EDP 380D-4: PSYCHOMETRIC THEORY AND METHODS
SPRING 2016 (Unique: 10660)

General Information
Lecture meeting time: Tuesday and Thursday, 2:00pm – 3:15pm.
Location: George I. Sanchez Building (SZB), Room 444

Instructor
*Name***:** Dr. Jodi Casabianca
*Office hours***:** Wednesdays, 3-4:00pm, and by appointment in **SZB 352A**
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Course Description
This course covers three broad topics in psychometrics: (a) classical test theory, (b) item response theory, and (c) factor analysis. The course integrates these topics to demonstrate the foundations of testing and assessment (reliability, validity, fairness). During the semester, you will learn about these topics from a theoretical perspective with an in-depth conceptual discussion of psychometric models, and also from an applied methodological perspective by way of applications of these models to real data using statistical analysis software. Prerequisites: Educational Psychology EDP 380C 2 (Fundamental Statistics) and EDP 380D 2 (Measurement and Evaluation).

Learning Goals
After completing this course, students will be able to:
1. Discuss and apply the theoretical fundamentals of classical test theory;
2. Describe item response theory models and their applications in measurement;
3. Understand the similarities, differences, and links between classical test theory and modern test theory (item response theory);
4. Discuss the foundations of testing (reliability, validity, fairness) and utilize psychometric modeling approaches to evaluate those foundations for specific tests;
5. Understand and apply the basics of factor analysis and principal components analysis for purposes of test construction and validation.

There are many detailed learning objectives related to these broad learning goals. I will provide learning objectives for each unit under discussion during the semester to help you focus on what is most important.

Required Textbooks and Materials

*Textbook***.** There is one required textbook for the course: **Kline, T. (2005).** *Psychological Testing: A Practical Approach to Design and Evaluation***. Sage Publications.** The text provides some information *not* covered in class and similarly some material is covered in class that might not be mentioned in the text. You are responsible for material covered in class. I will assign reading assignments on a weekly basis that will also include readings from other sources provided on Canvas. **It is your responsibility to complete the reading assignment for the following week in order to prepare for class.** Everyone learns differently, but from my own experience, doing a complete reading *before* and then again *after* class should almost guarantee your success in understanding the concepts. If you have questions about how to learn and study, please let me know and I can suggest some strategies.

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Class Handouts. Class handouts matching the overheads used by the instructor will be made available on Canvas (http://canvas.utexas.edu) to students the night before class. I update overheads to match class progress and thus cannot offer them any earlier. Please print them before coming to class.

Calculator. You may be required to calculate statistics by hand to master the use (and interpretation) of the relevant formulae. Therefore, you will need your own calculator to perform relevant mathematical functions (such as taking the natural log, the exponent, square root, etc.) during class and exams. Because you will need your calculator during exams, do not intend to share calculators or use your cell phone's calculator function/app.

Statistical Software/R. In research and practice, analysts do not compute statistics manually, they use statistical software. I will demonstrate how to use R in class. You will need to use statistical software to complete your assignments (described below). Although you are not required to use R for your assignments, it is to your advantage because this is what will be discussed in class and provided in course materials. If you use another statistical software program, then you are responsible for ensuring the correspondence between procedures and estimation techniques that are used.

Classroom Conduct
This course requires your full attention in class. For that reason, I will restrict classroom use of laptop computers. ***You are free to bring your laptops to class, but they should only be open when we are working on statistical analyses.*** During lecture, please take notes using the class notes that I have posted on Canvas. They will be available the evening before class (by 11:00pm) so that you have ample time to print them. If you have an accommodation that requires the use of your laptop, please do let me know.

Assessments
Your course grade will be a combination of your performance on three in-class exams (60%) and four psychometric analysis project assignments (40%). Note that five assignments will be offered, however only the four highest grades will count towards your final grade.

Exam Dates and Policies. There will be three examinations (3/1, 4/12, 5/5)—the dates of these exams will not change. Exams will consist of conceptual, computational and application questions. Students must bring a calculator to the exams. Exams are *not* open-book, but you may use one 8.5" X 11" two-sided page of notes during the exam to reduce test anxiety (students will likely be much better prepared if they don't need to rely on it).
  Exams cannot be made-up unless your absence is excused via doctor's note or prior arrangement because of religious holiday observance. If the student becomes ill on the day of a exam, then it is the student's responsibility to ensure the instructor is contacted to notify them, provide them with a doctor's note and to re-schedule the exam. In the case of a religious holiday observance, University policy requires students to notify each of their instructors as far in advance of the absence as possible so that arrangements can be made.

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Psychometric Analysis Project Assignments. To ensure that you will attain the course learning goals, you will be required to demonstrate conceptual understanding of the major topics in the course by applying them to real data using statistical software. These assignments will provide you an opportunity to engage in "real-word" psychometric analysis that you might not otherwise encounter until your dissertation and/or other research.

For each major course concept, the assignments will require you to: (a) use R or some other statistical software to run required analyses, (b) provide a written summary of the variables of interest and numerical/graphical summaries of them, (c) describe the research question/problem and the statistical analysis to be conducted, (d) present the relevant output, and (e) provide an interpretation of the output and conclusions. Your response to most of these required tasks will be facilitated by guided questions. Students will be provided R code for the assignments. **All assignments must be submitted as APA style reports. Please work alone on your data analysis project assignments.**

A printed copy of your assignment is due at the beginning of class on the due date specified with the assignment. The course schedule at the end of this syllabus provides tentative due dates for the assignments—these dates may change depending on the progress of the course. If a student cannot attend on the days when an assignment is due, then the student is responsible for notifying the instructor ***in advance*** and arranging timely delivery of the assignment.

Only in exceptional circumstances (including a verifiable medical excuse) and only with ***prior*** permission from the instructor will students be able to hand in an assignment late. Without this permission, the student will be penalized for late work. For each 24-hour period that the assignment is delayed, 5% will be deducted from the assignment's score. Because assignments are due at the beginning of class, each 24-hour period will start coincidently with the class's beginning. Thus if an assignment is due, for example, at 2:00pm on Tuesday, 2/16/16 but is handed in at 1:59pm on Thursday, 2/18/16, then 10% will automatically be deducted from the student's score on the assignment. There will be no exceptions to this penalty. If a student becomes ill on the day that an assignment is due, it is the student's responsibility to contact the instructor and to arrange delivery of the assignment by the time it is due. In this case, if the assignment is not complete, then the student will receive credit only for what was attempted. It is important to complete assignments **before** the day on which they are due.

Grading Policy

Your final course grade will be assigned based on the conversion from numeric course grade to letter grade as shown in the below table. Unless there was a computational error, grades will not be changed after the end of the semester.

A :	≥ 93	C+:	76-79
A-:	90-92	C:	73-75
B+:	86-89	C-:	70-72
B:	83-85	F:	<70
B-:	80-82		

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Canvas
All electronic materials used for this course will be available on Canvas. Grades for all exams and assignments will also be available on Canvas. You will also be responsible for checking the Canvas course site regularly for announcements and course materials. As with all computer systems, there are occasional scheduled downtimes as well as unanticipated disruptions, so plan accordingly.

Communication Policy
All students should become familiar with the University's official email student notification policy. The complete text of this policy and instructions for updating your email address are available at **http://www.utexas.edu/its/help/utmail/1564** .

Students are expected to check email on a frequent and regular basis in order to stay current with University-related communications, recognizing that certain communications may be time-critical. In this course, email will be used as a means of communication with students. You will be responsible for checking your e-mail regularly for class work and announcements. I check email several times a day on **_weekdays_** (during regular working hours). **_PLEASE do not email me in Canvas—Please use the UT email system._**

Attendance Policy
You are responsible for being present in class and for all lecture and written material covered in class, even if you miss a class. If a student misses a class, then regardless of the reason for class being missed the **_student is responsible_** for obtaining both the course material that was missed as well as any class announcements from his/her classmates. While attendance is not part of your grade, you will be better prepared to complete assignments and exams if you regularly attend class.

In addition to being physically present in the classroom, I expect that all students will be _mentally_ present. This means that there should be **minimal distractions** due to technology including cell phones and other devices. Please do not use your cell phones during class—put them away.

Accommodations for Religious Holidays
Notify me of your pending absence at least fourteen (14) days prior to the date of observance of a religious holy day. If you must miss a class, an exam or an assignment in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

Documented Disability Statement
Any student with a documented disability who requires academic accommodations should contact Services for Students with Disabilities (SSD) at (512) 471-6259 (voice) or 1-866-329-3986 (video phone). Faculty are not required to provide accommodations without an official accommodation letter from SSD. Also please notify me as quickly as possible if the material being presented in class is not accessible (e.g., text on presentation slides too small, etc.).

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Policy on Academic Integrity

University of Texas Honor Code. The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.

A fundamental principle for any educational institution, academic integrity is highly valued and seriously regarded at The University of Texas at Austin. More specifically, you and other students are expected to maintain absolute integrity and a high standard of individual honor in scholastic work undertaken at the University. This is a very basic expectation that is further reinforced by the University's Honor Code. At a minimum, you should complete any assignments, exams, and other scholastic endeavors with the utmost honesty, which requires you to:
- acknowledge the contributions of other sources to your scholastic efforts;
- complete your assignments independently unless expressly authorized to seek or obtain assistance in preparing them;
- follow instructions for assignments and exams, and observe the standards of your academic discipline; and
- avoid engaging in any form of academic dishonesty on behalf of yourself or another student.

On Working Together for Assignments. You are encouraged to study together and to discuss information and concepts covered in class with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Code can also be extended to include failure of the course and University disciplinary action.

On Exams. During exams, you must do your own work. Talking or discussion is not permitted during the exams, nor may you compare papers, copy from others, or collaborate in any way. Any collaborative behavior during the exams will result in failure of the exam, and may lead to failure of the course and University disciplinary action.

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Tentative Course Schedule
This schedule may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected. _Exam dates will not change_.

Date	Topic	Required Reading	Due
1/19	Course Introduction		
1/21	Statistics Review	• Kline, Ch. 1	
1/26	Measurement Review	• Kline, Ch. 2, pp. 29-35, Ch. 3	
1/28	Classical Test Theory (CTT)	• Kline, Ch. 5, pp. 91-94 • Furr & Bacharach Ch.5, pp. 101-121 • Furr & Bacharach Ch. 7, pp. 165-178	
2/2			**HW 1**
2/4	Reliability	• Kline, Ch. 7 • Furr & Bacharach, Ch. 6	
2/9			
2/11			
2/16	Introduction to Validity	• Kline, Ch. 9, pp. 201-224, Ch. 10, pp. 286-287 • Furr & Bacharach, Ch. 8, pp. 197-219 • Furr & Bacharach, Ch. 9, pp. 221-246, 253-256	**HW 2**
2/18			
2/23			
2/25	Review		
3/1	**Exam 1**	**(Topics: CTT, Reliability, Validity)**	**Exam 1**
3/3	Scaling	• Kline: Ch. 2, pp. 35-46 • Furr & Bacharach, Ch. 2, pp. 19-29	
3/8	Item Analysis	• Kline, Ch. 5, pp. 95-105 • Furr & Bacharach, Ch. 7, pp. 186-192	
3/10			
3/15	**No Class – Spring Break**		
3/17	**No Class – Spring Break**		
3/22	Item Response Theory (IRT)	• Kline, Ch. 6, pp. 107-128, 162-165 • Visual Guide to IRT (with applets)	**HW 3**
2/24			
3/29			
3/31			
4/5	Review		**HW 4**
4/7	**No Class – AERA/NCME**		
4/12	**Exam 2**	**(Topics: Scaling, Item Analysis, IRT)**	**Exam 2**

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4/14	Factor Analysis	• Kline, Ch. 10, pp. 241-269 • Pett, Lackey, & Sullivan, Ch. 4, 5	
4/19			
4/21			
4/26	Test Bias/Fairness	• Kline: Ch. 9, pp. 224-233 (Ignore Box 9.4) • Furr & Bacharach, Ch. 11, pp. 301-327	
4/28			
5/3	Review		**HW 5**
5/5	**Exam 3**	**(Topics: Factor Analysis, Test Bias/Fairness)**	**Exam 3**