Item Response Theory:  
Methods for the Analysis of Discrete Survey Response Data  

ICPSR Summer Workshop at the University of Michigan  
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Presented by:  
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COURSE OVERVIEW

Item Response Theory (IRT) is used in a number of disciplines including sociology, political science, psychology, human development, business, and communications, as well as in education where it began as a method for the analysis of educational tests. More broadly, IRT is useful in the development and analysis of survey measures where item responses are in the form of discrete categories. This course is geared to individuals who are interested in the foundations and applications of item response models as tools for measurement of latent traits across disciplines. The course is designed to acquaint students with the basics of the field of item response theory (IRT).

This course will begin with presentation of popular item response models, their estimation, and interpretation, and then continue reinforcing these lessons throughout the week with numerous examples and applications using data from different disciplines (including political science, education, and psychology). Additional topics include test equating, test development with IRT, differential item functioning, and computerized adaptive testing. The course will be focused on accessibility, with technical detail presented only when necessary for responsible application of the methods and techniques discussed. Participants should be familiar with basic statistical models (e.g., ANOVA and regression) and basic psychometrics (e.g., classical test theory), but no prior experience with item response or other psychometric models is assumed.

The course will utilize software developed for estimation of general latent variable models (Mplus). In addition to a course packet, you will have electronic access to all course materials, including overhead slides, analysis scripts, output files, relevant supporting documentation, and recommended readings.
## Tentative Course Schedule*

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Monday</td>
<td>9:00-10:15</td>
<td>Lecture 1: Historical Perspectives and Basic Statistical Prerequisites</td>
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<td>10:30-11:45</td>
<td>Lecture 2: Basic IRT Concepts, Models, and Assumptions</td>
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<td>1:15-2:30</td>
<td>Lecture 2, Continued</td>
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<td>2:45-4:00</td>
<td>Lecture 3: Model Specifications and Scale Characteristics</td>
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<td>4:00-5:00</td>
<td>Lab Activity 1: Introduction to Mplus Software for IRT</td>
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<td>Tuesday</td>
<td>9:00-10:15</td>
<td>Lecture 4: IRT Models for Polytomous Response Data</td>
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<td>10:30-11:45</td>
<td>Lecture 5: Estimation of Item Response Models</td>
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<td>1:15-2:30</td>
<td>Lecture 5, Continued</td>
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<td>2:45-4:00</td>
<td>Lecture 6: Assessment of Model Fit</td>
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<td>4:00-5:00</td>
<td>Lab Activity 2: Polytomous IRT Models</td>
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<td>Wednesday</td>
<td>9:00-10:15</td>
<td>Lecture 7: Latent Trait Reliability</td>
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<td>10:30-11:45</td>
<td>Lecture 8: Test Development with IRT</td>
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<td>1:15-2:30</td>
<td>Lecture 8, Continued</td>
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<td>2:45-4:00</td>
<td>Lecture 9, Computerized Adaptive Testing</td>
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<td>4:00-5:00</td>
<td>Lab Activity 3: Scale Development</td>
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<td>Thursday</td>
<td>9:00-10:15</td>
<td>Lecture 10: Multidimensional IRT</td>
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<td>10:30-11:45</td>
<td>Lecture 11: Diagnostic Classification Models</td>
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<td>1:15-5:00</td>
<td>Open Discussion and Consultation Time</td>
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References on Applications and Extensions of IRT

**GOOD GENERAL REFERENCES:**


**PARAMETER ESTIMATION:**


**BAYESIAN STATISTICS (GENERAL, NOT IRT-BASED):**

**Test Development:**


**Polytomous IRT Models:**


**Assessing Model-data Fit:**


**Test Score Equating:**


**Differential Item Functioning (DIF):**


**Multidimensional IRT:**


**Diagnostic Classification Models:**
