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 2020

Course Time: Thursday 4:30- 7:10 PM
Course Location: Innovation Hall 205 and/or Online

Instructor: Marvin Powell, Ph. D.
Office: West Building Room 2105
Office Hours: by appointment (please email).
Email address: mpowel11@gmu.edu

Prerequisite: B- or higher and satisfactory completion of EDRS 821 or EDRS 827 or equivalent required.

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**.

Under no circumstances, may candidates/students participate in online class sessions (either by phone or Internet) while operating motor vehicles. Further, as expected in a face-to-face class meeting, such online participation requires undivided attention to course content and communication.

Technical Requirements

To participate in this course, students will need to satisfy the following technical requirements:

- High-speed Internet access with standard up-to-date browsers. To get a list of Blackboard's supported browsers see: https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#supported-browsers

  To get a list of supported operation systems on different devices see:

https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#tested-devices-and-operating-systems

- Students must maintain consistent and reliable access to their GMU email and Blackboard, as these are the official methods of communication for this course.
- Students will need a headset microphone for use with the Blackboard Collaborate web conferencing tool. [Delete this sentence if not applicable.]
- Students may be asked to create logins and passwords on supplemental websites and/or to download trial software to their computer or tablet as part of course requirements.
- The following software plug-ins for PCs and Macs, respectively, are available for free download: [Add or delete options, as desire.]
    - Adobe Acrobat Reader: https://get.adobe.com/reader/
    - Windows Media Player: https://support.microsoft.com/en-us/help/14209/get-windows-media-player
    - Apple Quick Time Player: www.apple.com/quicktime/download/

Expectations

- Course Week: Our course week will begin on the day that our synchronous meetings take place as indicated on the Schedule of Classes.
- Log-in Frequency:
  Students must actively check the course Blackboard site and their GMU email for communications from the instructor, class discussions, and/or access to course materials at least twice per week. In addition, students must log-in for all scheduled online synchronous meetings.
- Participation:
  Students are expected to actively engage in all course activities throughout the semester, which includes viewing all course materials, completing course activities and assignments, and participating in course discussions and group interactions.
- Technical Competence:
  Students are expected to demonstrate competence in the use of all course technology. Students who are struggling with technical components of the course are expected to seek assistance from the instructor and/or College or University technical services.
- Technical Issues:
  Students should anticipate some technical difficulties during the semester and should, therefore, budget their time accordingly. Late work will not be accepted based on individual technical issues.
- Workload:
  Please be aware that this course is **not** self-paced. Students are expected to meet *specific deadlines* and *due dates* listed in the **Class Schedule** section of this syllabus. It is the student's responsibility to keep track of the weekly course schedule of topics, readings, activities and assignments due.
- Instructor Support:
  Students may schedule a one-on-one meeting to discuss course requirements, content or other course-related issues. Those unable to come to a Mason campus can meet with the instructor via telephone or web conference. Students should email the instructor to schedule a one-on-one session, including their preferred meeting method and suggested dates/times.

- Netiquette:
  The course environment is a collaborative space. Experience shows that even an innocent remark typed in the online environment can be misconstrued. Students must always re-read their responses carefully before posting them, so as others do not consider them as personal offenses. *Be positive in your approach with others and diplomatic in selecting your words*. Remember that you are not competing with classmates, but sharing information and learning from others. All faculty are similarly expected to be respectful in all communications.
- Accommodations:
  Online learners who require effective accommodations to insure accessibility must be registered with George Mason University Disability Services.

Learning 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.
Embertson, 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.
Baker, F. B., & Kim, S. (2017). *The basics of item response theory using R.* Springer International.
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:

Article Presentation (5%): You will be required to identify an IRT article (substantive and not methodological) within you field (or otherwise) and conduct a five-minute presentation. **Due 9/10**.

Homework Assignments (15%): Assignments and exercises will be given throughout the course and will include (a) Questions from readings, (b) Homework Problems, and/or (c) Data Analysis Assignment.

Article Review (20%): You will review (as though you were peer reviewing) an empirically-based article related to IRT. Your review should address the nature of the study, literature reviewed, methods (appropriateness), hypotheses, data, and conclusions. Your review will be less than two double spaced pages. **Due 12/03.**

Mid-term Examination (20%): You will take a midterm examination to demonstrate understanding and knowledge of course content covered. **Due 10/15.**

Item Response Theory Project (40%): This assignment can be done individually or within a small group of **no more than three students**. You will identify your own data to conduct IRT analyses to determine the model that best fits your data. The purpose of this project is to focus and integrate the concepts covered in class. You will submit a document that simulates the Methods and Results sections of manuscript for publication. You will also present their procedures and findings in class. You are also required to make a presentation of the project (10%). And the final written document will comprise the remaining 30%. **Due 12/15.**

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	Location	Topic	Reading	Due Date
08/27	1	Online	Course Overview Review and Contrasting CTT and IRT		
09/03	2	Online	Basic IRT Concepts, Models and Assumptions	E & R Ch. 1-3	
09/10	3	Online	Model Specification and Characteristics		Article Presentation
09/17	4	Online	Estimation Methods	de Ayala Ch. 3-4	
09/24	5	Online	Estimation Methods	de Ayala Ch. 3-4	
10/01	6	Online	Binary IRT Models	E & R Ch. 4 de Ayala 5-6	
10/08	7	Online	Polytomous IRT Models	E & R Ch. 5 de Ayala 7-9	
10/15	8	Online	**Midterm Examination**		Mid-Term
10/22	9	IH 205	Introduction to R Environment and IRT Packages		
10/29	10	Online	Reliability and IRT	E & R Ch. 6-7	
11/05	11	IH 205	Linking and Equating	de Ayala Ch. 11	
11/12	12	Online	Item and Test Bias		
11/19	13	IH 205	Differential Item Functioning	E & R Ch. 10 de Ayala Ch. 12	
11/26			**Thanksgiving**		
12/03	14	Online	Computerized Adaptive Testing and Multidimentional IRT	E & R Ch. 10 de Ayala Ch. 10	Article Review
12/10	15	Online	Research Project Presentations		Final Project Paper

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 https://catalog.gmu.edu/policies/honor-code-system/).
- Students must follow the university policy for Responsible Use of Computing (see https://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 https://ds.gmu.edu/).

- Students must silence all sound emitting devices during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to Tk20 should be directed to tk20help@gmu.edu or https://cehd.gmu.edu/aero/tk20. Questions or concerns regarding use of Blackboard should be directed to https://its.gmu.edu/knowledge-base/blackboard-instructional-technology-support-for-students/.

- For information on student support resources on campus, see https://ctfe.gmu.edu/teaching/student-support-resources-on-campus

Notice of mandatory reporting of sexual assault, interpersonal violence, and stalking:
As a faculty member, I am designated as a "Responsible Employee," and must report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-380-1434 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance from Mason's Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.

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