

## Psyc 602 – Psychometrics

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Class Meets: Mondays 2:00 – 4:30 PM  
Location: 429A Sewall Hall  
Office Hours: By appointment

### *Course Overview*

The purpose of this course is to provide you with an in-depth understanding of the theory and practice of psychological measurement. The course covers many different perspectives but probably would not be considered completely comprehensive. That is, in order to provide both a thorough enough treatment of the topics, I have had to sacrifice some areas that I feel you are less likely to encounter as psychologists. You will find, however, that the Nunnally and Bernstein text, along with the additional readings, will provide extensive coverage of most areas of psychological measurement. For those of you who are interested in what is not covered, I will not focus much on log-linear methods, conjoint measurement, or other strictly representational approaches to measurement. We will discuss these perspectives briefly, however, and I can certainly provide references for the seminal works in these areas.

### *Course Format*

There are three components to the course: First, I will try to provide an understanding of the purpose, meaning, and theory behind numerous psychometric methods. This material will be presented throughout the course and your knowledge and understanding of the material will be tested with a **Final Exam**. Supplementing the material on psychometric theory will be classes devoted to numerous applications. For these classes, we will meet in a computer lab and spend time figuring out exactly how to conduct the analyses for the psychometric techniques you have just learned. In my experience, this information is often left out of most statistics and measurement courses: you obtain a theoretical understanding without any idea of how to actually analyze data. In addition to getting exposure during class time to various statistical packages and procedures, you also will be assigned a series of **3 individual projects** that will require you to apply what you've learned to a realistic (yet fake) data set (I will provide more detail on these projects as they draw nearer).

The third and final component of the course will involve coming up with your own personal psychological measurement problem, solving it, and presenting the whole process to the class in a presentation format. This assignment is detailed below.

## Presentation

Many times, while immersing myself in a research project, I will come to realize that some aspect of the measurement process is not well covered by most traditional psychometric prescriptions. When examining the literature to see how other people have dealt with the issue at hand, I am often amazed to find that others completely sidestepped the issue either by ignoring the problem, by acknowledging the problem but claiming it was intractable, or by addressing it in a less than satisfactory manner.

One of the goals of this class is to encourage you not to do this. Instead of just giving up on a difficult measurement issue, it is usually possible to find an appropriate solution, or at least to find a method that is more appropriate than what is typically done.

I'm guessing that I am not alone in recognizing these difficult measurement issues, and I'm also guessing that these issues are present in pretty much every area of psychology. They may be somewhat difficult to identify, but most of you have undoubtedly come across some already. Thus, the first step in this project is to meet with me individually to help you identify a problem worthy of solving. If you know one right off the bat, that's fantastic, but I still want to meet with you to discuss it before you forge ahead. Because most of us cherish procrastination as if it were a lost dark art, I will go ahead and impose **September 29<sup>th</sup>** as the deadline by which you must have met with me **and** decided on a topic. So, if you are having difficulty coming up with something, *meet with me sooner rather than later* so that you will have time to nail something down. Please note that I have scheduled in time during class (**Oct. 2<sup>nd</sup>, 9<sup>th</sup>, and 30<sup>th</sup>**) where each of you can discuss your project ideas, ask questions to the class, and update us on your progress.

After you have selected an appropriate topic, you must then dig into the literature to try and find a solution. In a few cases, there may be no definitive answer. If this occurs, then you must be able to understand the plusses and minuses of the various alternative solutions. Once you have arrived at a workable solution (at least in theory), you must get to know the ins and outs of it well enough that you can easily describe it to someone else who is not familiar with the issue. This last part is particularly important because that is exactly what you will have to do at some point in late November to the rest of the class. Along with your presentation, I would like a written document (somewhere in the range of 5 to 10 single spaced pages) that also explains the problem and its solution and can be handed out to the entire class.

So at the end of this entire procedure, you will have the following to show for it:

- 1) You will have solved a psychological measurement issue in an area relevant to your own research.
- 2) You will retain the confidence that most, if not all, psychological measurement difficulties can be addressed.
- 3) You will have a lasting record, not only of your own issue, but also the issues from the rest of the class.
- 4) If your issue and its solution are compelling enough, you may have the beginnings of a publishable paper.

## Grading Policy

Final grades in this course will be calculated based on the following components:

Final Exam – 40%  
 Project 1 – 10%  
 Project 2 – 10%  
 Project 3 – 10%  
 Class Participation – 5%  
 Project and Presentation – 25%

Final Letter Grades will be distributed as follows:

100 – 98 % = A+	97% – 93% = A	92% – 90% = A-
89 – 87 % = B+	86% – 83% = B	82% – 80% = B-
79 – 77 % = C+	76% – 73% = C	72% – 70% = C-
69 – 67 % = D+	66% – 63% = D	62% – 60% = D-
59 – 0% = F		

## Course Schedule

DATE	TOPIC	ASSIGNMENT
8/28	Overview of Class	Nunnally & Bernstein (N&B; 1994), Chapter 1
9/4	<b>LABOR DAY</b>	<b>No CLASS</b>
9/11	Scaling and Systems of Measurement	N&B, Chapter 2; Judd & McClelland (1998), pp. 180-201; Stanislaw & Todorov (2000)
9/18	Validity	N&B, Chapters 3, 4, & 5
9/25	Finish Validity, Start Reliability	N&B, Go back over 3, 4, & 5; Chapters 6 & 7
10/2	Finish Reliability, Generalizability Theory	N&B, Chapters 6 and 7 <b>Discuss Project Topics in Class</b>
10/9	How to: Item and Scale Descriptives and EFA	N&B Chapters 11 and 12 <b>Hand out Project 1</b> <b>Discuss Project Topics in Class</b>
10/16	<b>FALL BREAK</b>	<b>No CLASS</b>
10/18	Item Writing, Scale Construction, and Study Design	N&B, Chapter 8; James (1998); Paulhus, Harms, Bruce, & Lysy (2003); Podsakoff, MacKenzie, Lee, & Podsakoff (2003)
10/23	How to: Reliability Analysis, CFA, and G-Theory analysis	N&B Chapter 13 <b>Hand out Project 2</b>

10/30	Special Topic in Psychometrics: Mediation and Moderation	Baron & Kenny (1986); MacKinnon, Lockwood, Hoffman, West, & Sheets (2002) <b>Discuss Progress on Projects</b>
11/6	Item Response Theory	Hambleton, Swaminathan, & Rogers (1991)
11/13	Test Bias	N&B, Chapter 9
11/20	How to: Test Bias (regression-based) and Item Bias (IRT)	<b>Hand out Project 3</b>
11/27	Student Presentations	
12/4	Student Presentations and prep for final	
12/?	<b>Final Exam</b>	

### *Reference List*

- Baron, R. M. & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality & Social Psychology*, *51*, 1173-1182.
- Hambleton, R. K., Swaminathan, H., & Rogers, H. J. (1991). *Fundamentals of item response theory*. Thousand Oaks, CA, US: Sage Publications, Inc.
- James, L. R. (1998). Measurement of personality via conditional reasoning. *Organizational Research Methods*, *1*, 131-163.
- Judd, C. M. & McClelland, G. H. (1998). Measurement. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.). *The handbook of social psychology*, Vol. 1 (4th ed.). (pp. 180-232). New York, NY: McGraw-Hill.
- MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*, *7*, 83-104.
- Nunnally, J. C. & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York, NY: McGraw-Hill.
- Paulhus, D. L., Harms, P. D., Bruce, M. N., & Lysy, D. C. (2003). The over-claiming technique: Measuring self-enhancement independent of ability. *Journal of Personality & Social Psychology*, *84*, 890-904.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*, 879-903.
- Stanislaw, H., & Todorov, N. (1999). Calculation of signal detection theory measures. *Behavior Research Methods, Instruments & Computers*, *31*, 137-149.