

University of Rochester School of Nursing
RESEARCH MEASUREMENT
NUR 513, Fall 2009

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Course Description

This course is a continuation of the quantitative approach to nursing research begun in NUR 511 (Research Design). The emphasis of the course material is on the principles of measurement and their application to problems in nursing research. There will also be a strong emphasis on data analysis, using existing data sets and widely available software packages, with sharing of printouts and interpretation of findings. The format will follow that of a seminar rather than lectures. Students are to present case studies and evaluate instruments.

The course is intended to be both methodological and substantive. The operationalization of constructs and applications in relevant study designs will be the main focus. A "peer review" approach of balancing strong points and weak points is followed. We hope to create a "work in progress" atmosphere.

Course Learning Objectives

At the end of the course, the student should be able to do the following:

1. Apply principles of measurement to the particular problems and needed designs for nursing research.
2. Evaluate existing instruments used in clinical nursing research as to reliability and validity.
3. Critique and adapt data collection procedures used in social sciences and medical care research to specific nursing studies (e.g., observational techniques, physiologic measures, psychological inventories, personal and telephone interviews, mail surveys, Q-methodology, Delphi technique).
4. Consider violations of assumptions in multivariate analysis like independence (e.g., unit-of-analysis issues; nested designs, cluster samples).
5. Design and implement methodologic studies if needed.
6. Understand and develop research adaptations to unique situations encountered in health related research (survival analysis, clinical trials, collaborative projects, evaluation research, multi-trait/multi-methods studies, event histories).

- Placement:** PhD Program in Health Research, Second Year
- Credits:** 3 graduate credits
- Class Hours:** Thursdays, 9:00-11:50 a.m., Helen Wood Hall (HWH) 1-501
- Office Hours:** By appointment
- Enrollment:** Second year PhD students, others as appropriate

Course Requirements & Grading:

University letter grades are used.

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| - Class participation/miscellaneous assignments | 15% |
| - Instrument database catalogs | 10% |
| - Measurement critique Class presentation and paper | 30% |
| - Small group measurement project | 45% |

Americans with Disabilities Act (ADA) Statement:

The University of Rochester is committed to providing equal educational and employment opportunities for individuals with disabilities, in accordance with state and federal laws and regulations, including the Americans with Disabilities Act (ADA) of 1991 and Section 504 of the Rehabilitation Act of 1973. To ensure equality of access for students with disabilities, the University provides reasonable accommodations, including auxiliary aids and modifications to courses, programs, services, activities or facilities. Exceptions will be made in those situations where the accommodation would fundamentally alter the nature of the program, cause undue hardship on the school, or jeopardize the health or safety of others. Accommodations must specifically address the functional limitations of the disability.

The process of receiving accommodations begins with self-identification. When a student chooses to self-identify a disability, documentation should be forwarded to Debbie Boyd, School of Nursing Disability Coordinator, University of Rochester, School of Nursing, Box SON, Rochester, NY 14642, (585) 275-2717.

Professional and Academic Honesty:

Each student is responsible for her or his own work. Students are expected to have read and to practice the principles of academic honesty, as discussed in the School of Nursing Student Handbook.

Required Textbook:

Di Iorio, C. K. (2005) Measurement in Health Behavior: Methods for Research and Evaluation. Jossey-Bass: San Francisco.

DeVellis, B. (2003). Scale Development: Theory and applications. Vol. 26. Applications in Social Research Methods. Sage.

Recommended Textbooks:

Frank-Stromborg, M., & Olsen, S. (2004). Instruments for Clinical Health-Care Research, 3rd Ed. Jones and Bartlett Publishers.

Waltz, C. F., Strickland, O. L., & Lenz, E. R. (2005). Measurement in Nursing and Health Research (3rd Ed.). NY: Springer Publishing.

Recommended Websites:

The following website is recommended for information regarding measurement.

www.socialresearchmethods.net/kb/measure.php

Major Assignments

1. Instrument database catalogs.

(Deliverable: annotated catalog of sources and databases of validated instruments)

Each student will select a research field (e.g., psychological health, nutrition and exercise, sexual health, etc.) and prepare an annotated catalog of available resources and databases that inventory instruments and measures in the selected field (or more broadly). A template for the catalogs will be developed in class.

2. Critique of published measurement instrument.

(Deliverables: class presentation; 2,000 to 3,000 word paper)

Each student will present in class and submit a paper focused on the evaluation of a quantitative measurement instrument that has been published and/or has been used in published research studies. The instrument will be critiqued relative to its conceptual and statistical properties. The instrument chosen should be one that has been used in at least three published research studies, excluding papers describing its development. It is suggested that the instrument chosen be one that the student may potentially use in his/her own dissertation work. Students will each choose a different instrument.

Although the instrument critiques (presentations and papers) are individual student assignments, the first phase of the assignment will be conducted in small groups of 4-5 students. Each group will develop an evaluation plan outlining the specific criteria to be used to critique instruments. Once all groups have completed this task, the groups will convene to share their respective plans. Each student will then be responsible for formulating his/her own evaluation plan based on these group discussions.

Class Presentation: Each student will present his/her critique in class (with supporting hand-outs) with a time limit of 20 minutes plus 10 minutes for discussion. The week prior to the class presentation, each student will share the original publication describing the instrument development and two published papers that used the instrument (and were included in the

student's critique). All students will be responsible for reading the shared papers to prepare for each other's presentation.

Paper: Each student will identify a scientific journal that would be appropriate for submitting the paper for publication. Students will then prepare a manuscript consistent with the length and format required by this journal. (The length must be between 2,000 and 3,000 words.) Actual submission of the manuscript to the journal is optional.

3. Small Group Measurement Project

(Deliverables: class presentation; 2,000 to 3,000 word paper)

Students will participate in a small group (2-3 students) project focused on conducting a measurement study using a secondary dataset. The project will consist of a psychometric evaluation of a quantitative measurement instrument to assess a concept or a variable of interest. The project may include evaluation of an adapted (e.g. abbreviated) instrument or validation of an existing instrument to a new population from an existing dataset to assess reliability, validity, and other measurement properties.

Each group of students will present the results of their project in class. In addition, each group will submit a written paper, co-authored by all students, summarizing the process of instrument construction and evaluation. This paper will be written for possible publication, thus maximum length of the final paper will be 15 pages, double-spaced, excluding title page and references. The paper will be written according to APA 5th edition guidelines.

Other assignments

In addition to these Major Assignments, course learning activities will include readings, class participation, conducting statistical analyses, and student led discussions.

Schedule Overview

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| 9/3/09 | Course Introduction and Overview |
| 9/10/09 | Validity and Reliability of Diagnostic Tests |
| 9/17/09 | Reliability of Measures in Health Research |
| 9/24/09 | Reliability Assessment |
| 10/1/09 | Validity of Measures in Health Research |
| 10/8/09 | Overview of Measurement Procedures |
| 10/15/09 | Class presentations: critiques of published measures |
| 10/22/09 | Measurement Adaptation to Special Populations |
| 10/29/09 | Scale Development |
| 11/5/09 | Factor Analysis |
| 11/12/09 | Item Response Theory |
| 11/19/09 | Qualitative and Mixed Methods Approaches |
| 11/26/09 | Thanksgiving holiday; no class |
| 12/3/09 | Measurement within the Research Context |
| 12/10/09 | Student Presentations of Small Group Projects |

1 - 9/3/09 Course Introduction and Overview

Class discussion:

- Course overview and assignments
- Role of measurement in research
- Template for instrument catalogs

Readings:

Di Iorio: Chapter 1. Introduction to measurement (pp. 1-17)
Di Iorio: Chapter 2. Types of measures (pp. 18-35)
Di Iorio: Chapter 3. Measurement error (pp. 36-53)
DeVellis: Chapter 1. Overview (pp. 1-13)

2 - 9/10/09 Validity and Reliability of Diagnostic Tests

Class discussion:

- Types of measures - diagnostics
- Sensitivity and specificity
- Instrument catalog assignments due
- Critique of published measurement instrument assignment

Readings:

Gordis: Chapter 5: Assessing the validity and reliability of diagnostic and screening tests (pp. 85-108)
Bewick, V, Cheek, L., & Ball J. (2004) Statistical review 13: Receiver operating characteristics curves. *Critical Care*, 8(6):508-512.
WS&L: Ch 21. Selection and use of existing instruments. (pp. 346-350)

3 - 9/17/09 Reliability of Measures in Health Research

Class discussion:

- Translating research hypotheses into measures
- Classical test theory
- Error and reliability
- Criteria for instrument evaluation

Readings:

Di Iorio: Chapter 6: Theory and measurement (pp. 103-120)
DeVellis: Chapter 2: Understanding the latent variable (pp. 14-26)
Di Iorio: Chapter 9: Fundamentals of reliability (pp. 163-175)

4 - 9/24/09 Reliability Assessment

Class discussion:

- Reliability assessment

Readings:

Di Iorio: Chapter 10: Reliability assessment and item analysis (pp. 176-210)

5 - 10/1/09 Validity of Measures in Health Research

Class discussion:

- Validity

Readings:

Di Iorio: Chapter 11: Validity (pp. 211-236)

Cook, D. A., & Beckman, T. J. (2006). Current concepts in validity and reliability for psychometric instruments: Theory and application. *The American Journal of Medicine*, 119, 166.e7-166.e.16.

6 - 10/8/09 Overview of Measurement Procedures: Interviews, Questionnaires, Surveys

Class discussion:

- Data collection issues

Readings:

WS&L: Chapter 11: Interviews (pp. 246-258)

WS&L: Chapter 12: Questionnaires (pp. 259-265)

WS&L: Ch 22. Internet Data Collection (pp. 351-356)

WS&L: Ch 23. Jenkins, L. S. Computer-based testing (pp. 357-363)

7 - 10/15/09 Class Presentations

8 - 10/22/09 Measurement Adaptations to Special Populations

Class discussion:

- Special populations

Readings:

Frank-Stromberg, M. & Olsen, S. J. (Eds.) (2004). Instruments for clinical health-care research.

Ch 2: Weinrich, S. P., Boyd, M. D., & Herman, J. (2004). Tool adaptation to reduce health disparities (pp. 20-32)

Ch 3: Hymovich, D. P. (2004). Measurement issues with children and adolescents (pp. 33-46)

Ch 4: Rasin, J. H. (2004). Measurement issues with the elderly (pp. 47-55)

Ch 5: Varricchio, C. G. (2004). Measurement issues concerning linguistic translations (pp. 56-64)

Ch 7: Kim, M. T., & Han, H. (2004). Cultural considerations in research instrumentation development (pp. 73-80).

9 - 10/29/09 Scale Development

Class discussion:

- Scale development

Readings:

Di Iorio: Chapter 4: Survey development (pp. 54-74)

DeVellis: Chapter 5: Guidelines in scale development (pp. 60-101)

10 -11/5/09 Factor Analysis

Class discussion:

- Factor analysis

Readings:

Di Iorio: Chapter 12: Factor analysis (pp. 237-275)

DeVellis: Chapter 6: Factor analysis (pp. 102-137)

11 -11/12/09 Item Response Theory

Class discussion:

- Item Response Theory

Readings:

Di Iorio: Chapter 13: Item Response Theory (pp. 276-297)

DeVellis: Chapter 7: Overview of Item Response Theory (pp. 237-275)

Petersen, M., Groenvold, M., Aaronson, N., Blazeby, J., Brandberg, Y., deGraeff, A., Fayers, P., Hammerlid, E., Sprangers, M., Velikova, G., & Bjorner, J. B. (2006). Item response theory was used to shorten EORTC QLQ-C30 scales for use in palliative care. *Journal of Clinical Epidemiology*, 59, 36-44.

12 -11/19/09 Qualitative and Mixed-Methods Approaches

Class discussion:

- Qualitative measurement

Readings:

WS&L: Hupcey, J. E. (2005). Chapter 8: Measurement issues in qualitative research (pp. 215-228)

Creswell, J. W., Fetters, M. D., & Ivankova, N. V. (2004). Designing a mixed methods study in primary care. *Annals of Family Medicine*, 2, 7-12.

13 - 11/26/09 Thanksgiving Holiday – No Class

14 - 12/3/09 Measurement in the Research Context

DeVellis: Chapter 8. Measurement in the broader research context (pp. 154-160)

WS&L: Chapter 20. Collecting sensitive information (pp. 339-345)

WS&L: Chapter 24. Ethical issues (pp. 367-379)

WS&L: Other measurement issues (pp. 380-413)

Podsakoff, P. M., MacKenzie, S. B., Lee, J., & Podsakoff, N. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88, 879-903.

**15 - 12/10/09 Student Presentations – Small Group Projects
Course Wrap-up**