GEORGE MASON UNIVERSITY
COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT
EDUCATIONAL PSYCHOLOGY PROGRAM

EDRS 828
Modern Measurement in Education and Human Development

Semester Year

Meeting Time/Days: 4:30pm-7:10pm, Friday
Location: Thompson Hall, L014
PROFESSOR: Dimiter Dimitrov
Office phone: 703-993-3842
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Office hours: Thursday (3:00pm-4:10pm); Friday (5:30pm-6:40pm)
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COURSE DESCRIPTION:
  A. **Prerequisites: EDRS 811**
  B. Focusing on the acquisition of knowledge and skills related to modern theory of measurement with application in the context of education, psychology, and related fields.

NATURE OF COURSE DELIVERY:
Lectures, large group discussion, in class activities, and individual/group assignments

LEARNER OUTCOMES:

This course is designed to enable students to:

- Understand fundamental concepts, principles, and procedures of modern measurement and test development in the framework of classical test theory, generalizability theory, item response theory, and psychometric models for cognitive diagnosis.
- Understand the contemporary treatment of reliability and validity of assessment scale data.
- Analyze and interpret measurement data in classical and modern frameworks, with computer aided applications in educational context.
- Synthesize and present the integration of their learning in a research project format.
- Read and evaluate scientific articles related to application of modern measurement in education, psychology, and related fields.
- Able to envision ways to pursue their interests in the area of educational assessment and measurement in their graduate study or careers.
  .

PROFESSIONAL STANDARDS:

The student outcomes are informed by the Standards for Reporting non Empirical Social Science Research in Publications of the American Educational Research Association (AERA; *Educational*

Researcher, Vol. 35, No. 6, pp. 33–40). Those standards deemed most relevant to addressing the learning targets for the course are those that state that *educators will have the knowledge, skill and disposition to:*

1. Apply principles of measurement practices for specific educational needs.
2. Evaluate the reliability of measurement data using advanced methodology and procedures the context of education and related fields.
3. Evaluate the validity of measurement data based on the contemporary model of construct validity in the context of education and related fields.
4. Conduct classical and modern analysis of measurement data using contemporary statistical software and interpret the results.
5. Use reliable and valid measurement data and interpretations to disseminate and advance understanding and knowledge related to modern measurement in education and related fields.
6. Recognize the implications of reliable measurements and valid interpretations for social justice in schools and other professional organizations.

REQUIRED TEXTS:

Osterlind, S. J. (2010). *Modern measurement: Theory, principles, and applications of mental appraisal* (2nd ed.) Upper Saddle River, NJ: Pearson.

COURSE REQUIREMENTS, PERFORMANCE-BASED ASSESSMENT, AND EVALUATION CRITERIA:

   A. Requirements

1. **In class/Homework Assignments (10%):** Students will be asked to work individually on homework assignments throughout the semester.

2. **Class Attendance and Participation (5%):** Students are required to attend all classes, to be on time, prepared, follow outlined procedures in case of absence, actively participate and support the members of the learning group and the members of the class. The scoring rubric for class attendance and participation in provided in Appendix 1.

3. **Midterm Examination (15%):** Students will take a midterm examination (closed books and notes) to demonstrate understanding and knowledge of course content covered to date of examination.

4. **Pilot Research Study (50%):** This course requires students to develop and conduct a pilot-research study related to development and/or validation of an assessment scale in the context of education. This study is intended to reflect what you have learned from this course. It should be written in a way that one would submit for a national professional conference paper presentation.

5. **Final Examination (20%):** Students will take a final examination (closed books and notes) to demonstrate understanding and knowledge of course content covered throughout the coursework.

Other requirements for this course are designed to build up bases for the final pilot research proposal. Research papers must be handed in on time and must adhere to the APA Publication Manual Guidelines.

This pilot research study will be divided into 4 sequential parts.

1. Identify a topic of modern measurement in educational context; conduct a literature review; discuss significance of the proposed study; state the purpose of the study and related research questions.
2. Methods – describe the study sample, targeted measurement objects, procedures of data collection, and selected methods for addressing the measurement research questions.
3. Write the results section.
4. Discussion and Conclusion.

The presentation of the final paper will take place the last day of class in a research paper format (APA style, see also guidelines posted on the AERA website, www.aera.net.org.) After completing the research study, reflect on that experience. What did you learn from it? How do you think course material helped you carry out the study? [**Scoring rubric** for the research paper is provided in Appendix 2].

B. Performance-based assessments

All of the student products specified under course requirements will require performance-based assessments guided by grading rubrics. The scoring rubrics associated with the assessment of (a) class attendance and participation and (b) pilot research project ate proposal development assignment is provided in Appendices 1 and 2, respectively.

C. Criteria for evaluation

There are 100 total points for the course, distributed among the homework assignments (10%), class attendance and participation (5%), midterm examination (15%), pilot research project (50%), and final examination (20%).

D. Grading scale

Letter grades will be assigned as follows:

A+ 97.5 - 100%, **A** 92.5 - 97.49%, **A-** 89.5 - 92.49%,
B+ 87.5 - 89.49%, **B** 82.5 - 87.49%, **B-** 79.5 - 82.49%,
C 70-79.49%, and
F below 70%

COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT

Student Expectations

- Students must adhere to the guidelines of the George Mason University Honor Code [See http://academicintegrity.gmu.edu/honorcode/].

- Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See http://ods.gmu.edu/].

- Students must follow the university policy for Responsible Use of Computing [See http://universitypolicy.gmu.edu/1301gen.html].

- Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.

- Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.

- Students are expected to exhibit professional behaviors and dispositions at all times.

Campus Resources

- The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See http://caps.gmu.edu/].

- The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing [See http://writingcenter.gmu.edu/].

- For additional information on the College of Education and Human Development, Graduate School of Education, please visit our website [See http://gse.gmu.edu/].

PROPOSED CLASS SCHEDULE

Session	Topic	Source[1]
Jan. 25	Introduction to educational and psychological measurement. Statistical concepts for measurement	**Text** (Ch. 1, 2) H1
Feb. 1	Classical Test Theory (CTT): True-score model	**Text** (Ch. 3), H2
Feb. 8	Reliability and Validity of Measurements	Text (Ch. 4, 5), H3
Feb. 15	Common factor model of true scores and reliability	H4
Feb. 22	Scales and Norms	**Text** (Ch. 6, 7), H5
March 1	Generalizability Theory Approach to Reliability	**Text** (Ch. 11), H6
March 8	Midterm Examination	
March 15	**SPRING BREAK** (No Classes)	
March 22	Item Response Theory (IRT): Description and relation to CTT. One-parameter IRT model of measurement	**Text** (Ch. 10), H7
March 29	Two- , and Three-Parameter Models in IRT	**Text** (Ch. 10), H8
April 5	Rasch model of measurement	H9
April 12	Differential item functioning (DIF)	**Text** (Ch. 12), H10
April 19	Scale Equating in IRT	**Text** (Ch. 15), H11
April 26	Cognitive diagnosis: Introduction and selected models [DINA and Least Squares Distance Model]	H12
May 3	Review and Project Discussion [Projects due]	
May 10	**FINAL EXAMINATION**	

[1] **H** Instructor's Handout Materials on Black Board

APPENDIX 1

RUBRIC FOR PARTICIPATION AND ATTENDANCE

		LEVEL OF PERFORMANCE		
ELEMENT	Distinguished (4-5 pts.)	Proficient (3 pts.)	Basic (2 pts.)	Unsatisfactory (1 or 0 pts.)
Attendance & Participation	The student attends all classes, is on time, is prepared and follows outlined procedures in case of absence. The student actively participates and supports the members of the learning group and the members of the class.	The student attends all classes, is on time, is prepared and follows outlined procedures in case of absence; the student makes active contributions to the learning group and class.	The student is on time, prepared for class, participates in group and class discussions. The student attends all classes and if an absence occurs, the procedure outlined in this section of the syllabus is followed.	The student is late for class. Absences are not documented by following the procedures outlined in this section of the syllabus. The student is not prepared for class and does not actively participate in discussions.

GENERAL EVALUATION CRITERIA:

- Clarity and organization
- Comprehensiveness of content
- APA style   TOTAL SCORE: **MAX = 50 pts.**

Performance Elements	Quality Points
Introduction Section	**max = 9 points**
Statement of the nature and importance of the problem and literature review related to the issues.	**4-5 points:** The study problem is (a) related to application of modern approaches to analysis of measurement data, (b) described in a parsimonious and complete manner, (c) channeled towards the purpose of the study, and (d) embedded in a literature review on related theory and research.
	2-3 points: The study problem is related to application of modern approaches to analysis of measurement data and overall well described, but it is not channeled towards the purpose of the study or the literature review is not quite on target.
	0-1 points: The study problem is not clearly described, poorly channeled towards the purpose of the study, and not supported well by the literature review.
Justification of the need for this study	**2 points:** The justification of the study is well described and stems from a necessity to fill up an existing gap in previous development and validation of assessment scales.
	0-1 points: The justification of the study is not well described and/or does not stem from a necessity related to development and validation of assessment scales.
Statement of the purpose of the study and related research questions.	**2 points:** The purpose of the study is connected to the statement of the problem and the research questions are properly described.
	0-1 points: The purpose of the study is not well connected to the statement of the problem and/or the research questions are not properly described.
Method Section	**max = 13 points**
	4 points: Provided is clear, accurate, and complete description of the study sample — sampling method

Description of the study sample	(e.g., random selection, existing data, etc.), relevant demographic characteristics, sample size (total and by subgroups), and judgments on the appropriateness of the sample for the measurement methods being used.
	2-3 points: The description of the study sample is relatively complete, but there are drawbacks related to the description of sampling method, relevancy of demographic characteristics, sample size, or sample appropriateness.
	0-1 points: Provided is a poor description of the study sample, with missing elements related to method of sampling, demographic characteristics, and appropriateness.
Description of the data (instruments, scales, and score reliability)	**2-3 points:** Provided is clear, accurate, and complete description of the assessment scale data and reliability of scores obtained for the study sample.
	0-1 points: The description of the data sources is incomplete (or missing) and there is no report on score reliability for the study sample.
Description of the data collection method	**2 points:** Provided is clear, accurate, and complete description of the data collection method.
	0-1 points: The description of the data collection method is incomplete (or missing).
Description of the measurement methods and procedures used to address the measurement issues and questions in the project	**4 points:** Provided is clear, accurate, and complete description of an *appropriate* measurement method, related procedures, and software for data analysis.
	2-3 points: The measurement method, procedures, and software are appropriate, but there is no sufficient clarity, accuracy, and/or completeness in their description and justification.
	0-1 points: The measurement method, procedures, and software are not entirely (or at all) appropriate.
Results Section	**max = 14 points**
	8 points: Provided is clear, accurate, and complete presentation of relevant results in APA style by project research questions.
	6-7 points: Provided is clear, accurate, and complete presentation of relevant results by project research questions, with some deviations from the APA style.
	5-6 points: Provided is an accurate presentation of

	relevant results by project research questions, with some deviations from clarity, completeness, and the APA style.
Within-text presentation of results obtained with the statistical data analysis for each research question	**4-5 points:** Presented are relevant results by project research questions, with some deviations from clarity, accuracy, completeness, and the APA style.
	2-3 points: Some results are irrelevant and/or there problems with clarity, accuracy, completeness, and APA style.
	0-1 points: Some results are irrelevant and there are serious problems with clarity, accuracy, completeness, and APA style.
Presentation of tables	**2-3 points:** The tables include all necessary information presented in APA style**.**
	0-1 points: The tables do not include all necessary information and /or there APA style problems.
Presentation of figures	**2-3 points:** The figures are clear and provide relevant information in APA style.
	0-1 points: There are serious problems with clarity of the figures, their relevance, and/or APA style.
Discussion Section	**max = 14 points**
Conclusions drawn from the results, findings and implications for theory and/or practice	**8 points:** Provided are clear, accurate, and complete conclusions drawn from the study results, comparisons with findings in previous studies on the topic of interest, plausible explanations of the study findings, and implications for theory and/or practice.
	6-7 points: Provided are conclusions drawn from the study results, but there are some minor problems in accuracy and/or sufficiency related to comparisons with findings in previous studies, plausible explanations of the study findings, implications for theory and/or practice, and APA style.
	5-6 points: Provided are conclusions drawn from the study results, but there are relatively serious problems in accuracy and/or sufficiency related to comparisons with findings in previous studies, plausible explanations of the study findings, implications for theory and/or practice, and APA style.
	4-5 points: Some conclusions are not well connected to the study results and there are relatively serious problems in accuracy and/or sufficiency related to comparisons with findings in previous studies,

	plausible explanations of the study findings, implications for theory and/or practice, and APA style.
	2-3 points: Some conclusions are not based on the study results and there are more serious problems in accuracy and/or sufficiency related to comparisons with findings in previous studies, plausible explanations of the study findings, implications for theory and/or practice, and APA style.
	0-1 points: The conclusions are not connected to (or not based on) the study results and there are serious problems in accuracy and/or sufficiency related to comparisons with findings in previous studies, plausible explanations of the study findings, implications for theory and/or practice, and APA style.
Limitations of the study	**2-3 points:** Provided is clear, accurate, and complete description of limitations of the study and their implications for the study findings and generalization.
	0-1 points: There are serious problems in clarity, accuracy, and completeness of the study limitations and their implications for the findings and their generalization.
Recommendations for future research	**2-3 points:** The recommendations for future research are clearly presented and stem from logical necessity for meaningful replications and/or further extensions of the study design and analyses.
	0-1 points: The recommendations for future research are *not* clearly presented and do not address (or justify) the necessity for replications and/or further extensions.