

Psychology 6323  
Spring 2017

## Psychometrics

**Instructor:** Osvaldo F. Morera, PhD  
**Office:** Room 212, Psychology Building  
**Phone** 747-5417  
**Office hrs:** Wednesdays from 9:45 am -11:45 am.  
**Email:** omorera@utep.edu  
**Lectures:** 1:30 pm – 2:50 pm, CRBL C304  
**Textbooks:** R.P. McDonald, *Test theory: a unified treatment*. Lawrence Erlbaum Associates, 1999.

There will also be readings, which will be distributed during class.

Reading 1: Selected chapters from Allen, M.J. & Yen, W.M. (1979). Introduction to Measurement Theory.

Reading 2: Sijtsma, K. (2009). On the use, misuse and very limited usefulness of coefficient alpha. *Psychometrika*, 74, 107-120.

### *Reading 2 Supplements:*

Cortina, J.M. (1993). What is coefficient alpha? An examination of theory and applications.

Morera, O.F. & Stokes, S.M. (in press). Coefficient  $\alpha$  as a measure of test score reliability: Review of Three Popular Misconceptions. *American Journal of Public Health*.

### Reading 3:

Selected chapters from Hambleton, R.K., Swaminathan, H. & Rogers, H. J. (1993). *Fundamentals of Item Response Theory*

### *Other Supplemental Readings*

MacCallum, R.C., Widamin, K.F., Zhang, S. & Hong, S. (1999). Sample Size in Factor Analysis. *Psychological Methods*, 4, 84-99.

MacCallum, R.C., Browne, M.W., & Sugawara, H.M. (1996). Power Analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, 1, 130-149.

### **Course Objective/Learning Objective:**

This course covers what is commonly referred to as classical test theory (theory of psychological measurement and theory of mental tests) and factor analysis. We will also cover factor analysis, multiple regression and modern test theory (item response theory).

The course is intended to provide you with the conceptual and technical skills needed to develop and evaluate psychological tests and measures. Moreover, this course will provide with the foundations for further study of measurement theory (i.e., an advanced course on Item Response Theory).

### **Course Prerequisites:**

It is assumed that you have knowledge of statistics through correlation and regression.

### **Evaluation:**

Course grades will be based on points earned from the following sources:

Homework assignments	25%
Midterm exam	25%
Final exam	25%
Course project	25%

### **Homework Assignments:**

Homework problem sets will usually be distributed during class and due 1 to 2 weeks later (depending on the length of the assignment). There should be between 8 – 10 homework assignments throughout the semester. Late homework assignments **will not be accepted**. If computer output is required for the homework, include only the part which is necessary for the solution and edit out any irrelevant output. Computer packages that will be used are SPSS, as well as some other software that accompanies the course text.

### **Exams:**

There will be one mid-term exam and a final exam. The midterm examination will cover material in the assigned readings, lectures and handouts up through Chapter 8 of the course text. The final examination will be comprehensive. The examinations will be closed-book and closed-notes, but will you be able to bring in a number of crib sheets to the exams. While the examinations are designed to be completed in the allotted time, I

made arrangements to find another room such that you can have extra time to complete the final exam (if needed). On the days of the examinations, we will report to Room 310 of Psychology.

## **Evaluation**

Although scores may be graded on a curve, I will grade no more conservatively than 85% or above equals an A. Scores between a 84% and a 70% will guarantee a B. Scores between a 69% and a 60% will guarantee a C. Scores between a 59% and a 50% will guarantee a D. Scores that are less than 50% will guarantee an F.

My “curving” consists of evaluating how you perform relative to everyone else in the class, while looking for gaps in the distribution to distinguish “A” students, “B” students and, if necessary, “C”, “D” and “F” students.

## **Course Project:**

The course project is an important part of this course, and as such, is worth 25% of the grade. You will be required to work in a group (of no smaller than 2 people and no more than 4 people). The project is described in further detail on another handout. Feel free to provide me with input concerning who you would like to with, but I will ultimately determine the make-up of each group.

The course project grade will consist of two components. The first part will consist of evaluations of an initial project proposal (5 points) and a final project proposal (10 points). The last part will consist of a 75 point paper that your group will turn in at the end of the class. The project grade will be the sum of these three components and is worth 90 points.

## **Course Project Homework:**

You **may** be required to make a class presentation (time permitting). This presentation would take place on **Thursday, April 27** and count as one of your homework assignments. All students **must** attend and participate in the class presentations.

## **Policy on Auditors**

Student and faculty auditors are welcome in the class, as long as they complete the required university audit form. However, my first priority is to the students who are registered for the class. Students in the class get first dibs on seats in the class. In addition, if we were to ever wind up in the Room 105 and seating in the room becomes a problem, registered students get first dibs on the 4 machines with *MPlus*/LISREL. I also ask that auditors not submit any homework assignments or take any exams, as it is

extra work on my part and the TA's part. If your attendance becomes sporadic, I expect that you will not slow down the class questions that were covered in prior lectures.

In short, your completion of the university audit form allows you the privilege of listening to the course material (and that is all). If your attendance requires additional time of my TA, additional time of myself or takes away from the learning experience from the registered students in the class, you should not audit this class.

## **Statistical Software**

The course will use SPSS for many of the analyses. You should have access to SPSS in your labs and in Room 105 of the Psychology Building. I will also be using several macros that can be found on Dr. Andrew Hayes' website ([www.afhayes.com](http://www.afhayes.com) or [www.processmacro.org](http://www.processmacro.org)). You should make every attempt to ask your advisor to install the PROCESS macro on the computers in your lab. In addition, you should bookmark the following website ([www.quantpsy.org](http://www.quantpsy.org)), as we will be using several tools on this website.

While the course text has affiliated software, I will be relying more and more on the LISREL and the *MPlus* software packages. Class time will be devoted to learning the LISREL syntax language. LISREL 8.8 is also available on a number of machines in Room 105 throughout the semester. The computers that have the full version of LISREL 8.80 installed are: dbvlab18 (utep tag #132801), dbvlab20 (utep tag #132803), dbvlab21 (utep tag #132796), and dbvlab23 (utep tag #132798). Please use Room 105, as it is dedicated space for this software and lack of use may lead to less access to *MPlus*.

Scientific Software (the distributors of LISREL) upgraded its version to 9.1. You can also download a free version of the student version of LISREL at the following website: <http://www.ssicentral.com/lisrel/downloads.html>. The student version limits the number of variables that you can analyze at one time (I think it is 12 variables). Products from Scientific Software (which includes LISREL) can also be rented for 6-months and for 12-months). Their website is [www.ssicentral.com](http://www.ssicentral.com). I am "old school" when it comes to using LISREL and I type out LISREL syntax. I will teach you how to type out LISREL syntax.

There is another (and much better) software program called *MPlus*, which I am becoming more acquainted with. An *MPlus* manual is available in the main office that you can use and I can send you the pdf version of the manual. *MPlus* is also syntax-based, but it is an easier language to learn than LISREL. You will probably like it better than writing LISREL syntax. You'll have the option of using either LISREL or *MPlus* to complete your assignments, but I'll probably provide you with *MPlus* output on your examinations. *MPlus* is installed on the four machines that have LISREL 8.8.

## Course structure and requirements:

1. Students will be responsible for all material covered in lectures, class handouts and assigned readings. With regard to lectures, there is no such thing as a stupid question (in most cases). If you have a question, someone else probably has that same question. Feel free to ask any questions.
2. Make-up exams will be given only under extraordinary circumstances, such as documented sickness, hospitalization or death of a family member (funeral card required). In some other cases, exceptions will be made if **advance notice of absence** is provided.
3. Exams are closed books and closed notes. However, you will be allowed to use crib sheets (see accompanying handout). As you can bring in crib sheets to the exam, examinations truly designed to test your knowledge of the content area. While the exams are designed to be completed in the allotted time, you will have extra time to complete the final exam (if necessary).
4. A calculator is highly recommended. It should perform all basic mathematical operations and should have several memories.
5. There will be between 8 and 10 homework assignments. Many of the homework assignments will require the use of statistical software. We will use SPSS in this class. SPSS can be run on the machines in Room 105 of the Psychology Building. SPSS is also available by logging on to **my.apps.utep.edu**.
6. **Please turn off all pagers, beepers and other electronic devices before entering class.** They are a distraction to other students in the class and to the professor.
7. **Office Hours and Appointments:** If you have questions concerning the topics of this course, you can stop by to see me during my office hours or please do not hesitate to make an appointment to see me. If you stop by my office and you do not have an appointment to see me, I will ask you to schedule an appointment to see me and I will answer your question during that appointed time. This policy also applies to “questions that will only take a minute to answer.”
8. **Conduct of Graduate Students:** Students enrolled in this course are graduate students and I have certain expectations of graduate students. As you are pursuing an advanced professional degree, I expect that you will act in a professional manner. Asking for extensions on assignments because you are busy with other courses/projects/papers is not professional. In addition, I also expect that you will show respect to everyone in the class.

9. Academic Misconduct: The Department of Psychology follows the university policy on academic honesty that is published in the Undergraduate College-Academic Regulations and is available to all members of the University community. Additional information on academic misconduct can also be found at the following links:

<http://studentaffairs.utep.edu/Default.aspx?tabid=4386>

<http://admin.utep.edu/Default.aspx?PageContentID=2084&tabid=30292>

This policy represents a core value of the University and all members of the university community are responsible for abiding by its tenets. Lack of knowledge of this policy is not an acceptable defense to any charge of academic dishonesty. The University has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion and representation of their own work, for the appropriate citation of sources and for respect of others' academic endeavors.

In other words, plagiarism, cheating and academic dishonesty will not be tolerated in this class. Plagiarism consists of using another person's ideas, words, or assistance, while failing to acknowledge this person. If you must submit someone else's work as if it were your own, you must acknowledge the original author/original source. If I suspect any incidence of academic dishonesty, plagiarism, collusion, cheating, etc. on any class assignment or exam, I will forward suspected material to the Office of Student Conduct and Conflict Resolution.

10. Accommodations for Students with Disabilities: If you have an identified disability that may affect your performance in this class, please see the instructor (no later than the second class) or contact the Center for Accommodations and Support Services in Room 106 of the Student Union (phone 747-5148) such that provisions can be made to ensure that you have an equal opportunity to meet all the requirements of this course.
11. I have also assigned supplemental readings. You are responsible for reading these papers, as I may ask questions concerning these readings on homeworks and/or examinations. Additional readings may be added during the semester.

## Important Dates to Remember

Wednesday, February 1

Census Day; Last day to drop course without  
“W” appearing on transcript

Friday, February 12

Pass/Fail Grade Option Selection Deadline

**Thursday, March 9**

**Midterm**

I have reserved another room in CRBL should  
You need more time to take the exam

March 13 – March 17

Spring break

Friday, March 30

Course drop deadline

Thursday, May 4

Last Day of our class

**Thursday, May 11**

**Cumulative Final Exam (1:00 pm – 3:45 pm)**

Wednesday, May 17

Grades due to Records Office

**Tentative Course Schedule**

<b>Date</b>	<b>Topic</b>	<b>Reading</b>
1/17, 1/19	Course overview General introduction and the algebra of expectations	Chapter 1
1/19, 1/24	Items and item scores	Chapter 2
1/26, 1/31	Item and test statistics	Chapter 3
2/2	The concept of a scale	Chapter 4
2/7 - 2/14	Classical Test Theory	Chapter 5 & Reading 1
<b>INITIAL PROJECT PROPOSAL, DUE 2/2</b>		
2/16 - 2/21	Introduction to the Single General Factor Model Test homogeneity and reliability	Chapter 6 & Reading 2
2/23 - 2/28	Applications of Reliability	Chapter 7
<b>FINAL PROJECT PROPOSAL, DUE 3/2</b>		
3/2 - 4/4	Simple and Multiple Regression; Identification of Moderator/Mediator/Suppressor Variables Imputation of Missing Data	Notes and Chapter 8
3/9	<b>MIDTERM EXAMINATION (Chapters 1- 7).</b>	
3/14 - 3/16	<b>SPRING BREAK</b>	
4/6 - 4/11	The common factor model	Chapter 9
4/13 - 4/20	Validity	Chapter 10
4/25 - 4/27	Classical item analysis	Chapter 11
5/2 - 5/4	Introduction to Item Response Theory	Chps 12 - 13 and Reading 3
<b>FINAL PROJECT DUE, MAY 5</b>		
<b>FINAL EXAMINATION THURSDAY MAY 11, 1:00 PM - 3:45 PM</b>		