

STRUCTURAL EQUATION MODELING

Course Number:	HSC 7937 – Fall 2023; Section 8632
Instructor:	JeeWon Cheong, Ph.D.
Class Time & Location:	Tuesday Period 4 – 6 (10:40 am – 1:40 pm); FLG 235
Credit Hours:	3 semester hours
Office Hours:	Wednesdays 3:00 – 4:00 pm via zoom or in-person; and by appointment
Contact Information:	Email jwcheong@ufl.edu

Overview

This course is an introduction to the theory and application of Structural Equation Modeling (SEM). SEM refers to a class of statistical techniques that encompass aspects of regression analysis, path analysis, and confirmatory factor analysis, and full scale models incorporating both measurement and structural components. These techniques are useful for both experimental and non-experimental data, as well as cross-sectional and longitudinal data sets. Many of these techniques are based on large sample statistical theory, and therefore, they are most readily applicable to the data sets with large sample sizes. They can, with some cautions, be applied to smaller data sets, particularly when variables are experimentally manipulated and/or the models being investigated are relatively simple.

Course Objectives

The general goals of the course are: (1) To provide students with a thorough background in the conceptual aspects and statistical foundations of structural equation models; (2) to introduce students to the major computer software programs in the field; and (3) to provide students with the ability to apply these techniques to their own research projects. At the end of the course, students are expected to have a solid, conceptual foundation of structural modeling issues, be able to analyze data using SEM package (e.g., Mplus), critically evaluate journal articles, and write-up SEM results.

Prerequisites

This course assumes that students have taken graduate statistics courses that cover simple and multiple regression analysis.

Textbooks

- Required:** Schumacker, R. E., & Lomax, R. G. (2016). *A beginner's guide to structural equation modeling* (4th Ed). Routledge.
- Optional:** Hoyle, R. H. (1995). *Structural Equation Modeling: Concepts, Issues, and Applications*. Sage Publications.

Exams and Assignments

There will be homework assignments and a midterm exam (in-class exam). The assignments will require applying the knowledge from the previous week(s) and will involve data analysis using the computer program. The purpose of the assignments is to provide a medium through which you really learn the material. You are free to discuss the assignments with me or your classmates; however, it is important and required for you to do the write-ups and the computer work yourself.

The **midterm exam** will be open book and handouts. You can use textbook and handouts for the exam, but it is strongly recommended to organize your own material in advance for the exam. The midterm exam will be on **November 7** during class hours. There will be no final exam.

Final Research Project:

The project can be on any topic you are interested in. You can use your own data set, reanalyze the data from your previous study, or reanalyze the data from studies published in academic journals. You can develop a new project or modify your previous project using SEM techniques. Simply replicating the studies that are already completed or in progress are not acceptable, unless substantial changes (e.g., analytic methods) are made.

The outline of your project (2-3 pages) should be turned in by **5 pm on October 31 (Tuesday) via email**. This outline will include the title, research questions you want to address, a brief background of the research topic, and a detailed description of analytic plans (Figure of your model should be included). If your project involves reanalyzing the data, you should clearly describe the differences between the previous and the current studies.

You will present your project in class on (November 28 or December 7). Your presentation must include: (a) Introduction (research background and hypotheses); (b) Method (sample description, measures, and data analysis overview); (c) Results; and (d) Discussion/Conclusions (implications of the findings and strengths and weakness of your study, particularly in relation to data analysis techniques). Your presentation materials (e.g., PowerPoint Slides) should be submitted to be via email by 5 pm on the day before your presentation. The presentation should **not exceed 30 minutes**, including questions and answers with your classmates.

You can consider this presentation as a data meeting with your research group (your classmates will serve as your group members). You are the leader of the meeting, so you should present all the necessary information to facilitate discussions. You can also ask your classmates questions (e.g., how to improve your model, alternative ways to test your hypotheses, etc.). You must submit to me (emailing would work) your slides in advance, i.e., no later than 5 pm the day before your presentation.

Attendance

The university recognizes the right of the instructor to make attendance mandatory and require documentation for absences (except for religious holidays), missed work, or inability to

fully engage in class. After due warning, an instructor can prohibit further attendance and subsequently assign a failing grade for excessive absences.

Evaluation

Assignments	Grading Scale
1. Class Participation: 10%	A 93% - 100%
	A- 90% - 92.9%
2. Homework Assignments: 30%	B+ 85% - 89.9%
	B 80% - 84.9%
3. Midterm Exam: 30%	C+ 75% - 79.9%
	C 70% - 74.9%
4. Final Project: 30%	F Below 70%

Computer Lab

There are several stand-alone SEM programs, including Mplus, LISREL, EQS, and AMOS. We will mainly use Mplus (Muthén & Muthén, 1998 – 2017) for this class. Mplus 8.9 is available at UF Apps (<https://info.apps.ufl.edu/>).

Handouts

You will be provided with handouts and program examples related to the topics covered in class. These materials are partly derived from various sources including Drs. Steve West and Roger Millsap at Arizona State University and Dr. Oi-man Kwok at Texas A&M.

All the materials generated for this course (e.g., handouts, assignment & exam problems, computer examples) are copyrighted.

Tentative Class Schedule

Week	Dates	Topics	Readings
1	Aug 29	Course Overview and Introduction	Handouts
2	Sep 5	Basic Concepts and Review of Multiple Regression:	S&L Ch 1-3
3	Sep 12	Path Models with Measured Variables <i>Homework 1 Out</i>	S&L Ch 4, 5, & 7
4	Sep 19	Path Models with Measured Variables	
5	Sep 26	Path Models with Measured Variables <i>Homework 1 In; Homework 2 Out</i>	

Week	Dates	Topics	Readings
6	Oct 3	Path Models with Measured Variables	
7	Oct 10	Measurement Models and Confirmatory Factor Analysis <i>Homework 2 In; Homework 3 Out</i>	S&L Ch 6 & 9
8	Oct 17	Measurement Models and Confirmatory Factor Analysis	
9	Oct 24	Structural Equation Models in Multiple Groups <i>Homework 3 In</i>	S&L Ch 8 & 10
10	Oct 31	Structural Interaction Models <i>Homework 4 Out</i> <u>Outline of final project is due.</u>	S&L Ch 15 & 16
11	Nov 7	Midterm Exam	Open book & handouts
12	Nov 14	Latent Growth Curve Modeling	S&L Ch 14 & handouts
13	Nov 21	Latent Growth Curve Modeling	S&L Ch 14 & handouts
14	Nov 28	<i>Project Presentations</i>	
15	Dec 5	<i>Project Presentations</i>	

Course Policies

1. Special Accommodations: Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. Please provide documentation to the instructor within the first two weeks of class.
2. Academic Honesty: UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code.” On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and possible sanctions.

Students are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor of this class.

3. Grade adjustments: It is unethical and in direct violation of the UF Student Honor Code to request an unjustifiable grade adjustment (UF Student Honor Code: “Conspiracy to Commit Academic Dishonesty”). Under no circumstances will I ever ‘round up’ a student’s grade (a 89.9% is a B+), nor will I offer extra credit. Additionally, I only discuss grades face-to-face (never via email or phone) to protect student privacy. If a grade input error occurs, students are strongly encouraged to notify me as soon as possible. If an error occurred, the grade will be adjusted. *Note*: Students have 1 week to contest a grade from the date the grade is posted on Canvas. After the 7 days have passed, students waive their right to contest the grade.
4. Excused Absence Policy: Per University of Florida policy, excused absences include medical appointments and illness (with doctor’s note), deaths in the family (with documentation) and school events (with documentation on school letterhead). Additional absences require documentation of medical excuses or extenuating circumstances, and must be submitted within 1 week of the absence using the “Excused Absence Request Form” (located on the course website). *Note*: Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.
5. Online Course Evaluation Process: Students are expected to provide feedback on the quality of instruction in this course. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open.
6. Instructor Office Hours: Students are encouraged to visit me during posted office hours, should questions or concerns arise during the semester. If you cannot make office hours, we can schedule an appointment. I am not, however, able to send or discuss grades or any other points via e-mail according to the department’s and university’s student privacy policy.

Class Recording

Per the House Bill 233 Intellectual and Viewpoint Diversity Act, students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. ***Specifically, students may not publish recorded lectures without the written consent of the instructor.***

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. ***A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips,***

private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

Students with Special Learning Needs

Any student with verification of disabilities will be provided every reasonable accommodation in the appropriate manner to assist them in meeting the academic requirements of the course as expected of all students enrolled after registering with the Office of Disabilities in Criser Hall. Such students should notify the instructor so that special arrangements can be made. If special needs/circumstances arise, it is your responsibility to notify me immediately, not at the course's end.

Civility, Accessibility and Community Resources (www.cdo.ufl.edu/)

Inclusion is one of UF's six core values and it is the connective tissue that unites these values in common purpose. The Office of the Chief Diversity (CDO) works in concert with other key offices on campus to ensure that inclusion and a sense of belonging are realized for all members of the Gator Nation.

Title IX

University of Florida has zero tolerance for sexual discrimination, harassment, assault/battery, dating violence, domestic violence, or stalking. Students are encouraged to report any experienced or witnessed occurrences to law enforcement and/or one of UF's Title IX Coordinators. Students can report incidents or learn more about their rights and options by contacting Student Conduct and Conflict Resolution at 202 Peabody Hall, 352-392-1261 or visit: www.dso.ufl.edu/scct/process/incident-report/ or www.dso.ufl.edu/scct/process/victim-rights/

Additional Student Resources

- **Library Support:** The Department of Health Education and Behavior has a designated librarian to support your research needs. To contact your subject specialist visit: <https://uflib.ufl.edu/specialists/>. There are many ways to receive assistance concerning using the libraries or finding resources.

1. Online Computing Help Desk for Canvas Support Services: <http://helpdesk.ufl.edu>
2. Online Library Help Desk:
<http://guides.uflib.ufl.edu/content.php?pid=86973&sid=686381>
3. Disabilities Resource Center: <http://www.dso.ufl.edu/drc>
4. Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>
5. Dean of Students Office: <http://www.dso.ufl.edu>: Do you need help resolving a conflict, or would you like access to the student code of conduct? Visit the Dean of Students website, or stop by Peabody Hall.