

363  
PK

RECEIVED  
MAR 10 2015  
WSU Registrar

Washington State University  
MAJOR CURRICULAR CHANGE FORM - - NEW/RESTORE COURSE

- Please attach rationale for your request, a complete syllabus, and explain how this impacts other units in Pullman and other campuses (if applicable).
- Obtain all required signatures with dates.
- Provide original stapled packet of signed form/rationale statement/syllabus PLUS 10 stapled copies of complete packet to the Registrar's Office, campus mail code 1035.
- Submit one electronic copy of complete packet to [wsu.curriculum@wsu.edu](mailto:wsu.curriculum@wsu.edu).

odd years?

Requested Future Effective Date: Spring 2017 (term/year) Course Typically Offered: Spring every other year  
 DEADLINES: For fall term effective date: **October 1<sup>st</sup>**; for spring or summer term effective date: **February 1<sup>st</sup>**. See instructions.  
 NOTE: Items received after deadlines may be put to the back of the line or forwarded to the following year. Please submit on time.

**New Course**

Temporary Course

Restore Course

ED PSYCH

575

Multilevel Modeling

course subject/crosslist

course no.

title

3 (3 - ) ED PSYCH 565; suggested ED PSYCH 569

Credit hrs

lecture hrs  
per week

lab or studio  
hrs per week

prerequisite

Description for catalog: The course will provide an introduction to multilevel modeling techniques and examine the use of these techniques in the social sciences

Additional Attributes: Check all that apply.

Crosslisting (between WSU departments)\*

Conjoint listing (400/500): \_\_\_\_\_

Variable credit: \_\_\_\_\_

Repeat credit (cum. max. hrs): \_\_\_\_\_

Special Grading:  S, F;  A, S, F (PEACT only);  S, M, F (VET MED only);  H, S, F (PHARMACY, PHARDSCI only)

Cooperative with UI

Other (please list request ): \_\_\_\_\_

The following items require prior submission to other committees/depts. (SEE INSTRUCTIONS.)

Request to meet Writing in the Major [M] requirement (Must have All-University Writing Committee Approval.)

Request to meet UCORE in \_\_\_\_\_ (Must have UCORE Committee Approval >> See instructions.)

Special Course Fee \_\_\_\_\_ (Must submit request to University Receivables.)

Contact: Brian French/Lynn Buckley Phone number: 335-8584 Campus mail code: 2136

Email: frenchb@wsu.edu/buckleyl@wsu.edu Instructor, if different: \_\_\_\_\_

A. Chinn 2/13/15

Chair/date

M. Ruder 3-3-15

Dean/date

All-University Writing Com / date

Chair (if crosslisted/interdisciplinary)\*

Dean (if crosslisted/interdisciplinary)\*

UCORE Committee Approval Date

Catalog Subcommittee Approval Date

GSC or AAC Approval Date

Faculty Senate Approval Date

\*If the proposed change impacts or involves collaboration with other units, use the additional signature lines provided for each impacted unit and college.

French, B. F.  
Educational Leadership, Sports Studies, Educational / Counseling Psychology

**New Course Description and Rationale:**

ED PSYCH 575: Multilevel Modeling

**Description (20 words or less):**

The course focuses on the understanding of multilevel models, assumptions, and research questions in the social and behavioral sciences.

**Rationale:**

The advanced doctoral topic titled *Multilevel Modeling* has been covered twice since the Spring semester of 2010 in an advanced doctoral seminar as a special topics course. This advanced course will be offered every other year. Students enroll in the course from various areas around campus. The demand for the course across campus is high given the use of these modeling techniques in education, sociology, psychology, business, and organizational research. The course adds to a series of other Educational Psychology courses focused on educational and psychological measurement, statistics, and research methodology.

This doctoral level course provides students with the technical foundation and computer software training necessary to conduct multilevel modeling in their area. For doctoral students to gain a significant background in these techniques and to appropriately conduct such analyses continues to be difficult, as some graduate schools do not offer a semester long course on the topic. There is no such course on the WSU campus.

Multilevel modeling is essential in areas such as educational research where data structures exist that violate the assumption of independence for situations such as students being sampled or nested in classrooms. The focus of the course is on understanding these models, their assumptions, and practical aspects of developing models to address research questions and interpreting the results. Examples will be focused on educational outcomes with other examples from various areas in the social and behavioral sciences. By focusing on (a) understanding the basic components of multilevel models, (b) practical applications, and (c) examination of methodological issues student leave the course prepared to apply this modeling technique to their area of work. Emphasis is placed on the application of the methods. In the course, the student will (a) develop skills to conduct multilevel analysis and (b) critically review the use of multilevel analysis in research. Doctoral students need to be properly trained to be quality consumers and producers of multilevel modeling research, especially given the increase of its use in many areas. This course is focused on providing such training.

This course is not expected to impact other units with the college or across campuses.

EDPSY 575– Multilevel Modeling  
Spring, Tuesday 1:10-4:00pm, Cleveland 63

**Instructor:** Brian French, Ph.D.

**Office:** Cleveland 362

**Office Hours:** Wednesday 9:30-10:30 or by appointment

**Telephone:** 335-8584

**Email address:** [frenchb@wsu.edu](mailto:frenchb@wsu.edu)

**Web:** Angel System

*Prerequisites:*

Previous coursework covering regression and knowledge of basic regression and multivariate analysis. Basic data analysis and statistical software experience is assumed. **Courses:** Ed PSYCH 565; suggested Ed PSYCH 569.

*Purpose:*

Assuming you are familiar with linear regression, multilevel versions of these models will be introduced. Multilevel or hierarchical models are used when the units of observation (e.g., students) are grouped within clusters (e.g., schools). With such data structures, observations for the same cluster (e.g., school) cannot be assumed to be mutually independent as required by conventional linear regression, for example. To allow for the fact that responses within the same cluster tend to be more homogenous to each other compared to responses from other clusters, multilevel models include cluster-specific random effects. Such models are also known as hierarchical models, (generalized) linear mixed models, random coefficient models, and variance components models. Longitudinal or repeated measures data can be thought of as clustered data with measurement occasions clustered within subjects. Multilevel models for longitudinal data are also known as growth curve models.

The focus of the course will be on understanding these models, their assumptions, and practical aspects of developing models to address research questions and interpreting the results. Examples will be focused on educational outcomes with other examples from various areas in the social and behavioral sciences.

The course will provide a general introduction to multilevel modeling techniques and examine the use of these techniques in the social sciences. The course focuses on (a) understanding the basic components of multilevel models, (b) practical applications, and (c) examination of methodological issues. Emphasis will be placed on the application of the methods. In the course, the student will (a) develop skills to conduct multilevel analysis and (b) critically review the use of multilevel analysis in research.

*Learning Outcomes:*

*Learning Outcomes* of the course are to enable the student to:

1. Learn key concepts underlying multilevel modeling, as demonstrated through homework assignments.
2. Understand research studies using multilevel modeling.
3. Become familiar with using software for multilevel modeling, as demonstrated through homework assignments.
4. Conduct analysis using at least one multilevel model, as demonstrated through homework assignments and the course project .
5. Present results, as well as interpret and discuss the findings, as demonstrated through homework assignments and class presentation.
6. Be familiar with topics such as latent multilevel models, growth modeling, longitudinal models, as demonstrated through discussion in class and homework assignments.

*Texts and Readings*

There is one required text. We will supplement this with primary readings from various sources. The student is encouraged to consult the additional texts for further discussions of issues. Readings may be added or deleted as necessary. We will also read several journal articles both in application and in methodology development.

1. Hox, J.J. (2010). *Multilevel Analysis: Techniques and Applications* (2nd ed.). New York: Routledge.

*Software:*

Computer lab work is a component of the course. This will give the student the opportunity to apply what is discussed in class. Students will be exposed to SAS, LISREL, SPSS, and possibly HLM. A student version of LISREL and HLM can be downloaded for free (<http://www.ssicentral.com>). LISREL and SAS will be available in the lab.

*Grades:*

Grades will be based on (a) participation in class discussions (20%), (b) in-class presentations (20%), (c) homework assignments (20%), and (d) final project (40%). Attendance is expected. Please notify the instructor in advance, if possible, if you are unable to attend class. As a seminar, students are expected to actively participate in class. You are responsible for the material covered during any class you miss. You are encouraged to work together and assist each other with the course material and assignments. However, all assignments should be your own work. Academic honesty is expected. **Please note that grading in Table 1 is only in whole numbers. Standard rounding rules apply.**

## Course Grading Standards:

Table 1

*Grade Scale For The Course Displaying Percent Associated With Letter Grade*

Grade	Percent
A	100 - 93%
A-	92 - 90%
B+	89 - 87%
B	86 - 83%
B-	82 - 80%
C+	79 - 77%
C	76 - 73%
C-	72 - 70%
D+	69 - 67%
D	66 - 60%
F	59% or below

*Assignments:*

There will be at least five computer homework assignments during the semester. The data and further information will be provided regarding these assignments throughout the semester. Data and sample code files will be available via course folders access via your computer.

*Presentations:*

Starting 2/8, Students in pairs will lead the class in a discussion of an article they find using Multilevel modeling in their area of research. You will give the article to the instructor the week before for the class to read. The pair is responsible for giving a summary of the article and some critique thoughts. The remainder of the class will ask questions and discuss this. This exercise will allow us to see these methods in action. I will make the articles available for your colleagues via Angel or our course folder. The second presentation will cover your final project at the end of the semester.

*Final Project:*

This is an opportunity to demonstrate what you have learned throughout the semester. The project involves conducting a multilevel analysis on data that are of interest to you. The dataset can be obtained from one of your professors, colleagues, a public dataset, or one that you have collected. A methodological study (i.e., simulation study) of an aspect of multilevel analysis also is acceptable. If you have questions about a data source, please ask. Projects will be presented to the class at the end of the semester. You may work in groups of 2-3 persons if you would like. Your written report is **due on 4/26**.

The project must be typed and follow APA format (6<sup>th</sup> edition). The APA style manual is available at the bookstores and in the reference section of the library. Font size should be no smaller than 10 or larger than 12 point. Page margins should be 1.0 inch. The paper should be no more than 12 pages double-spaced excluding references, tables, and output. The paper should be written in a form suitable for publication or submission for a conference paper in your area. Computer program and output from the analysis must be provided with the paper. More details will be given in class. Please proof read carefully. Incorrect grammar and misspelled words are unacceptable. Late assignments will not be accepted.

American Psychological Association. (2009). *Publication manual of the American Psychological Association (6th ed.)*. Washington, DC: Author.

*Cell and Smart Phones/Beepers/PDAs*

Any student carrying a cell phone/beeper or other PDA should turn it off or set it to vibrate during class. In the event that a student must remain “on-call” during class, they should plan to sit where they can easily leave the room without disturbing others.

We are also in a computer lab. Please do not surf the web, email, read the news, etc. It is distracting, rude, and disrespectful to your colleagues.

*Academic Integrity*

Academic integrity is the cornerstone of the university. Any student who attempts to gain an unfair advantage over other students by cheating, will fail the assignment and be reported to the Office Student Standards and Accountability. Cheating is defined in the Standards for Student Conduct WAC 504-26-010 (3). Attention to this policy is particularly important in a course like EDPSY/EDRES 565, in which collaboration with other students is encouraged. If, for example, you work closely with other students during the planning, execution, or interpretation of your data analyses – a process that I support – you should make sure that the other students’ contributions are recognized explicitly in your written account. **Academic dishonesty is not tolerated and will result in action (i.e., failing the assignment and/or course depending on the nature of the offense) in accord with the policy.** Please contact me if you have questions with this issue.

*Disability Accommodations*

Students with Disabilities: Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center. For more information contact a Disability Specialist on your home campus:

**Pullman or WSU Online:** 509-335-3417 <http://accesscenter.wsu.edu>, [Access.Center@wsu.edu](mailto:Access.Center@wsu.edu)

*Emergency Notification System*

Washington State University is committed to enhancing the safety of the students, faculty, staff, and visitors. It is highly recommended that you review the Campus Safety Plan (<http://safetyplan.wsu.edu/>) and visit the Office of Emergency Management web site (<http://oem.wsu.edu/>) for a comprehensive listing of university policies, procedures, statistics, and information related to campus safety, emergency management, and the health and welfare of the campus community.

**575 Schedule (subject to change in necessary): Readings may be added or changed as needed. Changes may occur due to Official University Holidays**

Week	TOPIC	ASSIGNMENT DUE/READINGS
1	Course Overview; Lecture on context of MLM	General introductions to MLM use in contexts
2	Introduction to multilevel analysis	Hox: Ch 1; Aitkin et al, 1981; Rumberger & Palardy, 2004;
3	The basic two-level model	Hox: Ch 2; Seltzer, 2004
4	Estimation, Deviance, Model fit	Hox: Ch 3; McCoach & Black, 2008; Singer 1998—top to p. 339
5	Methodology issues (e.g., Centering)	Hox: Ch 4; Enders & Tofighi, 2007
6	Observed Longitudinal and growth models	Hox: Ch 5, Hedeker, 2004; Singer p. 339 and forward
7	Cross-classified models	Hox: Ch 9; Beretvas, 2008
8	Sample size; Estimation issues	Hox: Ch 12,
9	Statistical power; Software for designs	Spybrook, 2008; Optimal Design manual/software; <b>DUE: project outline and references</b>
10	Latent Multilevel Models (LMM)	Hox: Ch 14, Ch15
11	Latent Growth Models	Hox: Ch 16; Byrne & Crombie, 2003; Hancock & Lawrence, 2006
12	Latent Profile/Class Models in MLM	Finch & French, <i>in press</i> ; Henry & Muthén, 2010
13	Latent Transition Models in MLM	Lanza, Bray, & Collins, 2013
14	Reporting and Software	Ferron et al, 2008; Roberts, 2008 <b>Final Project Written Report DUE</b>
15	Student led-lecture	<b>Readings assigned 1 week prior.</b>
16	Final	Time TBA

## References

- Aitkin, M., Anderson, D. Hinde, J. (1981). Statistical modeling of data on teaching styles. *Journal of the Royal Statistical Society, A*, 144, 419-461.
- Beretvas, S. N. (2008). Cross-classified random effects models. In A. A. O'Connell & D. B. McCoach (Eds). *Multilevel Modeling of Educational Data*, pp. 161-198. Greenwich, CN: Information Age Publishing.
- Byrne, B. M. & Crombie, G. (2003). Modeling and testing change: An introduction to the latent growth curve model. *Understanding Statistics*, 2, 177-203.
- Enders, C. K. & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods*, 12, 121-138.
- Ferron, J. M., Hogarty, K. Y., Dedrick, R. F., Hess, M. R., Niles, J. D., & Kromrey, J. D. (2008). Reporting results from multilevel analyses. In A. A. O'Connell & D. B. McCoach (Eds). *Multilevel Modeling of Educational Data*, pp. 391-426. Greenwich, CN: Information Age Publishing.
- Finch, W. H., & French, B. F., (in press) Multilevel latent class analysis: parametric and nonparametric models, *Journal of Experimental Education*.
- Hancock, G. R., & Lawrence, F. R. (2006). Using latent growth models to evaluate longitudinal change. In G. R. Hancock & R. O. Muller (Eds.), *Structural Equation Modeling: A second course*, pp.171-196. Greenwich, CN: Information Age Publishing.
- Hedeker, D. (2004). An introduction to growth modeling. In D. Kaplan (Ed.), *Handbook of Quantitative Methodology for the Social Sciences*, pp. 215-234. Thousand Oaks, CA: Sage Publications.
- Henry, K. L., Muthén, B. (2010). Multilevel latent class analysis: An application of adolescent smoking typologies with individual and contextual predictors. *Structural Equation Modeling*, 17, 193-215. DOI: 10.1080/10705511003659342.
- Lanza, S. T., Bray, B. C., & Collins, L. M. (2013). An introduction to latent class and latent transition analysis. In J. A. Schinka, W. F. Velicer, & I. B. Weiner(Eds.), *Handbook of psychology* (2nd ed., Vol. 2, pp. 691-716). Hoboken, NJ: Wiley.
- McCoach D. B., & Black A. C., (2008). Evaluation of model fit and adequacy. In A. A. O'Connell & D. B. McCoach (Eds). *Multilevel Modeling of Educational Data*, pp. 245-272. Greenwich,: CN: Information Age Publishing.
- Roberts, J. K., & McLeod, P. (2008). Software options for multilevel models. In A. A. O'Connell & D. B. McCoach (Eds). *Multilevel Modeling of Educational Data*, pp. 427-468. Greenwich, CN: Information Age Publishing.
- Rumberger, R. W. & Palardy, G. J. (2004). Multilevel models for school effectiveness research. In D. Kaplan (Ed.), *Handbook of Quantitative Methodology for the Social Sciences*, pp. 235-258. Thousand Oaks, CA: Sage Publications.
- Seltzer, M. (2004). The use of hierarchical models in analyzing data from experiments and quasi-experiments conducted in field settings. In D. Kaplan (Ed.), *Handbook of Quantitative Methodology for the Social Sciences*, pp. 259-280. Thousand Oaks, CA: Sage Publications.
- Singer, J. D. (1998). Using SAS PROC MIXED to fir multilevel models, hierarchical models, and individual growth models. *Journal of Educational and Behavioral Statistics*, 24, 323-355.
- Spybrook, J. (2008). Power, sample size, and design. In A. A. O'Connell & D. B. McCoach (Eds). *Multilevel Modeling of Educational Data*, pp. 273-311. Greenwich, CN: Information Age Publishing.