

EPRS9350
Item Response Theory
Fall 2018

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Office Hours: by an appointment

Course Requirements

Class Schedule: 409-ED
Thu. 4:30 - 7:00 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: BILOG-MG or IRT PRO
IRT PRO: <http://www.ssicentral.com/irt/downloads.html>

Windows only

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.

 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 BILOG-MG3 or IRTPRO. 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. 10, **10AM**
Final (take-home) due Wed. Nov. 28, **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 result in a failing grade in a course.

Note: The last day to withdraw and receive a "W" is 10/9/2018.

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.

Course Goals

The student will develop an understanding of:

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

Course Objectives

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 BILOG-MG3 with real data.
- (f) recognize future directions of IRT including multidimensional models.

Schedule (8/20/2018)

<u>Week</u>	<u>Topic Covered in Class</u>	<u>Reading Prior to Class</u>	<u>HW Due Wed 10AM</u>
1. (8/23)	Background	HSR Ch.1 De Ayala Ch.1	
2. (8/30)	Review of Classical Test Theory (CTT)	C&A Ch. 6,7 (ITEMS: Reliability)	
	Intro. To IRT	C&A Ch.14 HSR Ch.2	
	Math Review for IRT	*Hambleton & Jones (93) (ITEMS: CTT vs. IRT) Neel (*Set1, *Set2, *Set3)	Non-Excel HW0 Ex.Ch.1
3. (9/6)	IRT Models Intro to Simulation	HSR Ch.2 De Ayala Ch.2,5,6 *Harris (89) (ITEMS: 1P. 2P, 3P)	ExcelHW1 Ex.Ch.2
4. (9/13)	Parameter Estimation Intro to BILOG-MG/IRTPRO	HSR Ch.3 De Ayala Ch.3,4 *Oshima (94) (Speededness) *Paek & Han (13) (IRTPRO)	ExcelHW2 Ex.Ch.3
5. (9/20)	Model Estimation/Fit	HSR Ch.4 *Ames & Penfield (15) (ITEMS: Item Fit)	ExcelHW3 Ex.Ch.4
6. (9/27)	The Ability Scale Information and Efficiency	HSR Ch.5-6	

*Shaftel (05)
(Disability)

ExcelHW4
Ex.Ch.5-6

7. (10/4) Test Construction

HSR Ch.7

*Reid, et al. (07)
(IRT in Counseling)

ExcelHW5
Ex.Ch.7

8. (10/11) Exam Review/Project

Exam 1

9. (10/18)

Intro to Polytomous IRT De Ayala Ch. 7 Ch.8

*Penfield (14)
(ITEMS: Poly IRT)

*Toland (14)
(Practical Guide)

10.

(10/25) Differential Item
Functioning (DIF)

HSR Ch.8

De Ayala Ch.12

*Tay et al. (15)
(Overview of DIF)

*Oshima & Morris (08)
(ITEMS: DFIT)

Ex.Ch.8

11. (11/1) DIF

HSR Ch.8

*Woods, et al. (13)
(Wald Test)

*Oshima, et al. (15)
(MG DFIT)

ExcelHW6

12. (11/8) Equating

HSR Ch.9

De Ayala Ch.11

*Seybert & Stark (12)
(DFIT-IPR)

*Fikis & Oshima (17)
(Purification)

Ex.Ch.9

13. (11/15) Computer Adaptive Testing
(CAT)

HSR Ch.10

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

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

Project Due Wed 10AM

ExcelHW7
Ex.Ch.10

14. (11/29)
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 2018.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, Reinhart, and Winston.