Scale Development Methods
HBEH 852 – Spring 2019

Instructor: Marcy Boynton, PhD
Research Assistant Professor
Department of Health Behavior
Gillings School of Global Public Health

Office: Rosenau 309
Office phone: (919) 886-7164
E-mail: mhb23@unc.edu

Teaching Assistant: Susannah Zietz: zietz@live.unc.edu

Class Hours: Tuesdays and Thursdays, 9:30-10:45 AM
Class Location: McGavren Greenberg (McG) 1303

Office Hours: Dr. Boynton: TBD and by appointment (Rosenau 309)
Susannah Zietz: TBD

Course Objectives

The purpose of this course is to provide students with a foundational theoretical knowledge of psychological assessment and a skills-oriented understanding of common qualitative and quantitative analytical techniques for scale construction. A secondary course objective is to expose students to structural latent variable models and related advanced latent variable modeling techniques relevant to scale development.

Course Readings

Every week there will be one to two required course readings. You are expected to keep up with these readings, as they provide necessary foundational knowledge needed to fully benefit from the class lectures and discussions. Readings are listed at the back of the syllabus in the course schedule. Articles will be posted as PDF documents on Sakai. Many of the required readings throughout the semester will be from the following two books:

DeVellis, R.F. (2017). Scale Development: Theory and Applications (4th Edition). Thousand Oaks, CA: Sage Publications, Inc.

Brown, T. A. (2015). Confirmatory Factor Analysis for Applied Research (2nd Edition). New York, NY: The Guilford Press.

Course Software

We will use M*plus* as our statistical analysis program. You are not required to purchase this software, but you will need to have access to it inside and outside of class. One means of access is through UNC's ITS Virtual Lab: http://help.unc.edu/help/how-do-i-log-on-to-virtual-lab/)

Muthén, L. K., & Muthén, B. O. (1998-2017). Mplus User's Guide. Sixth Edition. Los Angeles, CA: Muthén & Muthén.

Coursework

Homework (40% of grade). There will be two homework assignments due over the course of the semester. The purpose of these assignments is to provide hands on skills building experience. For each assignment, detailed instructions with a grading rubric will be provided.

Cognitive Interview Assignment. You will be asked to write a brief summary describing a research topic of interest that gives context to a set of survey measures of your own design. For these measures, you will develop a cognitive interview guide and administer a set of cognitive interviews. You will write up the results of your interviews in the form of a cognitive interview report.

Factor Analysis Assignment. You will be provided a dataset that you must analyze using M*plus* to answer a set of factor analysis questions. You will be provided example syntax during lecture that you can adapt to complete the assignment.

Quizzes (5 @ 4% each = 20% of grade). Six in class quizzes will be administered on a biweekly basis (see course schedule for quiz dates). Each student will be able to drop their lowest quiz grade. Quiz makeups will generally not be permitted.

Project (40% of grade). You will need to develop and implement a project idea that elaborates on one or more aspects of this course. Your project can touch on any number of aspects of this course, but should be independent from your homework assignment work. Your project can be qualitative, quantitative, or both. It should ideally have some sort of applied skills implementation aspect. There are three components to the project—details on the specific requirements for each will be provided in class:

Proposal. This is a brief document that describes the issue that you are tackling and the methods that you propose. The proposal should be responsive to the feedback received during the student proposal brainstorming session.

Presentation. On the last week of class you will do a 10 minute presentation outlining the findings from your project. Details on the specific requirements of the presentation will be provided in class.

Paper. Your paper will present the results of your project. You may include figures or tables as needed.

It is strongly encouraged that you check in with the TA or instructor regarding your project idea prior to the student proposal brainstorming session.

Course Grades

Grades will be calculated based on the following rubric:

Quizzes	5 @ 4%	20%
Homework	2 @ 20%	40%
Project proposal	10%	10%
Project presentation	10%	10%
Project paper	20%	20%

Grade	**%**
High pass (H)	96-100
Pass (P)	80-95.9
Low pass (L)	70-79.9
Fail (F)	≤ 69.9

Course Rules

Assignment due dates. The deadlines that I set in this course are designed to ensure that everyone keeps up with the material and course expectations, but with the understanding that the life of a doctoral student has many competing demands. Where possible I try to incorporate some limited flexibility on the assignment due dates, which gives everyone in the class the opportunity to be successful. If a situation arises where you need a few extra days to complete an assignment, please follow up with the instructor. With the exception of extraordinary circumstances, the project paper deadline and assigned project presentation date/time is firm.

Ethics. Academic dishonesty is the act of taking someone else's work or ideas and presenting them as your own, and can be deliberate or the result of carelessness. Any form of academic dishonesty in this course will result in either a failing grade for the assignment, failing grade for the course, or suspension from the University. Professional comportment is expected during lecture and in your interactions with instructors, TAs, and your fellow classmates. This includes regularly attending class and arriving on time.

Grade Changes. All requests for formal reevaluation of an assignment must be made in writing to the course instructor within one week after the graded assignment is returned. In your request, please note your specific reason for requesting the re-grade. After I review the written request, I will re-grade the assignment. When requesting a re-grade, please be aware that a score can increase *or decrease*, depending on my assessment of the entire assignment. All assignment re-grade scores are considered final.

Attendance. Attendance will be taken but not graded. If you know that you are going to be away, please try to let the TA or instructor know. We will be covering a great deal of material in a short amount of time. The readings will cover a lot of statistical and theoretical material that you will need to prepare for full participation in class and to successfully complete your assignments. In class we will be synthesizing content from your readings as well as covering a lot of practical skills that cannot be mastered other than in a "hands on" fashion. Some of the most technically challenging aspects of the course come at the very end of the semester. It is therefore critical to your academic success in this course that you regularly attend class and keep up with your work.

Accessibility Services

UNC offers accessibility support to all students from the office of Accessibility Resources and Services (ARS): https://accessibility.unc.edu/ If you have a documented disability or medical condition requiring resources and/or services, please contact ARS to set up an academic accommodation plan. If you have an accommodation plan, please schedule a time to meet with the course instructor to discuss how to meet your documented needs in a reasonable and appropriate manner. It is the responsibility of you the student to proactively follow up with the instructor about your accommodation needs.

A Couple of Notes

The assessment elements of this course are designed to be largely skills-oriented and student driven. Psychometric theory and statistical formulae will be covered to some extent in the readings and course lectures, but the primary goal of this course is the give you the practical knowledge and skills needed to develop psychometrically valid measures and well-crafted survey instruments.

If there is a problem that is keeping you from successfully engaging with this course, please set up a time to meet. I cannot help you if you do not let me know there is a problem. For instance, if you have a learning disability or significant medical problem I encourage you to let me know so that I can accommodate your needs. Furthermore, if there is a serious personal situation that you think will affect

your performance, let me know and I will try my best (within reason) to work something out with you. I will be maintaining regular office hours. Please feel free to stop by or to make an appointment to see me.

Health Resources

Medical health and professional counseling services are available both on and off campus. Listed below are the on-campus resources for mental health, physical health, and academic issues:

University Counseling and Mental Health Services (CAPS)

https://campushealth.unc.edu/services/counseling-and-psychological-services

First time visits to CAPS are done on a walk in basis, which means ***no appointment is needed if you decide that you would like to initiate mental health services at CAPS***.

UNC Campus Health Services: https://campushealth.unc.edu/

Hours: https://campushealth.unc.edu/about-us/hours

Monday 8:00 a.m. through Saturday 4:00 p.m. and Sunday 8:00 a.m. to 4:00 p.m.

Dean of Students Office: https://deanofstudents.unc.edu/carereport (919) 966-4042

COURSE SCHEDULE & ASSIGNED READINGS

Week		*Topics*	*In class exercise*	*Quiz date*	*Due date*
UNIT 1 – THEORY & QUALITATIVE METHODS					
Week 1		**MEASUREMENT**			
Th	01/10	Introductions & course overview			
Readings – None					
Week 2		**FUNDAMENTALS OF SURVEY DESIGN I**			
Tu	01/15	Defining a theoretical construct	Measures classification		
Th	01/17	Types of construct validity			
Required reading Devellis (2017), Chapter 4					
Week 3		**FUNDAMENTALS OF SURVEY DESIGN II**			
Tu	01/22	Developing an item pool	Item generation		
Th	01/24	The cognitive interview: theory and basic principles		Quiz 1	
Required reading Devellis (2017), Chapter 5					
Week 4		**COGNITIVE INTERVIEWING**			
Tu	01/29	The cognitive interview: guide development	Probe writing		
Th	01/31	The cognitive interview	Pilot CI guide		
Required reading Willis, G. B. (1999). Cognitive Interviewing: A "How To" Guide. Reducing Survey Error through Research on the Cognitive and Decision Processes in Surveys: Short course presented at the 1999 Meeting of the American Statistical Association					

Week		*Topics*	*In class exercise*	*Quiz date*	*Due date*
Week 5		**MEASURES ADAPTATION**			
Tu	02/05	Evaluating past scales, common adaptation issues, and ethical considerations			
Th	02/07	Assessing diverse populations		Quiz 2	

Required reading
Selected sections from Behling O, Law KS. (2000). Translating Questionnaires and Other Research Instruments: Problems and Solutions. Thousand Oaks, CA: Sage Publications Inc.

UNIT 2 – BASIC STATISTICAL TECHNIQUES FOR SCALE DEVELOPMENT

Week 6		**FOUNDATIONAL STATS REVIEW**			
Tu	02/12	OLS review			**COGNITIVE INTERVIEW ASSIGNMENT**
Th	02/14	Review of quantitative scale development methods			

Required reading
Hox, J. J. & Bechger, T. M. (2003). An Introduction to Structural Equation Modeling. *Family Science Review, 11,* 354-373.

Week 7		**RELIABILITY**			
Tu	02/19	Internal consistency			
Th	02/21	Methods for reducing measurement error		Quiz 3	

Required reading
Devellis (2017). Chapter 3

Sijtsma, K. (2009). On the use, the misuse, and the very limited usefulness of Cronbach's alpha. *Psychometrika,* 74(1), 107-120. doi:10.1007/s11336-008-9101-0

Optional reading
Dunn, T. J., Baguley, T., & Brunsden, V. (2014). From alpha to omega: a practical solution to the pervasive problem of internal consistency estimation. Br J Psychol, 105(3), 399-412. doi:10.1111/bjop.12046

Week 8		**SCALE DEVELOPMENT APPLICATIONS**			
Tu	02/26	Student proposal brainstorming session			
Th	02/28	Scale development using covariance matrices			**PROJECT PROPOSAL**

Required reading
Cai, L. (2012). Latent variable modeling. *Shanghai Archives of Psychiatry, 24(2),* 118-120. doi:10.3969/j.issn.1002-0829.2012.02.010

Stucky, B. D., Gottfredson, N. C., Panter, A. T., Daye, C. E., Allen, W. R., & Wightman, L. F. (2011). An item factor analysis and item response theory-based revision of the Everyday Discrimination Scale. *Cultur Divers Ethnic Minor Psychol, 17(2),* 175-185. doi:10.1037/a0023356

Week 9		**EXPLORATORY FACTOR ANALYSIS I**			
Tu	03/05	Principal components analysis			
Th	03/07	EFA: basic concepts	Mplus EFA example 1	Quiz 4	

Readings – see next page

Week		*Topics*	*In class exercise*	*Quiz date*	*Due date*
Required reading Devellis (2017). Chapter 6 Preacher, K. J., & MacCallum, R. C. (2003). Repairing Tom Swift's Electric Factor Analysis Machine. *Understanding Statistics, 2(1),* 13-43. doi:10.1207/S15328031US0201_02 *Optional reading* Brown (2015). Chapter 2					
Week 10		**NO CLASS – SPRING BREAK**			
UNIT 3 – ADVANCED STATISTICAL TECHNIQUES FOR SCALE DEVELOPMENT					
Week 11		**EXPLORATORY FACTOR ANALYSIS II**			
Tu	03/19	Interpreting EFA results & model fit			
Th	03/21	EFA applications	Mplus EFA example 2		
Required reading Brown (2015). Chapter 3					
Week 12		**CONFIRMATORY FACTOR ANALYSIS I**			
Tu	03/26	Basic concepts & the unidimensional model			
Th	03/28	Multidimensional model	Mplus CFA example 1	Quiz 5	
Required reading Brown (2015). Chapter 4					
Week 13		**CONFIRMATORY FACTOR ANALYSIS II**			
Tu	04/02	Model fit and respecification			
Th	04/04	Special models	Mplus CFA example 2		
Required reading Brown (2015). Chapters 5-6					
Week 14		**LATENT VARIABLE MODELING & PREDICTIVE VALIDITY**			
Tu	04/9	Fitting basic structural models			
Th	04/11	Extending the basic structural model	Structural model example	Quiz 6	
Required reading TBD					
Week 15		**REVIEW & ITEM RESPONSE THEORY**			
Tu	04/16	Project Q & A session			**FACTOR ANALYSIS ASSIGNMENT**
Th	04/18	Item response theory: An overview			
Required reading Harvey, R. J., & Hammer, A. L. (1999). *Item Response Theory*. The Counseling Psychologist, 27(3), 353–383.					

Week		*Topics*	*In class exercise*	*Quiz date*	*Due date*
Week 16		**CLASS PRESENTATIONS**			
Tu	04/23	Group 1 project presentations			
Th	04/25	Group 2 project presentations			
Readings – None					
Week 17		**FINALS WEEK**			
Fri	05/03	Project paper must be submitted by 12 noon			**PROJECT PAPER**