

# EDP 380D-4: PSYCHOMETRIC THEORY AND METHODS

## SPRING 2017 (Unique: 10880)

### General Information

Lecture meeting time: Wednesday, 4:00pm – 7:00pm.

Location: George I. Sanchez Building (SZB), Room 435

### Instructor

Name: Bob Schwartz

Office hours: After class, and by appointment

E-mail: [robert.schwartz@pearson.com](mailto:robert.schwartz@pearson.com)

### 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. 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 psychometric modeling approaches for specific tests;
5. Understand 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 that will be provided for each unit during the semester to help you focus on what is most important.

### Required Textbooks and Materials

There are two required textbooks for the course:

- Kline, T. (2005). *Psychological Testing: A Practical Approach to Design and Evaluation*. Sage Publications. Can be purchased on Amazon. <https://www.amazon.com/Psychological-Testing-Practical-Approach-Evaluation/dp/1412905443>.
- American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association. I recommend purchasing this via [APA/AERA/NCME](http://www.apa.org/aera/ncme), where members can get a discount, and you can also get an electronic text. <http://www.aera.net/Standards14>

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*Additional readings will be posted on our Canvas course website.* These readings will include some that are required (see Course Schedule below), as well as optional further more detailed reading on topics we briefly discuss in class.

#### **Assessment**

Your course grade will be a combination of your performance on two in-class exams (66%) and one take-home exam (33%). The take-home exam may require knowledge of some material learned and tested by the first two in-class exams, but is not intended to be cumulative.

**Missed exams may not be made up unless arrangements have been made prior to class.**

#### **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+: | 77–79 |
| A-: | 90–92 | C:  | 73–76 |
| B+: | 87–89 | C-: | 70–72 |
| B:  | 83–86 | F:  | <70   |
| B-: | 80–82 |     |       |

#### **Canvas**

All electronic materials used for this course will be available on Canvas. Grades for all exams 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.

#### **Academic Integrity**

Following the University's honor code, students are expected to maintain absolute integrity and a high standard of individual honor in scholastic work. All student work must be completed with the utmost honesty, which includes acknowledging the contributions of other sources to your scholastic efforts; avoiding plagiarism; and completing assignments and exams independently unless expressly authorized otherwise.

#### **Accommodations For Persons With Disabilities**

Students with disabilities who require special accommodations need to get an accommodation letter that documents the disability from the Services for Students with Disabilities (471-6259 voice or 471-4641 TTY for users who are deaf or hard of hearing). This letter should be presented to the instructor in each course at the beginning of the semester and accommodations needed should be discussed at that time. Five business days before an exam, the student should remind the instructor of any testing accommodations that will be needed. See the following website for more information: <http://ddce.utexas.edu/disability/>.

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**Religious Holidays**

A student who misses an examination, work assignment, or other project due to the observance of a religious holy day will be given an opportunity to complete the work missed within a reasonable time after the absence, provided that he or she has properly notified the instructor. It is the policy of the University of Texas at Austin that the student must notify the instructor at least fourteen days prior to the date he or she will be absent to observe a religious holiday. For religious holidays that fall with the first two weeks of the semester, the notice should be given on the first day of the semester. The student will not be penalized for these excused absences, but the instructor may appropriately respond if the student fails to complete satisfactorily the missed assignment or examination within a reasonable time after the excused absence.

**Campus Carry**

Please see the [campus carry website](#) for more information.

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**Tentative Course Schedule and Readings**

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.*

| <b>Date</b> | <b>Topic</b>                                       | <b>Required Reading</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1/18        | Course Introduction and Statistics Review          | <ul style="list-style-type: none"> <li>• Kline, Ch. 1</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 1/25        | Measurement Review and Classical Test Theory (CTT) | <ul style="list-style-type: none"> <li>• Kline, Ch. 2 (pp. 29-35)</li> <li>• Kline, Ch. 3</li> <li>• Kline, Ch. 5 (pp. 91-94)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2/1         | Reliability                                        | <ul style="list-style-type: none"> <li>• Kline, Ch. 7</li> <li>• Standards, Chapter 2 (pp. 33-47)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 2/8         | Validity                                           | <ul style="list-style-type: none"> <li>• Kline, Ch. 9 (pp. 201-224)</li> <li>• Kline, Ch. 10 (pp. 286-287)</li> <li>• Standards, Chapter 1 (pp. 11-31)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 2/15        | More Reliability and Validity, and Review          | <ul style="list-style-type: none"> <li>• Sireci, S. G. (2009). Packing and unpacking sources of validity evidence: History repeats itself again. In R. Lissitz (Ed.), <i>The Concept of Validity: Revisions, New Directions and Applications</i> (pp.19-37). Charlotte, NC: Information Age Publishing Inc.</li> <li>• 2014 MCAS Technical Report Section 3.9:<br/> <a href="http://www.mcasservicecenter.com/documents/MA/Technical%20Report/2014/2014%20MCAS%20%20MCAS%20Alt%20Tech%20Report.pdf">http://www.mcasservicecenter.com/documents/MA/Technical%20Report/2014/2014%20MCAS%20%20MCAS%20Alt%20Tech%20Report.pdf</a> </li> </ul> |
| 2/22        | <b><u>Exam 1</u></b>                               | <b>(Topics: CTT, Reliability, Validity)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 3/1         | Scaling and CTT Item Analysis                      | <ul style="list-style-type: none"> <li>• Kline: Ch. 2 (pp. 35-46)</li> <li>• Standards, Chapter 5 (pp. 95-109)</li> <li>• Kline, Ch. 5 (pp. 95-105)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 3/8         | Item Response Theory (IRT)                         | <ul style="list-style-type: none"> <li>• Kline, Ch. 6 (pp. 107-128, 162-165)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

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| <b>Date</b> | <b>Topic</b>                           | <b>Required Reading</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3/15        | <b><u>No Class – Spring Break</u></b>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 3/29        | Advanced IRT Topics and Review         | <ul style="list-style-type: none"> <li>• Meijer, R.R., &amp; Nering, M.L. (1999). Computerized adaptive testing: Overview and introduction. <i>Applied psychological measurement</i>, 23(3), 187-194.</li> <li>• Ryan, J. (2011). A practitioner's introduction to equating. Washington, DC: Council of Chief State School Officers. (pp. 30-84)</li> <li>• Wilson, M., de Boeck, P., &amp; Carstensen, C.. (2008). Explanatory item response models: A brief introduction. <i>Assessment of competencies in educational contexts</i>, 91–120.</li> <li>• McClarty, K. L., Way, W. D., Porter, A. C., Beimers, J. N., &amp; Miles, J. A. (2013). Evidence-based standard setting. <i>Educational Researcher</i>, 42(2), 78-88.</li> </ul> |
| 4/12        | <b><u>Exam 2</u></b>                   | <b>(Topics: Scaling, Item Analysis, IRT)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 4/19        | Factor Analysis                        | <ul style="list-style-type: none"> <li>• Kline, Ch. 10, pp. 241-269</li> <li>• Pett, Lackey, &amp; Sullivan, Ch. 4, 5</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 4/26        | Bias/Fairness, DIF, and Accommodations | <ul style="list-style-type: none"> <li>• Kline: Ch. 9, pp. 224-233 (Ignore Box 9.4)</li> <li>• Standards, Chapter 3 (pp. 49-72)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 5/3         | Review                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 5/10        | <b><u>Take Home Exam 3 Due</u></b>     | <b>(Topics: Factor Analysis, Bias/Fairness)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |