

## Advanced Tests and Measurement (Psychometrics)

PSYC 6301-001

Tuesdays 9:30am-12:15pm – BEP 250

Spring 2022

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**Office Hours:** Tuesdays 12:15pm to 3:15pm, or by appointment

**Adjustments to the course for the COVID-19 outbreak will consist entirely of keeping the course online and eliminating face-to-face activities until after January 18<sup>th</sup>. After the 18<sup>th</sup> we may or may not resume face-to-face meetings depending on changes in COVID-19 incidence rates and instructions from university upper administration. I will post Powerpoint lectures on CANVAS in advance of the scheduled class day. Please review the lecture in advance of the scheduled class time. I will open a Zoom video conference at class time to lecture and discuss the content for that day, and then answer questions. These Zoom classes will likely run the full scheduled time. I will post articles for reaction papers and homework assignments, and also reviews before the midterm and final. Online exams will be take-home and open book. If we go back to face-to-face exams they will be in class and open book.**

### **COURSE OVERVIEW**

Psychometrics is an applied scientific discipline concerned with the construction of assessment tools, measurement instruments, and formalized models that may serve to connect observable phenomena (e.g., responses to a personality test) to theoretical attributes (e.g., personality traits). This course is designed to introduce students to the concepts necessary for an understanding of psychological testing and measure development and evaluation. As such, this course focuses on the theory and principles of test score reliability and validity, modern topics in measurement theory, and statistical procedures applicable to psychometric methods.

### **COURSE GOALS**

**In PSYC 6301, students who successfully complete the course will:**

Understand the use of norms and basic statistics in psychological testing

Understand some professional, legal, and ethical issues in testing

Demonstrate an ability to apply concepts from psychometric theory to psychological tests

Understand and apply methods of test development and evaluation

Demonstrate knowledge of classical test theory, including reliability and validity

Understand methods for evaluating test score reliability and validity

Demonstrate a capacity for critical evaluation of the adequacy of measures

Demonstrate understanding and use of factor analysis for evaluating test dimensionality

Demonstrate conceptual and applied knowledge of Item-Response Theory and Generalizability Theory

Understand test bias and methods for detecting test bias

### **Required Textbook**

Furr, R. M. (2022). *Psychometrics: An introduction* (4<sup>th</sup> Edition). Los Angeles: Sage Publications (ISBN 978-1-718-2407-8).

**Additional Required readings:** Additional required readings will be posted each week on Canvas as the semester progresses. The required readings are listed in the **Supplemental Reference** section at the end of this syllabus.

### **Course Format and Requirements**

Due to the nature of the objectives of this course, the format will involve both lecture and in-class discussion. It is important to keep up with text and all assigned readings and to be prepared to actively participate in classroom discussion based upon the readings. Being unprepared for class discussions of the readings will result in a reduction of your participation grade.

### **Graded Course Components**

Your final grade in the course will depend on the following graded elements:

#### 1. Reaction Papers and Participation (15%)

Submission of brief reaction papers will be required, based upon selected readings that will be provided to you. The reaction papers should also include a couple of questions that you still have after completing the readings. These questions can either be related to content areas that you found especially interesting about which you would like further information, or that can be related to areas that you did not understand or would like further clarification. I cannot guarantee that all discussion questions will be addressed in class, but I will choose at least one or two each class period to spend some time on in class via group discussion. Reaction papers should be 1-2 double-spaced typed pages. There is not a specific content requirement. The main point is to get you to think critically about the readings. As long as I see that you read the material and put some thought into it, you should get full credit. Not all readings will be conducive to reaction papers, so there may be some weeks that I do not assign a reaction paper.

#### 2. Homework (25%)

Homework assignments will be assigned periodically, and may include discussion questions, computational problems, or statistical analyses and/or result interpretation, using outputs and/or datasets that will be provided to you.

#### 3. Midterm Exam (30%)

The Midterm Exam will test knowledge of material from the first half of the course, including material from lecture, the text, and the additional required readings. The exam will consist primarily of essay questions and computational problems, but will also include some multiple-choice and short-answer questions.

#### 3. Final Exam (30%)

Same format as the Midterm Exam. The exam is not cumulative, per se, but may require understanding of material from earlier in the semester.

### **Course Grade**

Final grades will be determined on a straight-point scale based on the total number of points earned. Multiply your scores on the required course components by the percentage weights, and add up the results. Weighed totals translate to the following letter grades:

Percent of Points	Letter Grade
93-100	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
70-79	C
60-69	D
< 60	F

### **College of Education and Psychology Vision and Mission Statement**

#### **Vision**

The College of Education and Psychology is nationally recognized and respected for its academic programs and opportunities. It is a center of academic excellence, scholarly inquiry, and public service. The College prepares leaders to meet the critical challenges of the 21st Century through productive contributions to local and global communities and toward individual and cultural equity.

#### **Mission Statement**

The mission of the College of Education and Psychology is to provide a positive environment that fosters the acquisition of knowledge and skills. The mission is individually and collectively realized through a community of scholars that contributes to knowledge through scholarly inquiry; organizes knowledge for application, understanding and communication; and provides leadership and service. We affirm and promote global perspectives that value individual and cultural diversity to enhance learning, service, and scholarship.

### **Students Rights and Responsibilities**

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: <http://www.uttyler.edu/wellness/rightsresponsibilities.php>

### **Grade Replacement/Forgiveness and Census Date Policies**

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at <http://www.uttyler.edu/registrar>. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar. Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

**The Census Date is the deadline for many forms and enrollment actions that students need to be aware of. These include:**

Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.

Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date).

Schedule adjustments (section changes, adding a new class, dropping without a “W” grade).

Being reinstated or re-enrolled in classes after being dropped for non-payment.

Completing the process for tuition exemptions or waivers through Financial Aid.

### **State-Mandated Course Drop Policy**

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date).

Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

### **Disability Services**

In accordance with federal law, a student requesting accommodation must provide documentation of his/her disability to the Disability Services counselor. If you have a disability, including a learning disability, for which you request an accommodation, please contact the Disability Services office in UC 3150, or call (903) 566-7079.

### **Excused Absences**

**Student Absence due to Religious Observance:** Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

**Student Absence for University-Sponsored Events and Activities:** If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

**Student Absence Due to Illness, Family Emergency, or Other Situations:** If you miss class due to illness please provide documentation (e.g. doctor’s excuse; hospital bill) as soon as possible, and arrange to make up any missed assignments or tests. If you miss class due to unforeseen family demands (e.g. family member in hospital; death of family member) please notify instructor and make arrangements to miss class and make up assignments as quickly as possible, prior to missing if possible. If you miss class due to some other unforeseen situation (e.g. car breaks down; weather events; abducted by aliens) please notify instructor as soon as possible, and provide evidence if possible (e.g. bill for towing car or mechanic’s bill).

## **Social Security and FERPA Statement:**

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

## **Emergency Exits and Evacuation:**

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

## **Student Standards of Academic Conduct**

Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

(i) "Cheating" includes, but is not limited to:

- copying from another student's test paper;
- using during a test, materials not authorized by the person giving the test;
- failure to comply with instructions given by the person administering the test;
- possession during a test of materials which are not authorized by the person giving the test, such as class notes or specifically designed "crib notes". The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test;
- using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program;
- collaborating with or seeking aid from another student during a test or other assignment without authority;
- discussing the contents of an examination with another student who will take the examination;
- divulging the contents of an examination, for the purpose of preserving questions for use by another, when the instructor has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;
- substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment;
- paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, homework solution, or computer program, or information about an unadministered test, test key, homework solution or computer program;
- falsifying research data, laboratory reports, and/or other academic work offered for credit;
- taking, keeping, misplacing, or damaging the property of U. T. Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and,
- misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.

(ii) "Plagiarism" includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another's work and the submission of it as one's own academic work offered for credit.

(iii) "Collusion" includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.

**Sequence of Course Events:** Please note this sequence is **tentative**, and it is subject to change, as needed. **Additional required readings** will be assigned and uploaded to CANVAS weekly

<b>DATE</b>	<b>TOPIC</b>	<b>Book Chapter</b>
<b><u>Week 1 (1/11)</u></b>		
	Orientation to Course	Syllabus
	Introduction to Psychometrics and Measurement	Chapter 1
<b><u>Week 2 (1/18)</u></b>		
	Scaling and Levels of Measurement	Chapter 2
<b><u>Week 3 (1/25)</u></b>		
	Individual differences, Correlation, Test scores, Norms	Chapter 3
<b><u>Week 4 (2/1)</u></b>		
	Test Dimensionality and Factor Analysis	Chapter 4
<b><u>Week 5 (2/8)</u></b>		
	Reliability: Conceptual Basis	Chapter 5
<b><u>Week 6 (2/15)</u></b>		
	Empirical Estimates of Reliability	Chapter 6
<b><u>Week 7 (2/22)</u></b>		
	Importance of Reliability	Chapter 7
	Exam Review & <b>HANDOUT MIDTERM EXAM</b>	
<b><u>Week 8 (3/1)</u></b>		
	Validity: Conceptual Basis	Chapter 8
	Validity: Empirical Evaluation	Chapter 9
<b><u>Week 9 (3/8)</u> No Class; <b>SPRING BREAK</b></b>		
<b><u>Week 10 (3/15)</u></b>		
	Response Bias	Chapter 10
<b><u>Week 11 (3/22)</u></b>		
	Test Bias	Chapter 11
<b><u>Week 12 (3/29)</u></b>		
	Confirmatory Factor Analysis	Chapter 12
<b><u>Week 13 (4/5)</u></b>		
	Generalizability Theory	Chapter 13
<b><u>Week 14 (4/12)</u></b>		
	Item Response Theory	Chapter 14
<b><u>Week 15 (4/19)</u></b>		
	Prediction and Classification	
	hand out take-home final.	
<b><u>EXAM WEEK (4/26)</u></b>		
<b>FINAL EXAM 6:30-8:30 pm</b>		

## Supplemental References

### Week 1 (1/11)

- Meehl, P.E. (1971). Highschool yearbooks: A reply to Schwartz. *Journal of Abnormal Psychology*, 77, 143-148.
- Meehl, P.E. (1978). Theoretical risks and tabular asterisks: Sir Karl, Sir Ronald, and the slow progress of soft psychology. *Journal of Consulting and Clinical Psychology*, 46, 806-834.

### Week 2 (1/18)

- Blanton, H., & Jaccard, J. (2006). Arbitrary metrics in psychology. *American Psychologist*, 61, 27-41.

### Week 3 (1/25)

- Snyder, D. K., & Rice, J. L. (1996). Methodological issues and strategies in scale development. In D. H. Sprenkle & S. M. Moon (Eds.), *Research methods in family therapy* (pp. 216–237). The Guilford Press.

### Week 4 (2/1)

- Floyd, F.J., & Widaman, K.F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment*, 7, 286-299.

### Week 5 (2/8)

- Nimon, K., Zientek, L.R., & Henson, R.K. (2012). The assumption of a reliable instrument and other pitfalls to avoid when considering the reliability of data. *Frontiers in Psychology*, 3, 102.

### Week 6 (2/15)

- Henson, R. K. (2001). Methods, Plainly Speaking. Understanding Internal Consistency Reliability Estimates: A Conceptual Primer on Coefficient Alpha. *Measurement and Evaluation in Counseling and Development*, 34, 177-189.

### Week 7 (2/22)

No supplemental reading this week.

### Week 8 (3/1)

- Cronbach, L.J., & Meehl, P.E. (1955). Construct validity in psychological tests. *Psychological Bulletin*, 52, 281-302.
- Messick, S. (1995). Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning. *American Psychologist*, 50, 741-749.

### Week 10 (3/15)

- Cureton, E.E. (1950). Validity, reliability, and baloney. *Educational and Psychological Measurement*, 10, 94-96.

### Week 11 (3/22)

No supplemental reading this week.

### Week 12 (3/29)

- Madson, M.B., Arnau, R.C., & Lambert, S.J. (2013). Development and psychometric evaluation of the Revised Protective Behavioral Strategies Scale. *Psychological Assessment*, 25, 556-567.

**Week 13 (4/5)**

Bruce, T. (2003). A brief introduction to generalizability theory. In Thompson, B. (Ed.), *Score reliability* (pp. 43-58). SAGE Publications, Inc.

**Week 14 (4/12)**

No supplemental reading this week.

**Week 15 (4/19)**

Meehl, P.E., & Rosen, A. (1955). Antecedent probability and the efficiency of psychometric signs, patterns, or cutting scores. *Psychological Bulletin*, 52, 194-216.