

**George Mason University**  
**College of Education and Human Development**  
Ph. D. in Education and Human Development

EDRS 828.001 - Modern Measurement: Item Response Theory  
3 Credits, Fall 2017  
Thursday/4:30-7:10pm Thompson L014

**Faculty**

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**Prerequisite:**

EDRS 821 or EDRS 827

**University Catalog Course Description:** Develops knowledge and skills related to Item Response Theory with application in the context of education, psychology, and related fields.

**Course Overview:** EDRS 828 introduces students to the measurement of latent traits using Item Response Theory (IRT) models. Students require a working knowledge of measurement theory. EDRS 828 provides students with the requisite skills to interpret and critically evaluate IRT models as discussed in educational and psychological measurement journals. EDRS 828 will cover binary and polytomous IRT models. Students will learn through a combination of reading assignments, hands-on experience analyzing IRT models through multiple graphics packages and software.

**Course Delivery Method:** Lectures will be used to present quantitative and factual information. Seminar discussions will occasionally be used to clarify and extend knowledge presented in assigned readings. In-class and out-of-class homework, readings, and exercises will be assigned weekly and used to prepare for discussion. **Questions are encouraged.**

**Learner Objectives:** This course is a one-semester measurement course design to expand students' understanding of organizing, analyzing, and interpreting IRT models, it is expected that you will be able to:

- a) Understand fundamental concepts, principles, and procedures of IRT models;
- b) Analyze and interpret measurement data in an IRT framework, with computer aided applications in educational context;
- c) Synthesize and present the integration of their learning in a research project format;
- d) Read and evaluate scientific articles related to application of IRT models in education, psychology and related fields;
- e) Able to envision ways to pursue their interests in the area of educational assessment and measurement in their studies or career;

**Required Materials:**

de Ayala, R. J. (2009). *The theory and practice of item response theory*. New York, NY: The Guilford Press.

Embretson, S. E., & Reise, S. P. (2000). *Item response theory for psychologists*. Mahwah, NJ: Lawrence Erlbaum.

### **Recommended Resource:**

American Psychological Association (2009). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: APA.

Hambleton, R.K., Swaminathan, H., & Rogers, H.J. (1991). *Fundamentals of item response theory*. Newbury Park, CA: Sage. (ISBN: 0803936478)

Raykov, T., & Marcoulides, G. A. (2011). *Introduction to psychometric theory*. New York, NY: Routledge.

### **Course Performance Evaluation:**

**Homework Assignments (20%):** Assignments and exercises will be given weekly and will include (a) Questions from readings, (b) Homework Problems, and/or (c) Data Analysis Assignment. These assignments will be used as a record of participation in class discussions.

**Article Review (20%):** You will review (as though you were peer reviewing) an empirically-based article related to Item Response Theory. Your review should address the nature of the study, literature reviewed, methods (appropriateness), hypotheses, data, or conclusions. Your review will be less than two double spaced page

**Mid-term Examination (20%):** Students will take a midterm examination to demonstrate understanding and knowledge of course content covered.

**Item Response Theory Project (40%):** Students will be assigned to groups. Students will identify their own data to conduct IRT analyses to determine the model that best fit their data. The purpose of this project is to focus and integrate the concepts covered in class. You will submit a document that simulates the Results section of manuscript for publication. Students will also present their procedures and findings in class.

### **Other Requirements:**

**Class Readings:** The readings for this course come from the required textbook as well as journals and other books which provide insight or examples of the topic. Readings, when possible, will be made available to you for download from the Blackboard course website.

**Class Attendance & Participation:** Students are expected to come to class on time, complete assignments, and participate in class discussions.

### **Grading Policies:**

Grades will be assigned based on the following:

A+	98-100%	B+	88-89%	C	70-79%
A	93-97%	B	83-87%	F	below 70%
A-	90-92%	B-	80-82%		

Final grades are based in the assessments described above. “Extra credit” is not available.

**Late Assignments:** As a general rule, late assignments will not be accepted. If you believe you have EXCEPTIONAL circumstances and wish to negotiate to have extra time to complete course work, you must discuss this with me before the day the assignment is due. (Negotiating means that you will be sacrificing a portion, perhaps substantial, of your grade for extra time).

**Professional Dispositions:** Students are expected to exhibit professional behaviors and dispositions at all times. See <https://cehd.gmu.edu/students/polices-procedures/>

### Course Schedule

Date	Class	Topic	Reading	Due
08/31	1	Course Overview Review and Contrasting CTT and IRT		
09/07	2	Basic IRT Concepts, Models and Assumptions	E & R Ch. 1-3	
09/14	3	Model Specification and Characteristics		
09/21	4	Estimation Methods	de Ayala Ch. 3-4	
09/28	5	Estimation Methods	de Ayala Ch. 3-4	
10/05	6	Binary IRT Models	E & R Ch. 4 de Ayala 5-6	
10/12	7	Polytomous IRT Models	E & R Ch. 5 de Ayala 7-9	
10/19	8	<b>Midterm Examination</b>		
10/26	9	Introduction to R Environment and IRT Packages		
11/02	10	Reliability and IRT	E & R Ch. 6-7	
11/09	11	Linking and Equating	de Ayala Ch. 11	
11/16	12	Item and Test Bias		
11/23		<b>Thanksgiving</b>		
11/30	13	Differential Item Functioning	E & R Ch. 10 de Ayala Ch. 12	
12/07	14	Computerized Adaptive Testing and Multidimensional IRT	E & R Ch. 10 de Ayala Ch. 10	
12/15	15	Research Project Presentations		

Note: E & R - Embertson & Reise

Faculty reserves the right to alter the schedule as necessary, with notification to students.

## **Core Values Commitment**

The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: <http://cehd.gmu.edu/values/>.

## **GMU Policies and Resources for Students**

### *Policies*

- Students must adhere to the guidelines of the Mason Honor Code (see <http://oai.gmu.edu/the-mason-honor-code/>).
- Students must follow the university policy for Responsible Use of Computing (see <http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/>).
- Students are responsible for the content of university communications sent to their Mason 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 with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (see <http://ods.gmu.edu/>).
- Students must follow the university policy stating that all sound emitting devices shall be silenced during class unless otherwise authorized by the instructor.

### *Campus Resources*

- Support for submission of assignments to Tk20 should be directed to [tk20help@gmu.edu](mailto:tk20help@gmu.edu) or <https://cehd.gmu.edu/aero/tk20>. Questions or concerns regarding use of Blackboard should be directed to <http://coursesupport.gmu.edu/>.
- For information on student support resources on campus, see <https://ctfe.gmu.edu/teaching/student-support-resources-on-campus>

**For additional information on the College of Education and Human Development, please visit our website <https://cehd.gmu.edu/students/> .**