational Methodology, Policy, and Leadership

2015 Spring Term Syllabus

Meeting Days/Time: Tuesdays 9:00-12:50
Location: Lokey 115

INSTRUCTOR

Mark J. Van Ryzin
Department of Educational Methodology, Policy, and Leadership
E-mail: markv@uoregon.edu
Address: 102S Lokey Bldg
Office Hours: by appointment

DESCRIPTION
This course will include advanced topics in multilevel modeling and hierarchical data structures, including longitudinal and categorical data analysis, estimation methods, missing data and multiple imputation, and the use and interpretation of different HLM statistical software packages, including HLM, R, and Mplus.

COURSE PREREQUISITES
EDLD 628 (HLM I)

OBJECTIVES
The goal of the course is to build expertise in the use of multilevel models. Emphasis is on the mastery of concepts and principles and the development of skills in the use of multiple HLM software packages.

TEXTBOOK

SOFTWARE
Either purchase a license for HLM or download the free student version at: http://www.ssicentral.com/hlm/student.html. The student version is sufficient to complete all course work.

R can be downloaded at: http://www.r-project.org/
RStudio can be downloaded at: http://www.rstudio.com/

Either purchase a student license for Mplus (w/multilevel option) or download a free demo version at: http://www.statmodel.com/demo.shtml

Access to SPSS is also required: https://it.uoregon.edu/software/spss
OTHER REFERENCES AND RESOURCES
UC LA maintains an excellent website on statistical computing that includes detailed support for numerous statistical programs and packages, including HLM, R, and Mplus (http://www.ats.ucla.edu/stat/). This website also provides examples of programming and results in HLM and citations for four other texts on hierarchical linear modeling (http://www.ats.ucla.edu/stat/hlm/examples/default.htm).


Materials from other HLM courses:
http://statlab.stat.yale.edu/help/workshops/HLMworkshop/
http://courses.education.illinois.edu/edpsy587/
http://psych.unl.edu/psychcrs/944/

R tutorial: http://swirlstats.com/
Also: http://www.math.csi.cuny.edu/Statistics/R/simpleR/


OD (Optimal Design) calculates power and optimal sample sizes for testing treatment effects and variance components in multisite and cluster randomized trials with balanced two-group designs, and in repeated measurement designs. Get the software and manual for free at: http://www.wtgrantfoundation.org/resources/consultation-service-and-optimal-design

COURSE STRUCTURE
EDLD 629 HLM is organized in a seminar format. The major activities consist of a combination of lectures, group discussions, and software applications (i.e., workshops). There will be no traditional quizzes or exams. Instead, the course requires completion of a data analysis project using your own dataset. In-class analyses will be conducted on shared datasets that will be provided by the instructor. This class relies heavily on in-class participation, particularly in data analyses workshops; therefore, it is critical that you bring to class a laptop with the necessary software installed (SPSS, HLM, R, Mplus, and optionally, RStudio) and wireless access so that you may participate fully in class analysis workshops.

GRADING POLICY
Your final grade will be based on the weighted sum of the points earned for each course activity/assignment. Final letter grades for the course will be calculated as follows:

A+ 100%
A 95-99.9%
A- 91-94.9%
B+ 87-90.9%
B 83-86.9%
B- 78-82.9%
C+ 73-77.9%
C 69-72.9%
C- 66-68.9%
F <66%

Please note that if this class is taken P/NP, 78% or higher is required to pass the class.
Your final grade for this course will be determined based on course activities as follows:

- Participation (10 points) = 10%
- Analysis Assignment 1 (30 points) = 30%
- Analysis Assignment 2 (30 points) = 30%
- Analysis Assignment 3 (30 points) = 30%

Assignments
Assignments are due at the beginning of class. Please use email rather than paper.

First analysis assignment (30 points)
You will submit a single paper in APA format with five parts: the theoretical background, your proposed research questions and hypotheses (supported by theory), a description of the dataset you will use, how you will use HLM to address your research questions, and the initial findings from descriptive analyses. In other words, this would be equivalent to the Introduction and Methods sections of a research paper, including the first paragraph of a Results section where correlations are reported (in a table). The Methods should include: a Participants section where you describe the sample; a Measures section where you describe the measures; and, an Analysis Plan where you describe HLM for the benefit of the reader; this section could also contain a representation of your hypothesized model (as we have written them in class) and should defend your decision to use HLM.

Your research questions will form the foundation for your later assignments and should be informed by the descriptive analysis. You can use HLM or another statistical package (e.g., SPSS) to perform the descriptive analysis. This analysis should include reporting and interpretation of correlations between your outcome variable(s) and your predictors and control variables, as well as correlations among the predictors and control variables.

The instructor will provide feedback on the assignment which you should address in your later versions (each analysis assignment will build upon and incorporate earlier versions; the end result will be a completed research paper that you can submit for publication).

Note that you should use your own dataset for this assignment; if you do not have one that relates to your area of interest, then you can make use of a publicly available dataset or work with the instructor to locate an appropriate dataset and write a “methods” paper that focuses on comparing/contrasting two of the methods used in this course.

Second analysis assignment (30 points)
You will report on a series of basic models that you fit starting with an unconditional means model and arriving at a final hierarchical model (that is, a model in which all intended predictors and controls have been added). Your paper should include a discussion of the modeling decisions and trade-offs you made along the way. This would be similar to a full Results section of a published research paper. All results should be presented in tables using APA standards. The instructor will provide feedback on this assignment which you should address in your final version to be handed in during finals week.

Third (final) analysis assignment (30 points)
You will submit a final paper that utilizes your previous analysis assignment (i.e., Introduction, Methods, Results) along with a Discussion section that reviews the results and their implications for theory and practice in your field, discusses the limitations of the paper, and suggests new avenues for research. This section should directly address the research questions and hypotheses you presented initially, and when discussing implications for the field, you should refer back to the research that you surveyed in the Introduction.
Scoring Rubric for Analysis Assignment

The purpose of the research paper is to provide experience in interpreting and reporting the results of HLM models. The paper must represent the original analysis of data that you have not done before. This does not mean that you cannot use existing data or use a study on which you have previously conducted analyses; it means you need to conduct new analyses not attempted before. For the analysis, you must use at least one unconditional and one conditional HLM model. The paper should be 15-30 pages in length including figures, tables, and bibliography, use APA style (6th Edition), and include the elements listed below.

- A concise Introduction section to describe the context and purpose of the study and a concise Methods section to describe the sample, the measured variables, and the procedures for data collection and analysis.

- A complete and thorough Results section including tables and figures in APA style as necessary. Reporting of results should include descriptive analysis of data, testing of model assumptions, complete reporting of the HLM model(s) including discussion and interpretation of relevant coefficients, interpretation of strength of association or power as needed, and interpretation of variance explained.

- A Discussion section that describes study limitations, interprets the results with regard to hypotheses, and discusses implications for theory and practice.

COURSE POLICIES

ATTENDANCE POLICY
Attendance is required to succeed in this course and master the course material. If a student does miss class, it is the student’s responsibility to get class notes, and handouts or other distributed materials. Contact the instructor in case of illness or emergencies that preclude attending class sessions.

ABSENCE POLICY
Students must contact the instructor in case of illness or emergencies that preclude completing lessons as scheduled. Messages can be left on the instructor's voice mail or e-mail at any time prior to class. If you are unable to take complete an assignment due to a personal and/or family emergency, you should contact your instructor as soon as possible.

ACADEMIC MISCONDUCT POLICY
All students are subject to the regulations stipulated in the UO Student Conduct Code (http://conduct.uoregon.edu). This code represents a compilation of important regulations, policies, and procedures pertaining to student life. It is intended to inform students of their rights and responsibilities during their association with this institution, and to provide general guidance for enforcing those regulations and policies essential to the educational and research missions of the University.

CONFLICT RESOLUTION
The mission of the College of Education is to “Make educational and social systems work for all.” Several options, both informal and formal are available to resolve conflicts for students who believe they have been subjected to or have witnessed bias, unfairness or other improper treatment. Within the College of Education, you can contact: Ron Beghetto, Associate Dean for Academic Affairs: (541) 346-1534, or beghetto@uoregon.edu, or Surendra Subramani, Interim Diversity coordinator (541) 346-1473, or Surendra@uoregon.edu.
Outside the college, you can contact:
UO Bias Response Team: 346-1139 or http://bias.uoregon.edu/
UO Conflict Resolution Services 346-0617 or http://uodos.uoregon.edu/SupportandEducation/ConflictResolutionServices/tabid/134/Default.aspx
UO Affirmative Action and Equal Opportunity: 346-3123 or http://aaeo.uoregon.edu/

DIVERSITY
It is the policy of the University of Oregon to support and value diversity. To do so requires that we:

- respect the dignity and essential worth of all individuals.
- promote a culture of respect throughout the university community.
- respect the privacy, property, and freedom of others.
- reject bigotry, discrimination, violence, or intimidation of any kind.
- practice personal and academic integrity and expect it from others.
- promote the diversity of opinions, ideas and backgrounds which is the lifeblood of the university.

DOCUMENTED DISABILITY
Appropriate accommodations will be provided for students with documented disabilities. If you have a documented disability and require accommodation, arrange to meet with the course instructor within the first two weeks of the term. The documentation of your disability must come in writing from the Disability Services in the Office of Academic Advising and Student Services. Disabilities may include (but are not limited to) neurological impairment, orthopedic impairment, traumatic brain injury, visual impairment, chronic medical conditions, emotional/psychological disabilities, hearing impairment, and learning disabilities. For more information on Disability Services, please see http://ds.uoregon.edu/

EXPECTED CLASSROOM BEHAVIOR
Classroom expectations include:
- Participating in class activities
- Respecting the diversity of cultures, opinions, viewpoints in the classroom
- Listening to fellow students, professors, and lecturers with respect
- Arriving on time, prepared for class
- Attending for the duration of class; not reading other materials, books, newspapers

Racist, homophobic, sexist, and other disrespectful comments will not be tolerated.

GRIEVANCE
A student or group of students of the College of Education may appeal decisions or actions pertaining to admissions, programs, evaluation of performance and program retention and completion. Students who decide to file a grievance should follow the student grievance procedure, or alternative ways to file a grievance outlined in the Student Grievance Policy (https://education.uoregon.edu/academics/student-grievance) or enter search: student grievance.

INCLEMENT WEATHER
In the event the university operates on a curtailed schedule or closes, UO media relations will notify the Eugene-Springfield area radio and television stations as quickly as possible. In addition, a notice regarding the university’s schedule will be posted on the UO main home page (in the “News” section) at http://www.uoregon.edu.
If an individual class must be canceled due to inclement weather, illness, or other reason, a notice will be posted on Blackboard or via email. During periods of inclement weather, please check Blackboard and your email rather than contact department personnel. Due to unsafe travel conditions, departmental staff may be limited and unable to handle the volume of calls from you and others.

**COURSE SCHEDULE**

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<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Reading and Assignments</th>
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<tbody>
<tr>
<td>1) Mar 31</td>
<td>HLM I concepts in R (two-level cross-sectional/longitudinal models)</td>
<td>R tutorials (see above)</td>
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<tr>
<td>2) Apr 7</td>
<td>HLM I concepts in R (three-level cross-sectional/longitudinal models)</td>
<td>Graphing lab w/Tyler</td>
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<td>3) Apr 14</td>
<td>HLM I concepts in R (categorical data)</td>
<td>Long et al., 2009 (on BB)</td>
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<td>4) Apr 21</td>
<td>New concepts in HLM &amp; R (multiple imputation-HLM, cross-classified models, statistical power w/OD)</td>
<td>Raudenbush &amp; Bryk Chapter 12 (pp. 373-398)</td>
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<td>5) Apr 28</td>
<td>New concepts in R (multiple imputation-R and model estimation)</td>
<td>Raudenbush &amp; Bryk Chapter 14 (pp. 436-465)</td>
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<td>6) May 5</td>
<td>New concepts in R (NMAR models)</td>
<td>Hedeker &amp; Gibbons, 1997 (BB)</td>
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<td>7) May 12</td>
<td>Introduction to Mplus (syntax, correlation/regression, mediation, moderation, multiple imputation)</td>
<td><strong>First Analysis Due</strong></td>
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<td>8) May 19</td>
<td>Mplus (growth curves, discontinuous growth models, time-varying covs)</td>
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<td>9) May 26</td>
<td>Mplus (NMAR, random effects models)</td>
<td><strong>Second Analysis Due</strong></td>
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<td>10) Jun 2</td>
<td>Mplus (multilevel modeling)</td>
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<td>11) Jun 8-12</td>
<td>Finals Week</td>
<td><strong>Third Analysis Assignment Due Wednesday at 5pm</strong></td>
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