Psy 761: Psychological Measurement (Item Response Theory)
Tuesdays & Thursdays 10:15-11:30 AM
Course Syllabus

Dr. Adam Meade, 749 Poe Hall
E-mail: awmeade@ncsu.edu
Office hours: T and Th 11:30-12:00 and by appointment.
Course website: http://courses.ncsu.edu/psy761/lec/001/
Course list-serv: psy761-001@wolfware.ncsu.edu

Course prerequisites:
Students must have taken a course in basic statistics (e.g., ST 507 or 511) and in Psychometrics or Psychological Measurement (e.g., Psy 760) or equivalent.

Student Learning Objectives:
By the end of this course, students will be able to....

- . . . describe the statistical model utilized in Item Response Theory
- . . . explain how tests are scored using Item Response Theory
- . . . estimate test properties using Item Response Theory
- . . . use Item Response Theory techniques test for item and test bias
- . . . conduct a research study using Item Response Theory methods
- . . . effectively use Item Response Theory software programs
- . . . describe the advantages of Item Response Theory over classical methods of test development

Required Texts:
Baker, F. (2001). *The Basics of Item Response Theory (2nd ed.)*. ERIC Clearinghouse on Assessment and Evaluation. (free at http://edres.org/irt/baker/) [BIRT]
Camili, G. & Sheppard, L. A. (1994). *Methods for identifying biased test items*. Thousand Oaks, CA: Sage Publications. [C&S]
Embretson, S. E., & Reise, S. P. (2000). *Item Response Theory for Psychologist*. Mahwah, NJ: Lawrence Erlbaum Associates. [E&R]
Hambleton, R. K., Swaminathan, H., & Rogers, H. J. (1991). *Fundamentals of Item Response Theory*. Newbury Park, CA: Sage Publications. [HSR]

The Specifics of the Course Requirements:
Reading assignments are given to provide a basic foundation for the weekly material and to stimulate further inquiry and investigation. Students are expected to thoroughly read all assigned material prior to class and attend class prepared to discuss these readings. Students should also bring all assigned readings to each class meeting. Class time can be used to answer questions about the assigned reading and/or elaborate on specific articles.

Homework assignments and exercises

Throughout the semester you will be given several detailed assignments to be completed prior to class. Typically these will be handed into me via my mailbox (in Poe 640) the day before class, so that I may look them over and return them to you during class. These assignments are intended to supplement your understanding of the course material, so please contact me if you are having difficulty with any assignment. Grading for these assignments will be full credit (100), ¾ credit (75), half credit (50), or no credit (0). These assignments are noted throughout the syllabus, although they may change.

Mid-term exam

There will be one exam in this course. As you are extremely unlikely to be faced with a situation later in life in which you will need to be able to immediately recall the finer nuances of IRT, the exam will be take-home, open-book. Though the exam is take-home and open-book, you are NOT permitted to receive aid from another person.

Research Project

A large portion of your grade in this course will be determined by your performance on the course project. This project will entail both a paper and an oral presentation. In this project you are to analyze and write-up an application of IRT. You are encouraged to use existing data sets of interest, if at all possible. If, however, such data are not available, I will be happy to create data to your specifications for use during the project.

Projects should take one of two forms:

1. *The technical report* – Data should be analyzed using IRT and written up as a technical report. This approach is probably more appropriate for dichotomous (testing) data, such as appear in standard professional test manuals. Analyses that should be conducted when using this approach with testing data include (1) item statistics, (2) tests of item bias, (3) test-level statistics (e.g., test information), etc.
2. *The journal article* – This format is probably more appropriate for scale (e.g., Likert) data. With this approach, novel (and publishable) techniques can be investigated, e.g., detection of faking using IRT, tests of measurement equivalence, and other uses.

The journal article approach will likely focus more on a specific, somewhat novel, use of IRT. Journal articles should have a brief intro and focus more on methods, results, and discussion. Technical reports, however, need only a very brief intro, sizeable method, and comprehensive results. Discussion would be at a minimum for a technical report.

The Paper & Presentation

Presentations will occur during the final week of class with final versions of the papers due in class on Tuesday, April 25th. Papers should conform to APA standards and be well-written. Presentations should be informal, though they will be most effective with the use of graphs and a brief slide-show. The presentation is intended to both share your results with the rest of the class and develop your oral presentation skills.

Grading:
Final course grades will be determined using the following allocation of points:

25% - Homework assignments and exercises
30% - Midterm take-home open-book exam/project
40% - Project paper
5% - Project presentation

Final letter grades will be computed using the following scale:

A+ = 97-100	A = 93-96	A- = 90-92
B+ = 87-89	B = 83-86	B- = 80-82
C+ = 77-79	C = 73-76	C- = 70-72
D+ = 67-69	D = 63-66	D- = 60-62
F = < 60		

Late Assignments and Incomplete Grades:
Assignments are required to be completed in the time allotted. Assignments are due by the beginning of class on the day specified in the assignment. Late assignments will be accepted, but will be subject to a penalty of a loss of 10 percentage points (out of 100) on the grade assigned per day late. Incomplete grades will be handle according to the university's policy (see: http://www.ncsu.edu/policies/academic_affairs/grades_undergrad/REG02.50.3.php)

Attendance:
Students are expected to attend every class. There is no penalty for missing class, however, although students are expected to notify the instructor in advance, if possible. Students are responsible for all information and assignments discussed during any missed classes. When grades are assigned for in-class activities, absences must be excused in order for the work to be made up later. Please see the university's policy on attendance (including the definition of excused and unexcused absences:
http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.3.php)

Students with Disabilities:
Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.1)
(http://www.ncsu.edu/policies/academic_affairs/courses_undergrad/REG02.20.1.php)

Statement of Academic Honesty:
Students are expected to abide by the University's policy on academic honesty, which can be found in the Code of Student Conduct Policy (POL1135.1)
(http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php).
The nature of authorized and unauthorized aid will be made clear for each assignment. When in doubt as to whether aid is authorized or unauthorized, please ask beforehand.

Tentative Schedule of Topics

Week 1:	Reviewing Classical Test Theory (CTT): What you should already know about Psychometrics Comparing IRT (i.e., Modern Test Theory) to CTT
Week 2:	Binet's approach and the history of IRT IRT as model based measurement
Week 3:	Assumptions of IRT Item Characteristic Curves and the Three Basic Models
Week 4:	Item Information Fortran Format and DOS Basics
Week 5:	Intro to Bilog *BILOG "lab"*
Week 6:	Trait level measurement Test level properties Building Tests with IRT
Week 7:	Polytomous models Intro to Multilog *Multilog "lab"* Intro to GGUM *GGUM Lab*
Week 8:	Linking CAT Test Bias and DIF
Week 10:	The LR DIF Test LRDIF Lab
Week 11:	DIF/DTF DFIT Lab
Week 12:	CFA v. IRT tests of measurement invariance (DIF/DTF) Maximum Likelihood Estimation
Week 13:	Estimating person parameters Appropriateness Measurement
Week 14:	Calibrating items Advanced estimation techniques Assessing Model fit
Week 15:	Additional applications of IRT Intro to multidimensional IRT (MIRT)
Week 16: 4/25-4/27	*Class presentations of final projects* *Final Papers due in class on Tuesday 4/22*

Note: No class on 3/4-3/6 and 4/10