PSYCH 594A – Classical Test Theory/Psychometrics

Instructor: Marcus Crede, Lagomarcino W278, mcrede@iastate.edu

Class Meeting: Tuesday and Thursday in Lagomarcino W0272

Office Hours: Monday 1pm-3pm

Prerequisites: Statistics 401 (or equivalent) and a research methods course


Additional Course Readers (not required but a useful and inexpensive resources)


**Course Objectives**

This course serves as an introduction to the primary topics in Classical Test Theory. Topics covered include the True Score Model, Reliability, Generalizability Theory, Validity, Test Bias and Fairness, Scale Development and Threats to Psychometric Quality. Whenever possible, class discussions will be comprised of lectures by the instructor, discussions of assigned readings, and in class examples.

All assigned readings should be completed prior to the class period. I also strongly recommend that students read the textbook section covered in class prior to class meetings.
Provisional Class Schedule

March 31: Overview of Class, Introduction to Measurement Theory, Scaling and Measurement
Readings:

April 2 & April 7: True Score Model; strictly parallel, parallel, and tau-equivalent measurements; the standard error of measurement; reliability; Spearman-Brown formula; coefficient alpha; effects of measurement error on statistical methods
Readings:

April 9 & April 14: Test-retest, alternate-form, inter-rater, and internal consistency reliability; interval estimation of reliability coefficients; sample size requirements for reliability analyses; true score interval estimation; assessing differential reliability; reliability meta-analysis; reliability experiments.
Readings:

April 16 & April 21: Types of validity evidence; statistical methods to assess convergent, discriminant and predictive validity; sample size requirements for validity analyses; differential validity; test bias and statistical methods for assessing test bias, sample size requirements for validity analyses; validity meta-analysis
Readings:

April 23: Instructor away at Conference (Take-home Assignment will be posted on blackboard).

April 28: Test Construction (Overview of the Test Construction Process). Item analysis; item difficulty; item selection strategies for improving reliability; item selection strategies for improving validity.
Readings:

**April 30:** Threats to Psychometric Quality: Response biases, test bias, effort biases; test fairness, and test uses.

**Performance Evaluation**

There will be four homework assignments. One homework will be made available on blackboard at the end of each week (starting in week 2) and will be due on the following Thursday. Students are expected to work alone but can utilize any textbook or (non-human) online resource they would like. The focus of homework assignments will be on working with real data and interpreting and writing-up solutions appropriately.