It is with great interest that I submit this letter as an application for the 2017 psychometrics summer internship position, as posted on your company website. With more than 3 years of research experience and education in psychometrics and statistics, especially in item response theory (IRT), structural equation modeling (SEM), and factor analysis (FA), I believe I would be an ideal candidate for this position.

I’m passionate about assessments analyses and development, including but not limited to item analyses, modeling and scoring of responses, and measurement equivalence. In my opinion, a good assessment is the key to more effective hiring, admission, and training processes, more accurate prediction of a variety of education-related and work-related outcomes, and could be of great help for policy makers and employers. I believe that I will be able to make contribution to a project in this area, with my knowledge and research experience in IRT, SEM, and FA.

I’m competent with IRT-related analyses. During my second year in graduate school, I took a class on IRT taught by Professor Hua-hua Chang, where I learnt a lot about and did assignments on item calibration with dichotomous and polytomous IRT models, quality control, scaling and linking, item bias, and differential item functioning (DIF).

I also did my Master’s thesis on IRT, under the instruction of my advisor Professor Fritz Drasgow. I compared the performance of the Samejima’s Graded Response Model (SGR), and the Generalized Graded Unfolding Model (GGUM) in analyzing DIF of the Well-being scale and the Curiosity scale from the Comprehensive Personality Scale (CPS; Wang, 2013), using data collected from the U.S. and China. I am proficient in using MULTILOG, GGUM2004, and MCMC GGUM for item calibration, and in R programing for a variety of IRT analyses, including running packages (e.g., “lordif”, “difR”) for DIF computation, data generation with different IRT models, writing functions that automatically generate syntax for MULTILOG and GGUM2004, and calling from R external IRT programs to run automated analyses such as the constrained baseline and the free baseline modeling. I’m also very familiar with MODFIT, the widely used Excel macro for computing the fit for IRT models, and I am able to quickly get model fit computed from it and give accurate interpretation of the results for various IRT models (e.g., 2PL, 3PL, SGR, GGUM…). I have the ability to evaluate item features and qualities based on the ICCs, as in the course of working on my thesis, I saw and interpreted over a hundred of them, for the purpose of recognizing non-discriminating items, unfolding items, and negative items. Last but not least, I am also capable of transforming MATLAB code to R, as I did with the MATLAB syntax for the DIF effect size measure (Nye, 2011), which was used in my thesis to compensate for the oversensitivity of the Null Hypothesis Significance Testing (NHST) to large samples.

Besides the IRT approach, I’m also capable of analyzing measurement equivalence via the confirmatory factor analysis approach (CFA). In a project that I just finished with Professor Brent Roberts, the PISA 2012 data was used to investigate the prediction of math achievement and truancy by perseverance, controlling for SES and gender, across 9 major cultural groups consisting of 68 participating countries and regions. This project has given me the opportunity to get proficient in using CFA in both Mplus and AMOS to examine measurement equivalence, and performing in these programs multigroup SEM. I also carried out data splitting and merging, random sampling, and exploratory factor analysis (EFA) in SPSS in order to figure out the proper measurement model to adopt for SEM.

I also gained my knowledge and practice experience on factor analysis (FA) through the three statistics classes I’ve taken, where I learnt about and worked on assignments on this topic in both R and SAS. I also performed FA in SPSS on a Conscientiousness scale development project, directed by Professor Brent Roberts. I was responsible for factor analyzing data collected for our item pool of more than 300 items to figure out the structure and dimensionality of the data. I carried out both EFA and CFA, with different types of rotation, and I’m capable of interpreting the results of sample adequacy, eigenvalues, the scree plot, factor loadings, and factor correlations to decide the proper number of factors, factor names, and which items to drop from further analyses.

~~I believe that progression in the methodology for studying assessments is essential to the development of. This research area is important and promising, but also has for long debate over methodology such as the selection of model or framework (e.g. IRT vs FA). With my experience in both IRT and FA, I can’t wait to apply them out on the AP Capstone data and explore the strength and weakness of both of them.~~