

**APSTA 2016: Advanced Topics in Quantitative Methods**  
**Factor Scoring and Practical Issues in Scaling**

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**Office Hours:** TBA

**Credits:** 2

**Class Meeting Time / Room:** Mondays 4:55-7:35pm. Class meets from Sept. 2-Oct. 24 (first 7 weeks of semester) in Kimball Hall 301W.

**Course Description:** This course reviews and expands on the topics of measurement and reliability. The starting point is the true-score theory for observed data, which is used to review basic concepts and motivate the need for better approaches. We then consider unidimensional and multidimensional factor models for continuous data, moving onto item response theory for dichotomous and ordered-categorical data. It is also shown how these models are related to one another by a few basic assumptions. The final class addresses topics in inter-rater reliability, a somewhat tangential but nonetheless important topic. The course is especially well suited to students who have collected test / questionnaire data and require a method for getting scores from those data, scores which can then be used in further analyses.

**Course Orientation:** The focus is on interpreting the main features of each model (e.g., factor loadings, item response functions), assessing the reliability of the estimated factor scores, and implementation using available software. This course is intended to provide students with the requisite skills to deal with test / questionnaire in their own research. Class time is split between 1/3 theoretical discussion and 2/3 hands-on examples. Students are encouraged to bring a laptop to follow along with examples in class. Students can use a software of their choice, but class material focuses on Mplus (a free student demo is available at [www.statmodel.com](http://www.statmodel.com) and the full version is available at the Bobst 5th floor Digital Studio). Evaluation is centered on data-based assignments and a final project. For the final project, students may work in pairs and are invited to use their own data.

**Prerequisites:** Statistics at the level of RESCH-GE 2003. Classical true score theory (e.g., APSYC 2140) is strongly recommended but not required.

**Website:** The course uses Classes for lecture notes, handouts, readings, homework assignments, and general information.

**Text:** Readings from the research literature and chapter excerpts will be provided.

**Grading:**

10% Class attendance and participation

45% Three computer-based homework project

45% Final project

**Participation:** Each class, up to two participation points are earned by each student -- one point for attendance, and another for contributing to the classroom discussion. The final participation grade is the average over the classes.

**Homework:** Three computer-based homework projects will be assigned. Students have one week to complete assignments and class time is dedicated to working on assignments on the day they are distributed. Students can work together, but each person must hand in their own work.

**Final Project:** Students may use their own data, if appropriate, or an example data set made available by the instructor. The project requires applying one or more of the models discussed in class to real data, interpreting the model, and reporting the reliability of the scores obtained. Students can work together, and may optionally hand-in the project in pairs. Students have two weeks after the last lecture to complete the final project, and must submit a **hard copy** to the instructors mailbox.

**Time line:** This time line is approximate and may be altered during the semester.

Week	Homework	Topic
1		Overview, review of classical test theory
2	HW1 distributed	The unidimensional factor model for continuous data
3	HW1 due	The (exploratory) multidimensional factor model for continuous data
4	HW1 returned HW2 distributed	Advanced topics in factor analysis: goodness of fit and confirmatory approaches

5	HW2 due	Item response theory and dichotomous data
6	HW2 returned HW3 distributed	Item response theory and categorical data
7	HW3 due	Inter-rater reliability; final project consultation