Course Syllabus

Title: Seminar in Psychology: Statistical Modeling for Latent Variables
PSY 6930/7930: Section 001

Term: Spring 2014
Tuesdays and Thursdays: 9:30-10:45am

Location: University Hall – Room #1610

Credit Hours: 3

Instructor: Jon Elhai, Ph.D.
(419) 530-2829 (office)
Jon.elhai@utoledo.edu (e-mail)
www.jon-elhai.com

TA: Ateka Contractor
Ateka.Contractor@utoledo.edu

Office Hours: Tuesdays: 11:00am-12:00pm
University Hall (UH) – Room #1370

Required Reading: Kline, R. B. (2010). Principles and practice of structural equation modeling (3rd Ed.). New York: Guilford. Note: this book is available at the campus bookstore in the Student Union.

Byrne, B. M. (2011). Structural equation modeling with Mplus: Basic concepts, applications and programming. New York: Routledge. Note: this book is available at the campus bookstore in the Student Union.

Mplus Web Tutorial: http://www.ats.ucla.edu/stat/mplus/seminars/IntroMplus_CFA

Articles downloadable from this course's website: http://goo.gl/fcw4K

Required Software:
IBM SPSS Statistics Base software. SPSS is available on many campus computers. For students preferring to use SPSS at home, a 1-year license for SPSS' Statistics Base graduate pack can be purchased for about $70, through: www spss.com/gradpack. This version includes many statistics modules, including the cluster analysis and exploratory factor analysis features required for this course. Other, more advanced graduate pack versions of SPSS may be optionally licensed at that website as well.

Mplus. The Mplus Demo version is available at no charge from www.statmodel.com. The Demo version has all of the full (Combination) Mplus version's capability, but is limited to 6 dependent variables and 2 independent variables (which will be sufficient for this course). For students wanting to purchase a personal copy of Mplus for use in this course, the Mplus Base Program (offers regression, factor analysis, confirmatory factor analysis, path analysis and SEM) and Mixture Add-On (additionally includes latent class analysis and mixture modeling) is available to verified students for $240 (add-on modules for multilevel modeling are available, but not relevant to this course).

Course Description:
This course is a survey of latent variable statistical methods. Specifically, after briefly reviewing multiple regression and data screening methods, this course will focus on Exploratory Factor Analysis, Confirmatory Factor Analysis, Path Analysis, Structural Equation Modeling, Latent Class Analysis and Cluster Analysis, and Growth Curve and Mixture Modeling. Popular statistical software packages will be used, including SPSS and Mplus.

Prerequisites: Quantitative Methods for Psychology II (PSY 6110 or 7110) is a prerequisite for this course. Otherwise, special permission must be granted by the Instructor. Note: training on Multivariate Analysis of Variance (MANOVA) is not required before enrolling in this course.

Learning Objectives:

1. Students should identify the theory behind the statistical techniques covered in this course.
2. Students should explain the assumptions behind the statistical techniques covered in this course.
3. Students should be able to execute the statistical techniques covered in this course.

Course Policies and Procedures

1. Attendance: It is the responsibility of each student to attend all classes, and turn in all assignments on time. **Please do not arrive late to class!** Students are expected to contribute to class discussion – including asking questions of other students presenting their work. Attendance and participation are worth 20% of the final grade.

a. Classroom Environment. It is expected that the classroom environment will be peaceful and respectful. Having personal electronic devices in class, such as personal notebook computers and cell phones, is distracting. Please do not use such devices in class.

2. Exams: There will be one midterm exam, and a non-cumulative final exam. The exams will consist of short-answer essay questions, and computer-based tests of applied knowledge in analyzing datasets. Exam material will be taken from the textbooks, articles/book chapters and lectures. Each exam is worth 35% of the final course grade. **No makeup exams will be given.** If an exam must be missed due to extremely extenuating circumstances, let the instructor know as soon as possible.

3. Homework: Several homework assignments will be required (10% of your grade). These exercises will help consolidate the material in small chunks of information, and will demonstrate competence regarding the statistical analyses. Homework exercises will be due on the subsequent Monday; students should bring their completed homework to class for discussion. Homework exercises will be available for view at: goo.gl/fcw4K

4. Grading:

Grading scale

A	93-100	A-	90-92	B+	87-89
B	83-86	B-	80-82	C+	77-79
C	73-76	C-	70-72	D+	67-69
D	63-66	D-	60-62	F	< 60

Grades will be based on the Midterm Exam (35%), Final Exam (35%), Homework (20%), and Class Attendance (10%).

No other grades will be given except as noted above. If a student is doing poorly in the course (by not attending or by failing to submit assignments), it is the student's responsibility to drop or withdraw from the course before the appropriate deadline. If it is too late to drop or withdraw from the course, a mark of "Incomplete" will not be assigned; rather the student will be assigned the actual grade earned.

5. Academic Honesty: Department of Psychology Statement on Academic Honesty - Academic honesty is expected from students enrolled in courses and programs offered by the Department of Psychology; violations of this expectation will not be tolerated.

Violations of the expectation of academic honesty include, but are not limited to:

* Obtaining or attempting to obtain a copy of an examination prior to its administration.
* The unauthorized use of study material or textbooks during an examination.
* Obtaining unauthorized assistance from and giving unauthorized assistance to another individual during an examination or completion of an assignment.

* Plagiarism in written assignments. Plagiarism includes: (a) using, copying or paraphrasing another author's materials without appropriate acknowledgment through quotation and citation; (b) unauthorized collaboration in the preparation of reports, term papers, or theses.

In accordance with the Policy Statement in the University Catalog, instructors have the responsibility and right to bring cases of alleged dishonesty to department, college, and university administrative units. Students involved in academic dishonesty may expect to receive a grade of F on specific assignments, as well as in the course where the assignment was made.

Student Behavior - Students are expected to follow University policy with regards to proper conduct in the classroom, as detailed in the University of Toledo Student Handbook (See http://www.utoledo.edu/studentaffairs/dos/ for details.) Disciplinary action for violation of these policies will be decided on a case by case basis and will be in accord with University policy.

6. Class Communication: the Instructor will communicate to students by email about class announcements, changes to the course schedule (including class cancellations), and grades. **It is the student's responsibility to check their UT email account daily for such announcements.**

7. Additional Ground Rules: 1) Grade disputes must be submitted in writing in order to be considered. 2) Grievances about the course and/or Instructor should be brought up with that individual first in order to resolve the matter, prior to discussing the matter with the department/university's administration.

8. Office of Accessibility. Students registered with the Office of Accessibility for a disability must discuss possible accommodations with the Instructor during the first week of class in order to allow such accommodations to occur.

9. Title IX. Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find the appropriate resources here ...

Complaints can be reported online:
UT's Title IX coordinator: https://www.utoledo.edu/offices/oid/title-ix/index.html

Other resources:
UT's Student Counseling Center: https://www.utoledo.edu/studentaffairs/counseling/
UT Campus Police: https://www.utoledo.edu/depts/police/index.html
UT Sexual Assault Education and Prevention Program: www.utoledo.edu/studentaffairs/SAEPP
YWCA Battered Women's Shelter: www.ywcanwo.org/

Schedule of Classes and Readings (The assigned chapter should be read **before** each class)

Week	Note	Required Reading	Class Session	Activity Due
1/6		-K-Ch. 1-2	-Introduction -Choosing Appropriate Statistics -Review of Univariate Statistics	
1/13		-K-Ch. 3 -Graham Article	-Screening Data/Missing SEM Data -Matrix Algebra	
1/20			-Review of Linear and Logistic Regression in SEM	
1/27		-Fabrigar Article	-Exploratory Factor Analysis	Homework 1: Logistic Regression
2/3		-K-Ch. 5-6	-Theory Behind Structural Equation Modeling (SEM)	Homework 2: EFA
2/10		-K-Ch. 7-8	-Theory and Application of SEM	
2/17		-B-Ch. 1-2 -Mplus Web Tutorial	-Mplus Tutorial	
2/24			-Path Analysis	
3/3	**SPRING BREAK**		**No Class Tuesday and Thursday**	Homework 3: Path Analysis
3/10		-K-Ch. 9 -B-Ch. 3-5	-Confirmatory Factor Analysis	Homework 4: CFA (by end of week)
3/17		-Gregorich Article -Meredith Article -K-Ch. 10 -B-Ch. 6-9	**-Midterm Exam (Tuesday)** -Measurement Invariance	
3/24	**CONFERENCE TRAVEL**		-Structural Regression Models **No Class Thursday**	
3/31		-K-Ch. 13 -Muthen & Muthen Article	-MIMIC Models -Problems Found in Using SEM -Power -Cluster Analysis	
4/7		-Muthen (2001) Article	-Latent Class Analysis (LCA)	
4/14		-K-Ch. 11 -B-Ch. 11 -Muthen (2004) Article	-Growth Modeling	Homework 5: LCA
4/21			-Growth Mixture Modeling	
4/28			**4/29 (9:30am-12pm) - FINAL EXAM**	

Note: This syllabus may be appended by the instructor if necessary. Students are responsible for any changes made.

Recommended Texts (for further information on related content, but not required for this course):

Multivariate Statistics (general resource)

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, Massachusetts: Allyn and Bacon.

Mplus Software

Muthén, L. K., & Muthén, B. O. (1998-2010). *Mplus user's guide* (6th ed.). Los Angeles, California: Muthén & Muthén. Downloadable at no charge from: http://www.statmodel.com/ugexcerpts.shtml

Mplus Video Tutorials: http://www.statmodel.com/course_materials.shtml

Effect Size and Power in Latent Variable Modeling

Muthén, L. K., & Muthén, B. O. (2002). How to use a Monte Carlo study to decide on sample size and determine power. *Structural Equation Modeling, 4*, 599-620.

Exploratory Factor Analysis

Sass, D. A., & Schmitt, T. A. (2010). A comparative investigation of rotation criteria within exploratory factor analysis. *Multivariate Behavioral Research, 45*, 73-103. doi: 10.1080/00273170903504810

Confirmatory Factor Analysis/Path Analysis/SEM

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55.

Bollen, K. A. (1989). *Structural equations with latent variables*. New York City: John Wiley & Sons. (for an advanced understanding)

Mixture Modeling/Latent Class Analysis

Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling, 14*, 535-569.

Muthén, B. O. (2008). Latent variable hybrids: Overview of old and new models. In G. R. Hancock & K. M. Samuelsen (Eds.), *Advances in latent variable mixture models* (pp. 1-24). Charlotte, North Carolina: Information Age Publishing, Inc.