

**PSYCHOLOGY 606
ADVANCED MEASUREMENT THEORY
SPRING 2005**

Tuesday/Thursday, 12:30-1:45

ROOP 327

Class #: 20790 Section: 0001

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Prerequisite: PSYC 605.

COURSE GOALS:

This course will cover the principles and concepts underlying advanced measurement applications of classical test theory, generalizability theory, scale construction concepts, test bias, standard setting techniques, and item response theory. Measurement methods based on these theories are fundamental to virtually all measurement in psychology. The specific objectives of the course are to:

COURSE CONTENT/ OBJECTIVES:

1. Define and describe differences among evaluation, assessment, research, and measurement.
2. Define measurement and statistical terms and concepts.
3. Describe scaling, the process of test construction, and test scores as composites.
4. Interpret the following scales and transformed scores: T scores, Z scores, stanines, item response theory ability estimates, and grade and age equivalent scores.
5. Explain test results using norm referenced and criteria referenced interpretations.
6. Identify various item formats for achievement, attitude, and behavioral instruments.
7. Describe the classical true score model and associated reliability estimation procedures.
8. Interpret the reliability of change scores or ratings.
9. Identify the basic tenets of generalizability theory, differentiate G and D study purposes, combine variance components to calculate relative and absolute standard errors and G-coefficients and phi-coefficients. Use computer software to estimate variance components.
10. Describe and apply procedures used to determine the reliability of criterion-referenced tests.
11. Describe contemporary conceptions of validity and associated statistical procedures for investigating prediction, classification, bias in selection, other issues in decision theory, and factor analysis.
12. Locate, review, and select testing instruments that are psychometrically suitable and will provide useful and legitimate information to meet specific needs.
13. Calculate and interpret item statistics, and revise an assessment instrument using a selected response format.
14. Explain the basic tenets of Item Response Theory.
15. Describe and compare test bias, differential item functioning, and adverse/disparate impact.
16. Explain methods of setting standards and cut-off scores as an application of validity theory.
17. Describe the reasons for equating tests, and distinguish between horizontal and vertical equating. Apply equipercentile and linear equating.

18. Exhibit and apply professional and ethical sensitivity to human aspects of assessment using existing AERA, AEA, APA, and ACPA guidelines about fair testing and evaluation practices.

STATISTICAL SOFTWARE

You will be using SPSS & SAS software for this course. SPSS can be purchased from the JMU bookstore if you wish to own a personal copy (~\$190.00 –graduate pack), or you can utilize the computer labs on campus that have the software. To search for which computer labs on campus have computers with SPSS and SAS, go to: <http://www.jmu.edu/computing/labs/>.

BLACKBOARD SITE

I have set up a blackboard site for this course at <http://blackboard.jmu.edu/>. This site will be used to obtain the readings for the course (other than DeVellis) to obtain handouts, lecture notes, homeworks, etc.

REQUIREMENTS and EVALUATION:

<u>Percent</u>	<u>Letter Grade</u>
93 – 100	A
90 – 92	A-
87 – 89	B+
83 – 86	B
80 – 82	B-
70 – 79	C
<70	F

Your course grade will be based on three examinations (25% each) and several data analysis assignments (25%).

Examinations: Exam #1 is scheduled for mid-February (in-class), and Exam #2 is scheduled for mid-March (take-home). Exam #3 will be a take-home exam due at the time the final exam for this class is scheduled.

Data analysis: There will be several assignments where you will be asked to perform data analyses and required to interpret the results. You may work together in running SPSS or SAS, **but all group members should learn how to run the software and write-ups should be done individually.**

Honor System

Plagiarism and cheating will not be tolerated in this course. If you have questions concerning these issues please review the College of Graduate and Professional Programs Policies and Procedures (see page 32). <http://www.jmu.edu/cgapp/policymanual.htm> Also read or review the JMU Honor System at <http://www.jmu.edu/honor/> (in particular see Section B labeled Honor Code).

I may make minor adjustments to the course schedule/readings if deemed necessary.
Any changes will be made prior to the date of the class.

Lecture #	Date	Day	Topic	Reading
1	11-Jan	Tues	Review of Course/Measurement Intro	DeVellis Ch. 1; Benson & Hagtvvet 83-87
2	13-Jan	Thurs	Instrument Development/Table of Specs	Friedenberg Chs. 1 & 2
2/3	18-Jan	Tues	Writing Objectives/ Item Writing	Kubiszyn & Borich Ch. 5; Friedenberg Ch.4; DeVellis Ch. 5
3/4	20-Jan	Thurs	Performance Assessments/Scoring Rubrics	Skarr & Spognolo (1995)
5	25-Jan	Tues	Type of Test Scores	
6	27-Jan	Thurs	Type of Test Scores 2	Friedenberg Ch. 5 pp. 163-173
7	1-Feb	Tues	Classical Test Theory	DeVellis Ch. 2
7/8	3-Feb	Thurs	Classical Test Theory/Standard Error of Measurement	Gregory, Ch. 2, topic 6
9	8-Feb	Tues	Reliability Take 2	DeVellis Ch. 3
10	10-Feb	Thurs	Reliability Take 3	Traub (1994) pp.138-151
---	15-Feb	Tues	NO CLASS - Assessment Day	
---	17-Feb	Thurs	EXAM #1 (In-class)	
11	22-Feb	Tues	Item Analysis	Handout 10
12	24-Feb	Thurs	Matrix Algebra Introduction	
13	1-Mar	Tues	Principial Components Analysis	DeVellis Ch. 6; Benson & Nasser
14	3-Mar	Thurs	Exploratory Factor Analysis	TBA
---	8-Mar	Tues	NO CLASS - Spring Break	
---	10-Mar	Thurs	NO CLASS - Spring Break	
14	15-Mar	Tues	Exploratory Factor Analysis	
14	17-Mar	Thurs	Exploratory Factor Analysis/Confirmatory Factor Analysis	
15	22-Mar	Tues	Validity	Gregory, Ch.4, topic 7;DeVellis Ch. 4
15	24-Mar	Thurs	Validity	Benson & Hagtvvet, 1996; Messick, 1995; Mehrens, 1997
16	29-Mar	Tues	Standard Setting	Cizek (1996)
---	31-Mar	Thurs	NO CLASS - NASP	
17	5-Apr	Tues	Equating	Kolen (1988)
18	7-Apr	Thurs	Generalizability Theory	Shavelson & Webb,Chs.1 & 2;Webb, Rowley, & Shavelson 88
19	12-Apr	Tues	IRT Basics	Hambleton, Swaminathan, & Rogers (1991); Chs. 1 & 2
20	14-Apr	Thurs	IRT Applications	
21	19-Apr	Tues	IRT Theta Estimation	
22	21-Apr	Thurs	Computer-Based Testing/Computer-Adaptive Testing	TBA
23	26-Apr	Tues	Bias in Testing	Camilli & Shepard (1994) Ch. 1
23	28-Apr	Thurs	Bias in Testing	

READINGS:

Required Text: DeVellis, R.F. (2003). *Scale development: Theory and applications*, 2nd ed. Newbury Park: Sage. Available from Wal-mart.com for \$24.26 or from the JMU bookstore.

Additional readings below are available through Blackboard

- Benson, J., & Hagtvet, K.A. (1996). The interplay among design, data analysis, and theory in the measurement of coping. In M. Zeidner and N.S. Endler (Eds.). *Handbook of coping: theory, research, applications* (pp.83-106).
- Benson, J. & Nasser, F. (1998). On the use of factor analysis as a research tool. *Journal of Vocational Education Research*, 23(1), 13-33.
- Brennan, R. L. (1992). NCME instructional module: Generalizability theory. *Educational Measurement: Issues and Practice*, 11 (4), 27-34.
- Camilli, G. & Shepard, L. A. (1994). *Methods for identifying biased test items*. Thousand Oaks: Sage.
- Cohen, R. J., Swerdlik, M. E., & Phillips, S. M. (1996). *Psychological Testing and Assessment: An Introduction to Tests and Measurement* (3rd ed.). Mountain View, CA: Mayfield.
- Cizek, G. J. (1996). An NCME instructional module on setting passing scores. *Educational Measurement: Issues and Practice*, 15 (2), 20-31.
- Friedenberg, L. (1995). *Psychological testing: Design, analysis and use*. Boston: Allyn and Bacon.
- Gregory, R.J. (1992). *Psychological testing: history, principles and applications*. Boston: Allyn and Bacon.
- Hambleton, R. K. & Jones, R. W. (1993). Comparison of classical test theory and item response theory and their applications to test development. *Educational Measurement: Issues and Practice*, ??, 38-47.
- Hambleton, R. K., Swaminathan, H., & Rogers, H. J. (1991). *Fundamentals of Item Response Theory*. Newbury Park: Sage.
- Illinois State Board of Education, Department of School Improvement Services, School and Student Assessment Section. (1995). *Effective scoring rubrics: A guide to their development and use*. Springfield, IL: Author.
- Kolen, M. J. (1988). An NCME instructional module on traditional equating methodology. *Educational Measurement: Issues and Practice*, 7 (4), 29-36.
- Kubiszyn, T. & Borich, G. (1996). *Educational Testing and measurement: Classroom application and practice* (5th ed.). New York: HarperCollins College Publishers, Inc.
- Mehrens, W.A. (1997). The consequences of consequential validity. *Educational Measurement: Issues and Practice*, 16-18.
- Mehrens, W. A., & Lehmann, I. J. (1991). *Measurement and evaluation in education and psychology* (4th ed.). Fort Worth: Holt, Rinehart, & Winston.
- 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.
- Shavelson, R.J., & Webb, N.M. (1991). *Generalizability theory: A primer*. Newbury Park, CA: Sage Publications.
- Traub, R. E. (1994). *Reliability for the Social Sciences*. Newbury Park, CA: Sage.
- Webb, N. M., Rowley, G. L., & Shavelson, R. J. (1988). Using generalizability theory in counseling and development. *Measurement and Evaluation in Counseling and Development*, 21, July, 81-90.
- Zeidner, M. & Most, R. (1992). *Psychological testing: An inside view*. Palo Alto, CA: Consulting Psychologist's Press, Inc.