

**NEW YORK UNIVERSITY  
STEINHARDT SCHOOL OF EDUCATION**

**E10.2094 Factor Analysis and Structural Equation Modeling**

**Professor Frances Stage**  
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This course is designed to meet the needs of doctoral students who wish to learn about and ultimately conduct analysis of data using structural equations modeling techniques. The factor analysis portion will focus on analysis related to structural equation modeling. The purpose of this course is to present the theoretical basis for and the skills necessary for structural equation modeling. The course will begin with the theory of matrix algebra and factor analysis. Students will learn the underlying theory of the applications and assumptions for the use of the technique using LISREL. Theoretical presentation of a model, data entry, confirmatory factor analysis, and model specification will form the bulk of the class. The class will include reviews and criticism of extant research applying the techniques. The course will rely heavily on work in laboratory sessions that combines demonstrations, group work and tutorials on individual projects.

**Conduct of the Class:**

The course will be conducted with a mixture of lecture, workshop, and tutorial sessions that include a combination of lectures, demonstrations, student critiques of extant analyses, and in-class data analysis.

**Office Availability:**

I will be available immediately after class from 7:00 to 8:00. I am also available most days after 5 p.m. each day except Tuesday, my writing day. I am available for prearranged meetings. Because of departmental business and travel, I might not be available if you walk in to the office without an appointment. The most efficient way of scheduling is to send an Email note suggesting two or three possibilities.

### **Course Materials:**

Jöreskog, Karl G & Sörbom, Dag (1996). *LISREL 8 User's Reference Guide*. Lincolnwood, IL: Scientific Software International.

Hayduk, L. A. ( 1988). *Structural Equation Modeling with LISREL: Essentials and Advances*. Baltimore: Johns Hopkins University Press.

Stage, F.K. (1990). In Smart, J. (Ed.) LISREL: An introduction and applications in higher education. *Higher Education: Handbook of Theory and Research, Volume VI*. New York: Agathon Press.

Stage, F.K., Nora, A., Carter, H.C. & Barlow, L. (In press). Path Analysis and Structural Equations Modeling: An Introduction and Analysis of a Decade of Research. *Journal of Educational Research*.

Additional course materials will be distributed in class or posted to the Class Blackboard Web site. Students are be responsible for maintaining an NYU computer account and reading those materials.

### **Course Requirements:**

1. Class attendance, reading, and meaningful participation in classroom assignments and discussions. Use of Blackboard website to access class information and participate in assignments.
2. Proposal: Selection of a project by the 4<sup>th</sup> class meeting. A brief 4-5 sentence paragraph describing your possible research project should be posted to the web site in the digital drop box by noon on 5/24. (Project topics must be finalized by 5/27).
3. Fifteen minute verbal review of a LISREL analysis from a refereed journal. We will schedule these on the second day of class.
4. 4-5 page written description of your data, model to be analyzed including theoretical underpinnings by the 7<sup>th</sup> class meeting.
5. Brief, periodic presentation of project analyses to class as well as presentation of final analysis.
6. Final written report combining, theoretical proposal (from 5 above) with procedures, data analysis, and discussion.

Assignments should be posted (and sent) to the digital drop box on the web site. More information about assignments will be provided during class.

## Evaluation:

Following are the maximum points for each assignment:

1. Class participation	10
2. Project selection	10
3. Review of article	10
4. Written proposal for project	15
5. Presentation of project	15
6. Final report	<u>40</u>
	100

Grades will be assigned as follows:

A	93-100 points	B-	80-82 points
A-	90-92 "	C+	77-79 "
B+	87-89 "	C	73-76 "
B	83-86 "	C-	below 73 points

## Labs:

LISREL computer software is available in three labs on campus. Check the labs for summer hours.

- **The ITS 14 Washington Place Lab** (*Windows*)

14 Washington Place, Lower Level  
1-212-998-3457

Monday - Friday                                      8:30 a.m. - 11:30 p.m.  
Saturday - Sunday                                    Closed

- **The ITS Tisch Hall Lab** (*Windows*)

40 West 4th Street, Room LC-8  
1-212-998-3409

Monday - Friday                                      8:30 a.m. - 11:30 p.m.  
Saturday                                                8:30 a.m. - 5:30 p.m.  
Sunday                                                    Closed

- **The ITS Third Avenue North Lab** (*Windows and Macintosh*)

75 Third Avenue, Level C3  
1-212-998-3500

Monday - Thursday                                    8:30 a.m. - 11:30 p.m.  
Friday                                                    8:30 a.m. - 5:30 p.m.  
Saturday                                                Closed  
Sunday                                                    Noon - 1:30 a.m.  
(Open until 2:30 a.m. as of Oct. 19th)

## **Tentative Schedule**

**5/17— Introductions, syllabus, course resources, overview  
Introduction to LISREL: Underlying theory including matrix algebra, factor analysis, and path analysis. Examples of analyses.**

**Lab Work – Accessing LISREL, a simple confirmatory factor analysis**

**5/19 – Theoretical justification of models, notation, constructs and measured variables, specification.**

**Lab Work – Practice specifying simple models**

**5/20 – Differences between path analysis and structural equation modeling.**

**Lab Work – A simple model: Comparison of path analysis with Structural Equation Modeling**

**5/24 – Relationships within path models, nonrecursive models  
Discussion of class projects**

**Lab Work – Preparing data, Accessing data for projects**

**5/26 – Testing Fit, Modification Indices, Comparison of Models**

**Lab Work – Comparing models, Initial work on simplified models**

**5/27 – Reporting results, Review of articles using LISREL**

**Lab Work – Begin specifying project**

**6/2 – Review of articles using LISREL**

**Lab Work – work on SEM projects**

**6/3 – Presentations, Lab work on projects,**

**TBA - Final Reports**