

Instructions and Objectives

Masters Comprehensive Examination in Measurement

The following learning objectives have been prepared to assist you in your preparation for the master's comprehensive examination in the area of measurement. A review of content related to these learning objectives should provide you with the foundation required for a successful mastery of the content.

Students who have completed EDPS 870 (Introduction to Educational Measurement), regardless of instructor, should be able to answer a majority of the questions on this examination. Most introductory texts covering principles of measurement in education and psychology published in the past 10 years cover the topics assessed on the exam. The following texts are either currently used in EDPS 870, or are recommended for use by students enrolled in the course. They may be helpful in preparing for the exam.

Thorndike (2004). *Measurement and Evaluation in Psychology and Education* (7th Edition). Upper Saddle River, NJ: Pearson.

Anastasi, A., & Urbina, S. (1997). *Psychological Testing* (7th Edition). Upper Saddle River, NJ: Prentice Hall.

Crocker, L., & Algina, J. (1986). *Introduction to Classical and Modern Test Theory*. Belmont, CA: Wadsworth.

Osterlind, S.J. (2006). *Modern Measurement: Theory, Principles, and Applications of Mental Appraisal*. Upper Saddle River, NJ: Pearson.

Two forms of the exam are available, each containing 50 multiple choice questions with four to five response options each. Each item is worth 1 point. Each form contains the following categories of questions: scales of measurement, types of tests, and types of items (10%); reliability (30%); validity and factor analysis (40%); item analysis (10%); and norms, equating, and score interpretations (10%).

Scales of Measurement, Types of Tests, Types of Items

Students should know:

- The scales and levels of measurement: nominal, ordinal, interval, ratio, categorical, continuous.
- The differences between and different uses of various types of scores commonly used in testing contexts, for example: raw scores, standard scores, standardized scores, z-scores, percentile ranks, T-scores, normalized scores, stanines, normal curve equivalents, grade equivalents, age equivalents, intelligence quotients, etc.
- The differences between and usage issues related to common item structures: Likert-type, multiple choice, true/false items, Angoff scales, open response, etc.
- The common issues pertaining to the structure and use of items of the Likert-type, including assumptions, response options, and response format

- The distinctions in terms of content and usage between major categories of tests: aptitude tests, achievement tests, norm-referenced tests, criterion-referenced tests, etc.
- Bloom's taxonomy

Reliability

Students should know:

- The issues (i.e. assumptions, factors influencing, attenuation, etc.) related to common measures and types of reliability, including: standard error of measurement vs. reliability coefficients, test-retest reliability, alternate forms, internal consistency, split-half reliability, Cronbach's alpha, The Spearman-Brown Prophecy Formula, coefficient omega, Kuder-Richardson Formula 20, inter-rater reliability, etc.
- What affects reliability and what reliability tells us about scores from a test.
- The common sources of unreliability.
- How true score theory relates to the concept of reliability.
- How the attenuation paradox influences substances inferences due to reliability.

Validity and Factor Analysis

Students should know:

- The types of validity under the "Traditional View": content; criterion-related (predictive, concurrent); and construct (nomologic network, convergent vs. divergent validity, construct representation).
- The types (trick question) and aspects of validity under Messick's Unified View: content relevance, substantive, structural, generalizability, external, and consequential.
- The common threats to Construct Validity.
- Major sources of evidence for evaluating properties of tests or measures.
- The differences between a speeded test and a mastery test and the difference between Vygotsky's Zone of Actual Development and Zone of Proximal Development.
- The concepts underlying use of the multi-trait multi-method, particularly as it may apply to common methods variance.
- The purpose of factor analysis, but not the actual computation.
- The distinctions between constructs and observed variables.

Item Analysis

Students should know:

- The differences between common item content types: knowledge, comprehension, application, analysis, synthesis, evaluation, judgment vs. sentiment, affective vs. cognitive, absolute vs. comparative responses, survey vs. scale items, etc.
- The distinction between an item pool and an item bank.
- The distinctions between item difficulty and item discrimination.
- How psychological factors such as acquiescence, social desirability, response sets can influence test scores.
- The impact that qualitative item characteristics can have on item responses: double-barreled questions, ambiguity, reverse coding
- The utility of an item trace graphs or an item response function.
- The general principles and procedures involved in conducting an item analysis.

Norms, Equating, and Score Interpretation

Students should know:

- The distinction between the reliability and validity of tests versus scores.
- Desirable properties of measurement instruments: standardization, reliability, validity, population norms.
- The distinction between an item response and a scale score.
- How basic statistical principles affect test score interpretations: distribution assumptions, central tendency and variability, correlation versus covariation, etc.
- The conceptual distinctions between major types of correlation coefficients commonly used in measurement contexts: Pearson Product-Moment, Spearman Rank-Order, point-biserial, phi coefficient, etc.
- The major distinctions between Classical Test Theory and Modern Test Theory approaches such as Item Response Theory.