EPRS9350
Item Response Theory
Fall 2020

Instructor: Chris Oshima, Professor, Dept. of Ed. Policies
Office: 478 Col. of Ed. Bldg.)
e-mail: oshima@gsu.edu
Web: http://coshima.davidrjfikis.com
Office Hours: by an appointment

Course Requirements

Class Schedule: 100% Online
                   Synchronous Meeting: Thu. 4:30 – 6:30 PM

Texts: Hambleton, R. K., Swaminathan, H., and H. J. Rogers
                   (1991). Fundamentals of item response theory.
                   Newbury Park, CA: SAGE. Required.

                   De Ayala, R. J. (2009). The theory and practice
                   of item response theory. New York: NY: Guilford.
                   www.guilford.com Optional.

                   Neel, J. H (1991) A review of some algebra,
                   calculus, and statistics necessary for item
                   response theory. (Handout) Available on my Web.

                   Reading list of books and articles will be
                   provided.

Prerequisite: EPRS8540 (Quantitative Methods II) or equivalent
                   is required at minimum. In addition, knowledge
                   from a measurement course (typically, a master's
                   level class covering classroom testing) is
                   expected. Students are encouraged to take the
                   following courses prior to this class: EPRS8550
                   (Quantitative Methods III), EPRS9330 (Advanced
                   Measurement Theory). Please see the instructor
                   if there is any question regarding equivalence
                   of courses.

Homework: Due to the nature of the subject matter, problems,
                   theoretical solutions, and computer analyses
                   will be expected almost all periods. Submit
                   your HW0 – HW7 and didactic solutions to exercises
                   at the end of the chapters from the main textbook
                   (Ex. Ch. 1 – Ex Ch.10) to Assessments Dropbox
                   in iCollege. Typically due **Wed. 10AM.** Homework
                   will be counted only for submission (i.e., not
                   graded). All HW and Exercises are reviewed in

the class.

Software: IRTPRO

Projects: Each student will select one of the following
                   projects:

                   <A> Tutorial Videos
                       Using Camtasia (or other programs), create
                       a didactic video on a topic. The list of
                       topics is provided in a separate sheet.

                   <B> A research proposal
                       The proposal will consist of:
                       (1) abstract (one-half page limit) - The
                       summary should include a statement of the
                       research objectives, methods to be employed,
                       and the significance of the proposed
                       research.
                       (2) project description - The description
                       should include (a) rationale (literature
                       review), (b) objectives and significance,
                       and (c) research designs and methodology.
                       (3) references.

                   <C> A thorough literature review
                       The review will be focused on some topics
                       on item response theory. The paper should
                       be 10-15 pages with double space including
                       references.

                   <D> An analysis of real data
                       The student will obtain real test data,
                       and analyze the data using IRTPRO or
                       equivalent. Then a report will be prepared
                       including a description of the test,
                       item/test analyses and interpretation of
                       results. The report may include tables
                       and figures and the length of the report
                       may range from 5 to 15.

                   <E> Others
                       Developing useful software. Comparing
                       different software packages, Developing
                       instructional materials, A book review,
                       etc. Be creative!

Exams:	Midterm (take home) due Wed. Oct. 14, **10AM** Final (take-home) due Wed. Dec. 2, **10AM**
Grades:	Participation, two exams and project will be weighted equally (1/4 each) to determine the course grade. Students are required to present assigned materials and participate in discussions during the class. Participation Grade (Self Graded): 100 - Miss no more than one class and miss no more than one submission. Otherwise participated fully. 90 – Miss up to two classes or miss up to two submissions. Otherwise participated fully. 80 – Miss up to three classes or miss up to three submissions. Otherwise participated fully. 70 or below – Did not participate fully.
Academic Honesty:	Please see the section of the general catalog which describes the university policy on academic honesty. The policy provides descriptions of what violates the policy and of what penalties may be imposed for violations. Departmental policy authorizes professors to assign failing grades for any work which does not meet the standards of academic honesty. Any violation of academic honesty can results in a failing grade in a course.
Note:	The last day to withdraw and receive a "W" is 10/13/2020.

Course Description

An introduction to item response theory (IRT) as used in test construction. Applications include item banking, item bias, test equating, and computer adaptive testing.

Course Rationale

Modern test construction is rapidly becoming an IRT phenomenon with fewer and fewer classical methodologies. This course provides the

students to understand the theoretical basis for IRT and to begin
to apply the theory.

<u>Course Goals</u>

The student will develop an understanding of:

(1) basic IRT models.
(2) the use of computers in IRT.
(3) current research in IRT.

<u>Course Objectives</u>

After completing this course the student will be able to:

(a) explain different unidimensional IRT models (one-, two-, and
three-parameter models).
(b) demonstrate familiarity with estimation procedures.
(c) examine the model fit.
(d) recognize a variety of applications using IRT (i.e., item bias,
equating, item banking, computer adaptive testing, etc.)
(e) use IRTPRO with real data.
(f) recognize future directions of IRT including multidimensional
models.

Schedule 2020

Week	Topic Covered in Class	Reading Prior to Class	HW Due Wed 10AM
1. (8/27)	Background	HSR Ch.1 De Ayala Ch.1	
2. (9/3)	Review of Classical Test Theory (CTT)	C&A Ch. 6,7 (ITEMS: Reliability) C&A Ch.14	
	Intro. To IRT	HSR Ch.2 *Furgan, et al. (20) (IRT and CTT)	
	Math Review for IRT	Neel (*Set1,*Set2,*Set3)	Non-Excel HW0 Ex.Ch.1
3. (9/10)	IRT Models Intro to Simulation	HSR Ch.2 De Ayala Ch.2,5,6 *Harris (89) (ITEMS: 1P. 2P, 3P) *Feinberg, et al. (16) (ITEMS: Simulation)	ExcelHW1 Ex.Ch.2
4. (9/17)	Parameter Estimation Intro to IRTPR	HSR Ch.3 De Ayala Ch.3,4 *Oshima (94) (Speededness) *Paek & Han (13) (IRTPRO)	ExcelHW2 Ex.Ch.3
5. (9/24)	Model Estimation/Fit	HSR Ch.4 *Ames & Penfield (15)	

(ITEMS: Item Fit)

ExcelHW3
Ex.Ch.4

6. (10/1) The Ability Scale   HSR Ch.5-6
         Information and Efficiency
                                     *Shaftel (05)
                                     (Disability)

                                     ExcelHW4
                                     Ex.Ch.5-6

7. (10/8) Test Construction   HSR Ch.7
                                     *Sedransk (18)
                                     (About IRT Models)

                                     ExcelHW5
                                     Ex.Ch.7

8. (10/15)Exam Review/Project   Exam 1

9. (10/22)
         Intro to Polytomous IRT De Ayala Ch. 7 Ch.8

                                     *Penfield (14)
                                     (ITEMS: Poly IRT)

                                     * Hiramatsu, et al. (20)
                                     (Shame and IRT)
10.
   (10/29) Differential Item   HSR Ch.8
           Functioning (DIF)   De Ayala Ch.12

                                     *Gomes-Benito et al. (18)
                                     (DIF/Validity)
                                     *Oshima & Morris (08)
                                     (ITEMS: DFIT)
                                     Ex.Ch.8

11.(11/5)DIF   HSR Ch.8

                                     *Woods, et al. (13)
                                     (Wald Test)
                                     *Oshima, et al. (15)
                                     (MG DFIT)
                                     ExcelHW6

12.(11/12)Equating   HSR Ch.9

```
                              De Ayala Ch.11
                              *Malatesta (19)
                              (Equating Software)
                              *Fikis & Oshima (17)
                              (Purification)

                                             Ex.Ch.9

13.(11/19)Computer Adaptive Testing
            (CAT)             HSR Ch.10

                              *Thompson & Weiss (11)
                              (Practical Guidance on CAT)
        Multidimensional IRT  HSR Ch.11

                              *Ackerman et al. (03)
                              (ITEMS: MD IRT)

                              Project Due Wed 10AM


                                             ExcelHW7
                                             Ex.Ch.10



14. (12/3)
        Project Presentations                Exam 2
```

The asterisk * indicates a possible student's presentation.
ITEMS: The Instructional Topics in Educational Measurement Series

Note: The course syllabus provides a general plan for the course; deviation may be necessary. Please see "Outline Fall 2020.xlsx" for a week-by-week detailed schedule including videos.

References
    Crocker, L., & Algina, J. (1986). Introduction to classical and modern test theory. New York: Holt, Reinehart, and Winston.