

REMP COURSES

Course Number: EDUCATION 509

Course Title: Fundamentals of Test Construction

Course Description:

This course is designed to enable students to construct a variety of assessment instruments useful for measuring characteristics of individuals and groups. Characteristics specific to educational research (e.g., achievement, proficiencies, and related psychological constructs) will be emphasized. After successful completion of the course, students will be prepared to develop assessment instruments that are targeted toward specific measurement purposes. For example, students will learn skills about how to create classroom tests, as well as how to create tests that could be used on a larger scale. A variety of item formats and types of tests will be covered, including multiple-choice and performance-based items. Innovations in educational testing such as authentic assessment and portfolio assessment will also be covered. Students will learn how to write test questions and how to evaluate and improve test questions. The entire test development process, including item writing, item piloting, item review, and final form construction will be covered. Issues of test fairness will be emphasized such as how to develop valid tests that are sensitive to the diversity of the population for which they are designed. Current issues in testing and in test construction, such as computerized testing, developing test norms, and creating a meaningful score scale will be introduced.

Course Number: EDUCATION 553

Course Title: Modern Assessment Methods and Practices

Course Description:

The course will begin with a consideration of technical advances in the development, evaluation, and uses of criterion-referenced assessment. The focus of course content will then shift to newer technical developments associated with performance assessment, standard setting, the use of multiparameter IRT models, score reporting, and current issues in assessment such as (1) the role of computers in assessment, (2) adaptation of tests into multiple languages and cultures, (3) National Assessment and proposed revisions, and (4) the evaluation of current district and state assessment systems (e.g., Kentucky and Massachusetts).

Course Number: EDUCATION 555

Course Title: Introduction to Statistics & Computer Analysis I

Course Description:

The purpose of this course is to give students in the social sciences and, in particular, education, skills in statistical reasoning so that they will be: a) critical readers of research literature in their fields and b) in a position to design research studies and analyze data on their own. More specifically, the purposes of this course are to provide students (i) a conceptual understanding of the basic statistical procedures used in educational and social science research and (ii) to provide them with the computational skills necessary to carry out the procedures.

Course Number: EDUCATION 632

Course Title: Principles of Testing

Course Description:

This course has been designed to provide graduate-level education students with a solid foundation of educational and psychological testing and measurement skills. By the end of the semester, successful students should be able to: a) define basic testing, measurement, and statistical terms; b) identify situations where educational and/or psychological tests can be helpful in making decisions about individuals and/or programs; c) describe and use reliability and validity concepts and methods; d) interpret and use scores reported on common educational and psychological scales; e) describe various cultural and environmental factors which influence test performance; f) distinguish norm-referenced testing from criterion-referenced testing and describe the ways in which each type of test is developed, evaluated, and used; g) identify popular achievement, aptitude, and personality tests; h) locate commercially available instruments to meet particular assessment needs and to evaluate the usefulness of the instruments; i) identify current testing issues and developments (e.g., computers and testing, performance testing, code of fair testing, testing competencies for educators); and j) carry out basic statistical methods on test scores and use basic measurement theory (e.g., main results from classical test theory).

Course Number: EDUCATION 656

Course Title: Introduction to Statistics & Computer Analysis II

Course Description:

This course is the sequel to Introduction to Statistics & Computer Analysis I. The purpose of the course is to further strengthen the students' basic understanding of statistics and to provide them with intermediate/advanced skills in the design and analysis of experiments and field studies. Topics covered include: a) analysis of categorical data, b) experimental design, and c) regression analysis.

Prerequisite(s): Education 555

Course Number: EDUCATION 661

Course Title: Educational Research Methods

Course Description:

The principal purpose of this course is to provide graduate students with many of the skills they will need to conduct empirical research studies in the field of education. Course topics will include: (1) Purposes and Types of Educational Research, (2) Steps in Conducting Research: Preparing a Research Proposal, (3) Selection of Research Questions for Investigation; Literature Reviews, (4) Basic Statistical Methods for Quantitative Data Analysis, (5) Development and Validation of Instrumentation, (6) Principles of Sampling, (7) Research Designs, (8) Data Collection Techniques, (9) Introduction to SPSS (a package of computer programs for data analysis, and (10) Interpreting Results; Drawing Conclusions; Reporting Research Results. Survey, correlational, and experimental research methods and practices will be emphasized in the course.

Course Number: EDUCATION 731

Course Title: Structural Equation Modeling

Course Description:

The purpose of this course is to provide advanced doctoral students in education/psychology, sociology with techniques for specifying statistical models that conform to theory, fitting the models to data, testing the fit of the models and, based on the analysis, either rejecting or modifying the theory. Currently available multivariate analyses courses deal with models and model fitting procedures when all the variables under investigation are observed. There are situations, however, where unobservable variables such as hypothetical constructs or latent variables give rise to observable, quantifiable phenomena. In these cases, relationships between observed and unobserved variables must be specified and the parameters that relate observable variables to unobservable variables must be estimated, and the goodness of fit of the model to data must be tested. The specification and fitting of models that relate observable variables to unobservable variables is known as Structural Equations Modeling.

Prerequisite(s): Education 771, 772, or Equivalent OR Permission of the Instructor

Course Number: EDUCATION 735

Course Title: Classical Test Models and Practices

Course Description:

This is the first of three courses (735, 736 and 763) designed to provide students with comprehensive coverage of the theory and methods of instrument development and evaluation. In addition, many recent developments in the field of testing are reviewed and their implications for evaluators, researchers, and psychologists are considered. Training in the courses is aimed at preparing professionals to carry out psychometric research and/or to work as psychometricians in many job environments including testing agencies, state departments of education, large school districts, universities, the armed services, and the medical, clinical, and allied-health fields.

The first course (735) is intended to provide students with a solid foundation in classical psychometric models and methods. Classical models, reliability and validity issues and methods, and test development are emphasized. Consideration is given, too, to important topics such as criterion-referenced measurement, and emerging issues in testing and assessment field such as computer-based assessment.

Prerequisite: Education 555

Course Number: EDUCATION 736

Course Title: Introduction to Item Response Theory

Course Description:

Over the past 30 years many agencies who construct educational assessments, as well as aptitude and achievement tests, have switched from the use of classical test theory (CTT) and practices in their work to item response theory (IRT) and practices. The reasons for the switch include the increased flexibility of IRT over CTT, useful properties of IRT item and ability parameters, and evidence that IRT provides a better and more flexible measurement solution to some technical problems that arise in assessment and testing. In this course, basic IRT concepts, models, features, parameter estimation, model fit, and computer software will be introduced. In addition, specific applications of IRT to test score equating, computer-administered tests, the identification of biased items, and test development will be considered.

Prerequisite: Education 555

Course Number: EDUCATION 751

Course Title: Scaling Methods for the Behavioral Sciences

Course Description:

Scaling is fundamental to the process of measurement. The purpose of scaling is to form a metric, or continuum, along which the magnitude of a variable can be measured. Scaling issues in the behavioral sciences are complex due to the myriad of unobservable variables studied such as abilities, attitudes, perceptions, traits, and proficiencies. The purpose of this course is to introduce and explore scaling methods essential for research in the social sciences. In particular, techniques of unidimensional scaling, multidimensional scaling, and classification are covered. Unidimensional scaling topics include scaling surveys, tests, and rating forms. Multidimensional scaling topics focus on uncovering the hidden structure of multivariate data. Classification techniques covered include cluster analysis and partitioning methods. Application of these scaling techniques to the areas of educational, psychological, and sociological research is emphasized.

Prerequisite: Education 555

Course Number: EDUCATION 756

Course Title: Advanced Measurement Seminar

Course Description:

The purpose of this advanced level measurement seminar is to provide an opportunity for discussion of emerging technical topics in the educational assessment field. Topics to be addressed include issues of scale construction and score reporting, adapting tests from one language to another, psychometric foundations for performance assessment (e.g., standard-setting and validity), and polytomous and multidimensional models. Graduate student research and thesis topics will also be considered.

Prerequisites: Education 555; Education 735

Course Number: EDUCATION 763

Course Title: Advances in Item Response Theory

Course Description:

Educational assessments are changing and new psychometric models are needed for scoring, test development, and evaluation. In this course, students will be introduced to IRT models for analyzing polytomous and multidimensional data which are becoming popular in school, state, and national assessment programs. These models include the partial credit model, the graded response model, the rating scale model, and the normal ogive and logistic multidimensional models. Applications of these new models to test scoring, the detection of bias, equating, computer-based testing, test development, and score reporting will be emphasized. Also, students can expect to learn to use new IRT software such as Multilog, Parscale, and NOHARM.

Prerequisites: Education 555; Education 736

Course Number: EDUCATION 771

Course Title: Applied Multivariate Analysis I

Course Description:

This course is designed to provide students in the social and behavioral sciences advanced techniques for the analysis of univariate and multivariate data. Rather than providing the students with a compendium of statistical techniques, the course is designed to provide the students with unified treatment of the procedures for analyzing data. To this end, a rigorous treatment of mathematics and statistical theory underlying the techniques covered in the course is provided.

Understanding multivariate statistics requires a knowledge of linear algebra. Since most students in the social and behavioral sciences do not have a deep understanding of linear algebra or a background in it, the first part of the course is designed to provide students skills in linear algebra. The topics covered are: basic operations with vectors and matrices, scalar functions of matrices such as trace and determinants, linear dependence and rank of a matrix, inverse of a matrix, solution of linear equations, and characteristic roots and vectors of a matrix.

The second part of the course deals with statistical foundations. Topics covered include: joint, conditional, and marginal distributions; the multivariate normal distribution; and, include: joint, conditional, and marginal distributions; the multivariate normal distribution; and, algebra of expectations. These concepts are applied to the linear model and includes discussions of the general linear model, the general linear hypothesis, hypothesis testing procedures, the problem of multiple comparison, and applications to regression and experimental design models. The multivariate linear model is introduced and its implications are discussed. The course concludes with a discussion of multivariate analysis of variance and discriminant analysis.

The students are taught to write their own programs for the analysis of multivariate data using matrix operation packages. In addition, they are expected to reconcile results obtained with their hand-crafted programs with that obtained using such package programs as SPSS MANOVA.

Prerequisites: Education 555; Education 656

Course Number: EDUCATION 772

Course Title: Applied Multivariate Analysis II

Course Description:

This course is a continuation of Education 771 and includes further topics on multivariate analysis. The course begins with a review of MANOVA and continues with more detailed analysis of repeated measures designs. The general multivariate model is introduced and applications to growth curve analysis and classification analysis are covered.

The second part of the course deals with the structure of multivariate data. Topics covered include principal components analysis, factor analysis with a discussion of the problem of rotation, the interpretation of factor loading, and methods of factor extraction procedures. The course concludes with structural equations modeling and the use of the computer program LISREL.

Prerequisite: Education 771

Course Number: EDUCATION 7940

Course Title: Validity Theory and Validity Applications

Course Description:

This course presents and discusses the major theories regarding the concept of “test validity” and the major practices involved in test validation. The course comprises two sections. During the first part of the semester, we will cover the major theories regarding test validity (e.g., Cronbach, Kane, Messick, Shepard, etc.). During the second part of the course, students will analyze data from one or more large scale testing programs and prepare a report regarding the validity of inferences derived from these test scores. Thus, both theoretical and applied aspects of test validity and validation will be taught in this course. By taking this course, students will learn: (a) why approaches to test validation vary according to testing purposes, (b) how to design studies for evaluating the validity of a test for a particular purpose, and (c) how to conduct such studies. The skills taught in this course will enable students to be experts in testing tests. The concepts addressed in the course are advanced and specialized. Knowledge of basic statistical techniques is necessary.

Prerequisites: Education 632 or Education 509; Education 555

Course Number: EDUCATION 801

Course Title: Advanced Psychometric Methods I

Course Description:

The course deals with the latest developments and current thinking in the areas of psychometrics, measurement, and educational statistics. The purposes of this course are to provide students who are specializing in psychometrics, measurement, and educational statistics with advanced psychometric/statistical techniques for analyzing item response data, studying the characteristics of tests/assessment instruments, using available computer software to analyze data, and conducting research in the area.

Students graduating with specialization in psychometrics, measurement, and educational statistics must not only be familiar with current developments in the field, but must also be able to (a) apply the techniques and procedures for solving measurement problems that emerge, and (b) conduct research in the area. This course is designed to provide advanced students with the skills necessary to function successfully in academic as well as applied settings and to be competitive in the job market upon graduation.

Prerequisites: Education 735, 736, 771, and 772; or by permission of instructor.

Course Number: EDUCATION 802

Course Title: Advanced Psychometric Methods II

Course Description:

This course is a continuation of Advanced Psychometrics I. As with Advanced Psychometric Methods I, this course deals with the latest developments and current thinking in the areas of psychometrics, measurement, and educational statistics. The purposes of this course are to provide students who are specializing in psychometrics, measurement, and educational statistics with advanced psychometric/statistical techniques for analyzing item response data, studying the characteristics of tests/assessment instruments, using available computer software to analyze data, and conducting research in the area.

Students graduating with specialization in psychometrics, measurement, and educational statistics must not only be familiar with current developments in the field, but must also be able to (a) apply the techniques and procedures for solving measurement problems that emerge, and (b) conduct research in the area. This course is designed to provide advanced students with the skills necessary to function successfully in academic as well as applied settings and to be competitive in the job market upon graduation.

Prerequisites: Education 735, 736, 771, and 772; or by permission of instructor.

Course Number: EDUCATION 803

Course Title: Psychometric and Statistical Modeling

Course Description:

The purpose of this course is to provide advanced students in the areas of psychometrics and statistics with techniques for carrying out research using computer simulations. The topics covered are: Programming with FORTRAN 90 language, data manipulation, simulation of data according to statistical and psychometric models, numerical techniques for matrix operations, solution of non-linear equations, optimization, and Monte-Carlo Markov-Chain techniques.

Weekly assignments will be given. The students will be expected to carry out a research project to demonstrate simulation techniques and make a presentation.

Prerequisites: Students must have taken courses in classical and modern test theory (Educ. 735, 736), psychometric methods (Educ 731; 751), and multivariate analysis (Educ 771, 772).

