

**RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY**  
**SCHOOL OF SOCIAL WORK**  
**COURSE OUTLINE**

**16:910:657:01**

**Advanced Statistical Methods III**

**Fall 2019**

Instructor: Andrew Peterson  
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Credit Hours: 3  
Classroom Hours: Tuesday, 1:00 - 3:40 pm  
Office hours: By appointment

**Course Overview and Objectives**

This is a course in advanced statistical methods. The objective of the course is to achieve an understanding of the advantages and limitations of various statistical techniques. The focus of this course is principally upon the development of both conceptual and computer tools needed for advanced statistics in hypothesis testing, model fitting and estimation, and interpretation of data. Students are expected to use actual data to gain experience on data analysis and data interpretation through computer exercises. The objectives of this course are: (1) to provide students with knowledge on structural equation modeling and other multivariate statistical analyses, (2) to develop students' skills in modeling and carrying out their own research, and (3) to improve students' abilities to critically analyze published work in the social sciences.

**Required Materials**

- Byrne, B.M. (2016). Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming, 3<sup>rd</sup> Edition. New York: Routledge/ Taylor & Francis.
- Field, A. (2018). Discovering Statistics Using IBM SPSS Statistics, 5<sup>th</sup> Edition. Thousand Oaks: Sage. ISBN:9781526436566.
- IBM SPSS Statistics Standard GradPack (including AMOS for structural equation modeling).

**Course Requirements and Grading**

- 1) It is important that assigned readings be completed on a timely, weekly, basis in order to have informed class discussions. All class lectures will assume that students have read the assigned material.
- 2) Class participation and attendance (10% of final grade) are considered in evaluating grades. Students are expected to notify the class instructor if they are unable to attend class for any reason. Unexcused absences will affect your grade negatively.
- 3) Three assignments (60% of final grade) will be provided. These are intended to provide you an opportunity to practice, and to test, the analytic skills you have learned from the readings and hands-on experiences. If you need a dataset, one will be provided. Each assignment is worth 20% of your grade.
- 4) A final project (30%). Students are expected to address research questions or hypotheses using statistical analyses that are covered over the semester. Students will present their projects in class.

The grading scale for the Rutgers Graduate School of Social Work is as follows:

- A 92-100
- B+ 87-91
- B 82-86
- C+ 77-81
- C 70-76
- F 0-69

## **Course Outline**

### **Section I.**

#### **Weeks of Sept. 3, Sept. 10, Sept. 17 & Sept. 24**

- Introduction to SEM, AMOS, and path modeling
  - Purpose and process of SEM
    - Latent and observed variables
    - Exogenous and endogenous variables
    - Mediation, moderation, and mixed models (e.g., moderated mediation)
  - Factor analytic method
  - Symbol notation
  - Path diagrams
  - Structural equations
  - Covariance and mean structures
  - Fit indices
- Using the AMOS program
  - Graphics
  - Modeling tools
  - Hypothesized models
  - Model identification
- Path analysis
  - Testing mediation and moderation

#### Readings for Weeks of Sept. 3 and Sept. 10:

- Byrne (2016) Chps 1-2
- Hooper, D., Coughlan, J. and Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods*, 6, 53 – 60.
- Magill, M. (2011). Moderators and mediators in social work research: Toward a more ecologically valid evidence base for practice. *Journal of Social Work*, 11(4), 387-401.
- Morrison, T. G., Morrison, M. A., & McCutcheon, J. M. (2017). Best practice recommendations for using structural equation modelling in psychological research. *Psychology*, 8(09), 1326.

Readings for Weeks of Sept. 17 and Sept. 24:

- Bryan, A., Schmiede, S. J., & Broaddus, M. R. (2007). Mediation analysis in HIV/AIDS research: Estimating multivariate path analytic models in a structural equation modeling framework. *AIDS and Behavior, 11*(3), 365-383.
- Peterson, N.A., Farmer, A.Y. & Zippay, A. (2014). The implicit curriculum in an urban university setting: Pathways to students' empowerment. *Journal of Social Work Education, 50*, 630-647.
- Powell, K.G. & Peterson, N.A. (2014). Pathways to effectiveness in substance abuse prevention: Empowering organizational characteristics of community-based coalitions. *Human Service Organizations: Management, Leadership, & Governance, 38*, 471-486.
- Peterson, N. A., Powell, K. G., Treitler, P., Litterer, D., Borys, S., & Hallcom, D. (2019). The strategic prevention framework in community-based coalitions: Internal processes and associated changes in policies affecting adolescent substance abuse. *Children and Youth Services Review, 101*, 352-362.

\*\*\* PRESENTATIONS FOR ASSIGNMENT I WILL BE ON OCTOBER 1;  
ASSIGNMENT I DUE – OCT. 8 \*\*\*

## Section II.

Weeks of Oct. 1, Oct. 8, & Oct. 15

Factor analysis

- Exploratory factor analysis
- Confirmatory factor analysis

Readings for Week of Oct 1:

- Field (2018) (Chp. 18)
- Byrne (2016) (Chps. 3 & 4)
- Peterson, N.A., Farmer, A.Y., Donnelly, L. & Forenza, B. (2014). Assessing the implicit curriculum in social work education: Heterogeneity of students' experiences and impact on professional empowerment. *Journal of Teaching in Social Work, 34*, 460-479.
- Worthington, R.L. & Whittaker, T.A. (2006). Scale development research: A content analysis and recommendations for best practices. *The Counseling Psychologist, 34*, 806-838.

Readings for Weeks of Oct 8 and Oct. 15:

- Byrne (2016) (Chp. 5 & 7)  
Peterson, N.A., Speer, P.W. & Hughey, J. (2006). Measuring sense of community: A methodological interpretation of the factor structure debate. *Journal of Community Psychology*, 34, 453-469.  
Speer, P. W., Peterson, N. A., Christens, B. D., & Reid, R. J. (2019). Youth Cognitive Empowerment: Development and Evaluation of an Instrument. *American Journal of Community Psychology*.

### Section III.

Weeks of Oct. 22, Oct. 29, & Nov. 5

Testing Full Structural Equation Models and Change Over Time  
Cross-Lagged Panel Analysis  
Latent growth Curve Modeling

Readings for Week of Oct. 22

- Byrne (2016) (Chp. 9)  
Peterson, N. A., Speer, P. W., Peterson, C. H., Powell, K. G., Treitler, P., & Wang, Y. (2017). Importance of auxiliary theories in research on university-community partnerships: The example of psychological sense of community. *Collaborations: A Journal of Community-Based Research and Practice*, 1(1), 5.

Readings for Weeks of Oct. 29 & Nov 5

- Byrne (2016) (Chp. 11)  
Christens, B.D., Peterson, N.A. & Speer, P.W. (2011). Community participation and psychological empowerment: Testing reciprocal causality using a cross-lagged panel design and latent constructs. *Health Education & Behavior*, 38, 339-347.  
Duncan, T.E. & Duncan, S.C. (2009). The ABCs of LGM: An introductory guide to latent growth curve modeling. *Social & Personality Psychology Compass*, 3, 979-991.  
Martens, M.P. & Haase, R.F. (2006). Advanced applications of structural equation modeling in counseling psychology research. *The Counseling Psychologist*, 34, 878-911.  
McMahon, S., Peterson, N.A., Postmus, J.L., Winter, S.C., Palmer, J.E. & Koenick, R.A. (2015). Predicting bystander behavior to prevent sexual assault on college campuses: The role of self-efficacy and intent. *American Journal of Community Psychology*, 56, 46-56.

\*\*\* PRESENTATIONS FOR ASSIGNMENT II WILL BE ON NOVEMBER 5;  
ASSIGNMENT II DUE – NOV. 12 \*\*\*

Section IV.

Weeks of Nov. 12, Nov. 19, Dec. 3, & Dec. 10

Testing Group Differences

T-tests; indep. samples/ pairs

Analysis of variance/covariance

One-way, two-way, three-way ANOVAs/ interactions

Repeated measures

Multivariate analysis of variance/covariance

Discriminant analysis

Readings for Week of Nov. 12:

Field (2018) (Chps. 10, 12 & 13)

Readings for Week of Nov. 19:

Field (2018) (Chps. 14 & 17)

Readings for Weeks of Dec 3 & Dec 10:

Field (2018) (Chp. 15 & 16)

\*\*\* PRESENTATIONS FOR ASSIGNMENT III WILL BE ON DECEMBER 10;  
ASSIGNMENT III DUE – DEC. 17 \*\*\*

\*\*\* FINAL PROJECT PRESENTATIONS WILL BE ON DECEMBER 17 \*\*\*

Course

Evaluation:

Rutgers University issues a survey that evaluates both the course and instructor. This survey is completed by students toward the end of the semester, and all answers are confidential and anonymous.

Academic

Integrity

Policy:

All work submitted in a graduate course must be your own. It is unethical and a violation of the University's Academic Integrity Policy to present the ideas or words of another without clearly and fully identifying the source. Inadequate citations will be construed as an attempt to misrepresent the cited material as your own. Use the citation style preferred by the discipline. Plagiarism is the representation of the words or ideas of another as one's own in any academic exercise. To avoid plagiarism, every direct quotation must be identified by quotation marks or by appropriate indentation and must be properly cited in the text or in a footnote.

Acknowledgement is required when material from another source is stored in print, electronic, or other medium and is paraphrased or summarized in whole or in part in one's own words. To acknowledge a paraphrase properly, one might state: "to

paraphrase Plato's comment..." and conclude with a footnote identifying the exact reference. A footnote acknowledging only a directly quoted statement does not suffice to notify the reader of any preceding or succeeding paraphrased material. Information which is common knowledge, such as names of leaders of prominent nations, basic scientific laws, etc., need not be footnoted; however, all facts or information obtained in reading or research that are not common knowledge among students in the course must be acknowledged. In addition to materials specifically cited in the text, only materials that contribute to one's general understanding of the subject may be acknowledged in the bibliography. Plagiarism can, in some cases, be a subtle issue. Any question about what constitutes plagiarism should be discussed with the faculty member. Plagiarism along with any and all other violations of academic integrity by graduate and professional students will normally be penalized more severely than violations by first-year undergraduate students. Since all violations of academic integrity by a graduate or professional student are potentially separable under the Academic Integrity Policy, faculty members should not adjudicate alleged academic integrity violations by graduate and professional students, but should refer such allegations to the appropriate Academic Integrity Facilitator (AIF) or to the Office of Student Conduct. The AIF that you should contact is Antoinette Y. Farmer, 732.932.2621. The student shall be notified in writing, by email or hand delivery, of the alleged violation and of the fact that the matter has been referred to the AIF for adjudication. This notification shall be done within 10 days of identifying the alleged violation. Once the student has been notified of the allegation, the student may not drop the course or withdraw from the school until the adjudication process is complete. A T/Z or incomplete grade shall be assigned until the case is resolved. For more information regarding the Rutgers Academic Integrity Policies and Procedures, see: <http://academicintegrity.rutgers.edu/integrity.shtml>.

### Disability

Accommodation: Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.