STRUCTURAL EQUATION MODELING

Course Number:	HSC 7937 – Fall 2021; Section 1186
Instructor:	JeeWon Cheong, Ph.D.
Class Time & Location:	Tuesday Period 4 – 6 (10:40 am – 1:40 pm); FLG 275
Credit Hours:	3 semester hours
Office Hours:	Wednesdays 3:00 – 4:00 pm via zoom; 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 2** 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 November 9 (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 **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 December 6.** The presentation should **not exceed 25 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.

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 8.0 is available at UF Apps (https://apps.ufl.edu/Citrix/UFApps_StoreWeb/). AMOS is also freely available, which is embedded in SPSS 24 at UF Apps.

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 24	Course Overview and Introduction	Handouts
2	Aug 31	Basic Concepts and Review of Multiple Regression:	S&L Ch 1-3
3	Sep 7	Path Models with Measured Variables *Homework 1 Out*	S&L Ch 4, 5, & 7
4	Sep 14	Path Models with Measured Variables	
5	Sep 21	Path Models with Measured Variables *Homework 1 In; Homework 2 Out*	
6	Sep 28	Path Models with Measured Variables	
7	Oct 5	Measurement Models and Confirmatory Factor Analysis *Homework 2 In; Homework 3 Out*	S&L Ch 6 & 9
8	Oct 12	Measurement Models and Confirmatory Factor Analysis	
9	Oct 19	Measurement Models and Confirmatory Factor Analysis *Homework 3 In*	
10	Oct 26	Structural Equation Models in Single and Multiple Groups	S&L Ch 8 & 10
11	Nov 2	**Midterm Exam**	Open book & handouts
12	Nov 9	Structural Equation Models in Multiple Groups *Homework 4 Out* **<u>Outline of final project is due.</u>**	S&L Ch 11
13	Nov 16	SEM Interaction Models Reporting SEM Research	S&L Ch 15 S&L Ch 16
14	Nov 23	*Homework 4 In* **No Class**	
15	Nov 30	Latent Growth Curve Modeling	S&L Ch 14
16	Dec 7	Project Presentations	

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.

Course Ground Rules

1.   Respect each other's opinions and comments even though you may not agree.
Each of you has a heritage, history, and variety of life experiences that influence how you see the world. We tend to attach labels, develop values, and express attitudes based on this diversity. It is this diversity, however, that makes us each unique and important. In this classroom, we will attempt to minimize the barriers associated with sensitive or controversial topics and maximize learning together in a trusting environment.

2.   If you come in late or leave early, use the doors at the back of the classroom.
Please leave the back row empty for those who enter after class has started. This is to alleviate any interruptions for both you and the instructors.

3.   The use of electronic devices during class is permitted only for accessing class materials.
Please do not use laptops, cell/smart phones, electronic tablets, etc., for surfing the internet, checking emails, or accessing materials irrelevant to this class.

4.   Please do not begin packing up until you have been officially dismissed by the instructor.
When a few people start to pack up it is distracting to the instructor and fellow students. Please be respectful and wait until the class is concluded.

5.   Students are prohibited from unnecessary side conversations, sleeping, completing outside work, reading off topic materials (such as newspapers) while class is being conducted.

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.

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/sccr/process/incident-report/ or www.dso.ufl.edu/sccr/process/victim-rights/

Additional Student 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.