

Educational Research and Measurement 8610  
Educational Measurement Theory  
Fall Semester 2002  
Instructor: Seock-Ho Kim

## **Topic: Classical Test Theory**

### **Course Description and Objective**

Theoretical basis of classical test theory: statistical treatment of reliability and validity; emphasis on application and interpretation of results through computer analyses (*Graduate Bulletin* 2001-2002).

We will consider theory and principles of test development and validation. The emphasis of the course will be on both theoretical and practical issues of educational and psychological measurement under classical test theory. Following a review of basic ideas of measurement, tests, and statistical concepts, two major concepts of classical test theory, reliability and validity, will be discussed.

The primary objective of the course is to sharpen the skill, sophistication, and intuition of the student in the interpretation of educational and psychological test data, and in the construction and use of tests as instruments of educational and psychological theory and as tools in the practical problems of selection, evaluation, and guidance.

### **Prerequisite**

ERSH 8320 (Applied Correlation and Regression Methods in Education) and ERSH 6600 (Applied Educational Assessment), or equivalents

### **Textbook**

Crocker, L., & Algina, J. (1986). *Introduction to classical and modern test theory*. Belmont, CA: Wadsworth.

### **Suggested Supplementary Text**

Lord, F. M., & Novick, M. R. (1968). *Statistical theories of mental test scores*. Reading, MA: Addison-Wesley.

A copy of Lord and Novick (1968) will be placed in the closed stack Reserve Desk area of the Main Library. Please contact the Reserve Desk (542-3256) if you have questions. Email communication should be addressed to mainresv@uga.cc.uga.edu.

## **Assignments, Examinations, and Evaluation**

Weekly exercises will be assigned and each student is expected to complete the exercises independently. All work must be completed and turned in on time. All work should be lucid, orderly, and self-contained. There will be two midterm examinations on September 24 (Tuesday, 11:00 am-12:15 pm) and on October 24 (Thursday, 11:00 am-12:15 pm) and a final examination on December 16 (Monday, 8:00 am-11:00 am). The midterm examinations will be administered in class. The date and time of the final examination is based on the 'Final Examination Schedule.' The midterm and final examinations will be composed of short answer and brief essay items and basic algebraic proofs of essential formulae and theorems. Specific objectives of the midterm and final examinations as well as copies of practice examinations will be distributed as additional handouts. Grades will be based on completion of the exercises (25%) and on the scores of the three examinations (25% each). Full attendance of lectures is required. Grades will be assigned as follows: A (above 90%), B (between 80% and 90%), C or worse (below 80%).

## **Advice**

On any aspect of the course, see Seock-Ho Kim in 325U Aderhold from 10:00 to 11:00 am on Tuesday and Thursday or by appointment. For appointments or replies to brief questions, send email to skim@coe.uga.edu or call me at 542-4224 (Room 325E). If I am not available when you call, your call will be transferred to the main office of the Department of Educational Psychology. If you leave a message, I will probably reply by email, rather than call you back. Please send me your email address as soon as possible. If you do not have such an address, you may set up a student account through ARCHES.

## **Course Outline**

Week 1: Overview and Introduction to Measurement Theory  
Crocker & Algina, Chapter 1

Week 2: Statistical Concepts for Test Theory  
Crocker & Algina, Chapter 2  
Week 3: Introduction to Scaling  
Crocker & Algina, Chapter 3  
Week 4: Test Construction  
Crocker & Algina, Chapter 4  
Week 5: Test Scores as Composites  
Crocker & Algina, Chapter 5  
Week 6: **Midterm Examination 1**  
Crocker & Algina, Chapters 1-5  
Week 7: Reliability and Classical True Score Model  
Crocker & Algina, Chapter 6  
Week 8: Procedure for Estimating Reliability  
Crocker & Algina, Chapter 7  
Week 9: Validity  
Crocker & Algina, Chapter 10  
Week 10: **Midterm Examination 2**  
Crocker & Algina, Chapters 6-7, 10  
Week 11: Procedures for Prediction and Classification  
Crocker & Algina, Chapter 11  
Week 12: Procedures for Prediction and Classification  
Crocker & Algina, Chapter 11  
Week 13: Factor Analysis  
Crocker & Algina, Chapter 13  
Week 14: Item Analysis  
Crocker & Algina, Chapter 14  
Week 15: Item Response Theory  
Crocker & Algina, Chapter 15  
Week 16: Correction for Guessing  
Crocker & Algina, Chapter 17  
Week 17: **Final Examination**  
Crocker & Algina, Chapters 11, 13-15, 17

## Computer Lab (618 Aderhold) Outline

Lab 1: Descriptive Statistics and WWW Resource  
SPSS, Netscape  
Lab 2: Correlation, Variance and Covariance Matrix  
SPSS  
Lab 3-4: Reliability  
SPSS, CIA, SAS, BMDP  
Lab 5: Multiple Regression, Discriminant Analysis  
SPSS  
Lab 6: Factor Analysis  
SPSS, LISREL

Lab 7-8: Item Analysis Software, Item Response Theory  
CIA, ITEMAN, BILOG

## Tentative Assignments

<b>Problem Set</b>	<b>Due Date</b>
1. Chapter 1 Exercises 1, 4, 5 Chapter 2 Exercises 3, 8, 18	September 3, Tuesday
2. Chapter 3 Exercises 1 Chapter 4 Exercises 1, 5, 6	September 17, Tuesday
3. Chapter 5 Exercises 2, 3	September 24, Tuesday
4. Chapter 6 Exercises 2, 5, 6	October 8, Tuesday
5. Chapter 7 Exercises 1, 2	October 15, Tuesday
6. Chapter 10 Exercises 2, 7	October 24, Thursday
7. Chapter 11 Exercises 1, 3	November 12, Tuesday
8. Chapter 13 Exercises 1	November 19, Tuesday
9. Chapter 14 Exercises 1, 2	November 26, Tuesday
10. Chapter 15 Exercises 4 Chapter 17 Exercises 1	December 16, Monday

N.B. All other end-of-chapter exercises are optional. Additional computer exercises will be assigned later.

## Selected References

### Collections

- Lindquist, E. F. (Ed.). (1951). *Educational measurement*. Washington, DC: American Council on Education.
- Linn, R. L. (Ed.). (1989). *Educational measurement* (3rd ed.). New York: Macmillan.
- Thorndike, R. L. (Ed.). (1971). *Educational measurement* (2nd ed.). Washington, DC: American Council on Education.

### Texts and Monographs

- Allen, M. J., & Yen, W. M. (1979). *Introduction to measurement theory*. Monterey, CA: Brooks/Cole
- American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (1999). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.
- Anastasi, A., & Urbina, S. (1997). *Psychological Testing*. Upper Saddle River, NJ: Prentice Hall.
- Cronbach, L. J. (1984). *Essentials of psychological testing* (4th ed.). New York: Harper & Row.
- Cronbach, L. J., Gleser, G. C., Nanda, H., & Rajaratnam, N. (1972). *The dependability of behavioral measurements: Theory of generalizability for scores and profiles*. New York: Wiley.
- Guilford, J. P. (1954). *Psychometric methods* (2nd ed.). New York: McGraw-Hill.
- Gulliksen, H. (1987). *Theory of mental tests*. Hillsdale, NJ: Erlbaum. (Original work published 1950)
- Hopkins, K. D. (1998). *Educational and psychological measurement and evaluation* (8th ed.). Boston: Allyn and Bacon.
- Magnusson, D. (1967). *Test theory* (H. Mabon, Trans.). Reading, MA: Addison-Wesley. (Original work published 1966)
- McDonald, R. P. (1999). *Test theory: A unified treatment*. Mahwah, NJ: Erlbaum.
- Payne, D. A. (2003). *Applied educational assessment* (2nd ed.). Belmont, CA: Wadsworth.
- Rogers, T. B. (1995). *The psychological testing enterprise: An introduction*. Pacific Grove, CA: Brooks/Cole.
- Thorndike, R. M. (1997). *Measurement and evaluation in psychology and education* (6th ed.). Upper Saddle River, NJ: Merrill/Prentice-Hall.

August 2002



				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
		Chap 1		Lab 1		
25	26	27	28	29	30	31
		Chap 2		Chap 2		

## September 2002

1	2	3	4	5	6	7
		Chap 3		Lab 2		
		Prob 1				
8	9	10	11	12	13	14
		Chap 4		Chap 4		

15	16	17	18	19	20	21
		Chap 5		Chap 5		
		Prob 2				
22	23	24	25	26	27	28
		<b>Mid 1</b>		Chap 6		
		Prob 3				
29	30					

## October 2002

		1	2	3	4	5
		Chap 6		Lab 3-4		
6	7	8	9	10	11	12
		Chap 7		Chap 7		
		Prob 4				
13	14	15	16	17	18	19
		Chap 10		Chap 10		
		Prob 5				
20	21	22	23	24	25	26
		Chap 10		<b>Mid 2</b>		

				Prob 6		
27	28	29	30	31		
		Chap 11				

## November 2002

					1	2
3	4	5	6	7	8	9
		Chap 11		Lab 5		
10	11	12	13	14	15	16
		Chap 13		Chap 13		
		Prob 7				
17	18	19	20	21	22	23
		Chap 14		Lab 6		
		Prob 8				
24	25	26	27	28	29	30
		Chap 15				
		Prob 9				

# December 2002

1	2	3	4	5	6	7
		Chap 17		Lab 7-8		
8	9	10	11	12	13	14
15	16	17	18	19	20	21
	<b>Final</b>					
	Prob 10					
22	23	24	25	26	27	28
29	30	31				