

**Psychology 442 – Test Theory**  
**Illinois State University**  
**Spring 2011**

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<b>Instructor:</b>	Dr. Jeffrey H. Kahn	<b>Classroom:</b>	48 DeGarmo Hall
<b>Office:</b>	451 DeGarmo Hall	<b>Class times:</b>	Tue, Thu 11:00 - 12:15
<b>Phone:</b>	438-7939	<b>Web page:</b>	www.ilstu.edu/~jkhahn/psy442
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**Course Description**

As described in the ISU catalog, this course covers “theory and principles of test reliability and validity, topics in test theory, and statistical procedures applicable to psychometric methods.” This course is an extension of the basic measurement principles covered in undergraduate courses on testing and measurement. Demonstration of proficiency in these basic measurement principles (established by completion of an undergraduate course in measurement, independent reading and study in measurement, etc.) is required for continued enrollment in Test Theory.

This course is geared toward understanding the statistical theories that underlie test scores and the methods used to determine the technical adequacy of test scores. In this class we will balance the conceptual, in the form of theory and statistical bases, with the applied, in the form of data analysis using SPSS and writing about psychometric data. PSY 440 (Statistics: Data Analysis and Methodology) is a prerequisite for this course, and students must have an understanding of basic statistical issues and familiarity with SPSS to succeed in this course.

**Course Goals**

It is my hope that by the end of the semester you will have achieved and demonstrated the following:

1. An understanding of principles of test theory at both a theoretical and mathematical level, including a thorough understanding of classical and modern views of reliability and validity.
2. Familiarity with statistical procedures used to gain information about the psychometric adequacy of test scores and how to interpret data from these procedures.
3. Competence with SPSS as a tool to manage and analyze data from tests.
4. The ability to communicate information about test scores, reliability, and validity in a scientifically appropriate manner.

**Readings**

The following books are required:

Crocker, L., & Algina, J. (2008). *Introduction to classical and modern test theory*. Mason, OH: Cengage.

Five supplemental articles related to test theory available as a packet at PIP Printing in the Bone Student Center:

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

Helms, J. E., Henze, K. T., Sass, T. L., & Mifsud, V. A. (2006). Treating Cronbach's alpha reliability coefficients as data in counseling research. *The Counseling Psychologist*, *34*, 630-660.

Kahn, J. H. (2006). Factor analysis in counseling psychology research, training, and practice: Principles, advances, and applications. *The Counseling Psychologist*, *34*, 684-718.

Smith, G. T. (2005). On construct validity: Issues of method and measurement. *Psychological Assessment*, 17, 396-408.

Vacha-Haase, T. (1998). Reliability generalization: Exploring variance in measurement error affecting score reliability across studies. *Educational and Psychological Measurement*, 58, 6-20.

### Assignments and Grades

#### **Midterm and Final Exams**                      **120 points**

Two exams (each worth up to 60 points) will be given during the semester. These exams will be short-answer exams designed to assess your understanding of conceptual and mathematical issues covered in the first half of the semester (for the midterm) and second half of the semester (for the final). Review guides and formula sheets will be provided on the course web site prior to the exams. Make-up exams will not be given unless an acceptable arrangement has been made with the instructor at least one day prior to the exam.

#### **Take-Home Exercises**                      **120 points**

Take-home exercises (each worth up to 15 points) will be given on eight different Thursdays to be turned in the following Thursday in class. These exercises are designed to assess your ability to compute, interpret, and report psychometric information. Most problems will require the use of a computer, although a few problems may need to be worked out by hand. Exercises are to be turned in typed and in APA style. Late take-home exercises will only be accepted with the instructor's approval, and the instructor may invoke a 50%-off penalty for late exercises.

#### **Research Paper**                      **60 points**

The research project will require you to review the literature regarding the reliability or validity of scores from an existing test in psychology. This paper must be formatted using APA style. (See Guidelines for the Research Paper at the end of this syllabus.) This paper will be due in class on **Thursday, April 28**. Papers may be turned in before the due date, but late papers will not be accepted.

Final grades will be based on the total number of points earned during the semester:

270 to 300 points = A

240 to 269 points = B

210 to 239 points = C

180 to 209 points = D

Less than 180 points = F

### Academic Integrity

I believe that collaborative learning is to everyone's advantage. However, the line between collaboration and academic dishonesty is an important one. One example of academic dishonesty is when two or more students type up the answers to an exercise together and print a separate copy for each student. Because only one student can actually type at a time, one student is letting another student do the work for her/him. You are responsible for abiding by ISU's Code of Conduct (available at [www.deanofstudents.ilstu.edu](http://www.deanofstudents.ilstu.edu)). If it becomes apparent that you have crossed the line into academic dishonesty, you may receive a 0 on the assignment, an F in the course, and/or other disciplinary action.

**Tentative Class Schedule**

<b>Week</b>	<b>Topic</b>	<b>Readings</b>
Jan 11, 13	Introduction to test theory	C&A Chapter 1
Jan 18, 20	Transforming item and test scores	C&A Chapter 2 Blanton & Jaccard (2006)
Jan 25, 27	Covariance, correlation, and bivariate regression	C&A Chapter 2
Feb 1, 3	Linear combinations and composite scores	C&A Chapter 5
Feb 8, 10	Reliability theory	C&A Chapter 6
Feb 15, 17	Estimating the reliability of test scores	C&A Chapter 7 Helms et al. (2006)
Feb 22, 24	Generalizability theory	C&A Chapter 8
Mar 1	Reliability generalization	Vacha-Haase (1998)
Mar 3	<b>Midterm Exam</b>	
<i>Spring Break</i>		
Mar 15, 17	Overview of test-score validity	C&A Chapter 10 Smith (2005)
Mar 22, 24	Correlation and regression in validity assessment	C&A Chapter 11
Mar 29, 31	Differential validity and test bias	C&A Chapter 12
Apr 5, 7	Exploratory factor analysis: Factor extraction	C&A Chapter 13 Kahn (2006)
Apr 12, 14	Exploratory factor analysis: Factor rotation	C&A Chapter 13
Apr 19, 21	Confirmatory factor analysis	
Apr 26, 28	Item-response theory	C&A Chapter 15
May 5	<b>Final Exam</b> at 10 a.m.	

**Special Accommodations**

If you need a special accommodation to fully participate in this class, please contact Disability Concerns at 438-5853 (voice), 438-8620 (TDD).

## Test Theory – Spring 2011 Guidelines for the Research Paper

The research paper (due no later than Thursday, April 28) requires you to review empirical evidence of the reliability or validity of a psychological test. The test you select is up to you, but it must be cleared with the instructor ahead of time. You have three options for your paper:

### Option A

Conduct a reliability generalization study in which you informally meta-analyze published reliability coefficients of scores from a given test in psychology. For an example, see:

Yin, P., & Fan, X. (2000). Assessing the reliability of Beck Depression Inventory scores: Reliability generalization across studies. *Educational and Psychological Measurement, 60*, 201-223.

### Option B

Review the construct validity of scores from a given test in psychology and draw a conclusion about the construct the test scores measure. A strict meta-analysis is not necessary, but a summary of quantitative data would be helpful. For an example, see:

Kinicki, A. J., McKee-Ryan, F. M., Schriesheim, C. A., & Carson, K. P. (2002). Assessing the construct validity of the Job Descriptive Index: A review and meta-analysis. *Journal of Applied Psychology, 87*, 14-32.

### Option C

Review the evidence of criterion-related validity of scores from a given test in psychology as they relate to predicting a given criterion. A strict meta-analysis is not necessary, but a summary of quantitative data would be helpful. For an example, see:

Morrison, T., & Morrison, M. (1995). A meta-analytic assessment of the predictive validity of the quantitative and verbal components of the Graduate Record Examination with graduate grade point average representing the criterion of graduate success. *Educational and Psychological Measurement, 55*, 309-316.

Grading will be based on the following criteria:

- The purposes and goals of the paper are clearly specified.
- The author adhered to a rigorous and comprehensive methodology for locating sources.
- Data from a large and diverse group of research studies are incorporated into the paper.
- The results of the research studies (i.e., reliability and validity findings) are clearly communicated in the paper, either singly or in a summary form.
- The conclusions drawn concerning reliability or validity are appropriate given the results of the reviewed research studies.
- The paper is well organized, the arguments are strong, and the writing is clear (including proper grammar/spelling/mechanics and adherence to APA style). You are encouraged to use subheadings, and you are strongly recommended to review the following writing tips: [www.ilstu.edu/~jkhahn/writing.html](http://www.ilstu.edu/~jkhahn/writing.html).

You may submit a rough draft (in any form) to the instructor for feedback. If you submit a rough draft, it must be submitted to the instructor by Thursday, April 14.