Structural Equation Modeling I
Syllabus

EDLD 633 – 4 Credits – CRN 27594
University of Oregon, Department of Educational Methodology, Policy, and Leadership

Winter Term 2014
Meeting Days/Time: Tuesdays 4:00 - 7:50 PM
Location: Lokey 176 ED
Computer Lab: 110 HEDCO (Learning Commons)

Instructor: David S. DeGarmo, Ph.D.
Research Associate Professor
E-Mail: degarmo@uoregon.edu
Phone: (541) 346-6554
Address: 677 E. 12th Ave, Suite 500
Office Hours: by appointment

DESCRIPTION
EDLD 633 Structural Equation Modeling I is the first quarter of a two quarter sequence on Structural Equation Modeling (SEM). The goal of the course is to gain familiarity and build expertise in the use of latent variable models within a structural equation modeling framework. The course includes the use and interpretation of AMOS and Mplus software. Topics covered will include path analysis, path diagramming, covariance structures, model specification and identification, parameter and model estimation, goodness of fit testing, estimation methods, regression models, confirmatory factor analysis, full SEM models, and invariance testing.

COURSE PREREQUISITES
Students should have the equivalent of a year of doctoral study in statistics including an intermediate graduate course in applied statistics before enrolling in this course. The ideal prerequisite course is completion of multiple regression. Computer skills sufficient to allow proficient use of statistical software are also required to complete course work.

OBJECTIVES
The goals of the course are to learn practical application of structural equation modeling. Emphasis in the course is on the mastery of concepts and principles, development of skills in the use and interpretation of general SEM rubrics and software, and in the development of critical analysis skills in understanding and consuming existing research using the covered techniques.

REQUIRED READING MATERIALS

A reading list of required articles will be also be assigned and distributed in class. All required reading materials will be made available on Blackboard.
SOFTWARE
AMOS:
The software we will use is SPSS and AMOS. SPSS 22 and AMOS are available in the HEDCO Learning Center computer lab (110 HEDCO) for all registered students in College of Education coursework. Licensed copies are available for GTFs or UO student employees, see UO Information Technology software center if you are eligible at https://it.uoregon.edu/software/list. Full versions of AMOS are sold by SPSS/IBM. A limited time trial version of AMOS 22 is available at: http://www-03.ibm.com/software/products/en/spss-amos (only for 14 days).

Mplus:
All course examples will also be supplemented with Mplus. No publicly available copy of Mplus software is available on campus. Mplus is not required but is optional for all assignments. Information on Mplus is available at: http://www.statmodel.com/index.shtml and a free limited capacity version of the software is available at: http://www.statmodel.com/demo.shtml. All features in Mplus Version 7.11 Base Program and Combination Add-On are available in Mplus Demo Version 7.11. The Mplus Demo Version is limited by the number of observed variables that can be used in an analysis. Student pricing is available for those who have not yet obtained a Ph.D. Finally, an alternative option for running Mplus is to provide the instructor with your data file and your input file and the output will be returned to you in a reasonable period of time.

OTHER REFERENCES AND RESOURCES:


- (Available on Blackboard and download at http://www.statmodel.com)

SEMNET open forum SEM discussion group at: http://www2.gsu.edu/~mkteer/semnet.html


COURSE STRUCTURE AND REQUIREMENTS
EDLD 633 SEM I is organized in a seminar format. The major activities consist of a combination of lectures, group discussions, and software applications and interpretations. The course will cover an introduction to SEM with an emphasis on building, specifying, estimating and testing models, confirmatory factor analysis, invariance testing, full SEM models, and related techniques. For each topic, there will be readings in the required texts as well as supplementary assigned readings. Assignments include three homeworks and a final brief paper as well as regular participation in class discussion. Students completing homework in Mplus as well as AMOS will receive 10% extra credit.

All class lecture slides and any additional reading materials assigned beyond textbook will be made available on Blackboard. Students are expected to read all materials that are posted on Blackboard two or more weeks prior to class, participation in discussion and questions are expected.
HOMEWORK
There are three homework assignments. These assignments will provide a basis for seeing the range of applications available in SEM, gaining experience and facility in running SEM software and interpreting output. All assignments must be completed on time to fulfill course requirements. A minimum of 10% will be deducted from late work. You may work in groups of two or three for any of the homework assignments. A team of students should turn in one copy of the group homework with all names listed and with a statement that all group members contributed to the project equally. Every group member will receive the same grade on an assignment completed as a group.

PAPER
A brief paper is required that will provide the opportunity to build, test, interpret and report results of an SEM of the student's creation. Ideally the paper will use your own research ideas, data and a path analysis or Confirmatory Factor Analysis (CFA) model. There can be some flexibility in this requirement depending on class needs, but I envision a project that involves model building (i.e., specification and a path diagram) and that involves analyses of one's own data with some presentation and discussion of results with the group (if you do not have data, I will make data available). A preliminary one-page outline of the project along with a complete path diagram of the proposed model will be due February 11. The final paper should be 5-8 pages, should use APA style, and provide a complete description of the results and interpretation of your CFA analysis. Additional details and a grading rubric are provided below.

You may work in groups of two or three for the final paper. Again, a team of students should turn in one copy of the group homework with all names listed and with a statement that all group members contributed to the project equally. Every group member will receive the same grade on an assignment completed as a group.

The paper due date is March 18th.

GRADING POLICY
Your final grade for this course will be determined based on attendance/participation (10% or 10 points), three homework assignments (60% or 20 points per homework assignment), and the final course paper (30%) or (.30 × 100 points available, see below).

Your final grades will be based on the total number of points accrued during the term. There will not be a curve. Final letter grades for the course will be calculated as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A+</td>
<td>97-100%</td>
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<tr>
<td>A</td>
<td>93-96.9%</td>
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<tr>
<td>A-</td>
<td>90-92.9%</td>
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<tr>
<td>B+</td>
<td>87-89.9%</td>
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<tr>
<td>B</td>
<td>83-86.9%</td>
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<tr>
<td>B-</td>
<td>78-82.9%</td>
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<tr>
<td>C+</td>
<td>73-77.9%</td>
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<tr>
<td>C</td>
<td>69-72.9%</td>
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<tr>
<td>C-</td>
<td>66-68.9%</td>
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<tr>
<td>F</td>
<td>&lt; 66%</td>
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Late work will be penalized a minimum of 10%. Work is due at the beginning of class on the due date. Each student is responsible for submitting his/her own original work. Any instance of academic dishonesty (e.g., plagiarism) will result in a minimum of a score of zero for the assignment. Again, extra credit of 10% will be awarded to those who complete all homework assignments using AMOS and Mplus.
RESEARCH PAPER SCORING RUBRIC
The purpose of the research paper is to provide experience in using, interpreting and reporting the results of SEM models. The paper must represent the original analysis of data that you have not done before. This does not mean that you cannot use existing data or use a study on which you have previously conducted analyses; it means you need to conduct new analyses not attempted before. For the analysis, you must use either a path analysis or CFA model. The paper should be 5-8 pages in length (you will lose points for exceeding the page limit), should use APA style (6th Edition), and should include the following elements. In grading, points for the different sections of the paper will be awarded as indicated by the numbers in parentheses.

Introduction section (approximately one page) to describe the context and purpose of the study (5 points)

A concise methods section (approximately one page) to describe the sample, the measured variables, and the procedures for data collection (10 points)

A complete and thorough results section including tables and figures in APA style as necessary. At least one figure and one table of results including parameter estimates are required. Report of results should include screening of data, treatment of missing data, testing of model assumptions, complete reporting of the SEM model(s) including discussion and interpretation of relevant coefficients, interpretation of strength of association or power as needed, and interpretation of goodness of fit and variance explained (50 points)

A concise discussion section (1-2 pages) that describes study limitations, interprets the results, discusses implications of the study (25 points)

References in APA style as well as general style, coherence of writing, and correct use of APA style for the whole paper (10 points)

The paper is due Tuesday, March 18th.
# TENTATIVE SCHEDULE OF TOPICS AND ASSIGNMENTS

<table>
<thead>
<tr>
<th>WEEK</th>
<th>TOPIC</th>
<th>ASSIGNMENT</th>
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<tbody>
<tr>
<td>1</td>
<td>January 7 Introduction, Overview of topics and course structure</td>
<td>Kline 1-4, AMOS 1-65 (AMOS page numbers refer to the AMOS 19 User’s Guide)</td>
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<td>2</td>
<td>January 14 Path Analysis, SEM models with observed variables</td>
<td>Kline 5-6, AMOS 67-79</td>
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<td>4</td>
<td>January 28 Evaluating Model Fit</td>
<td>Homework 1 Due</td>
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<td>Kline 8, AMOS 101-127 &amp; Appendices</td>
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<td>5</td>
<td>February 4 Introduction to factor analysis</td>
<td>Kline 9; AMOS 137-144</td>
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<td>6</td>
<td>February 11 Measurement Models and CFA</td>
<td>Homework 2 Due</td>
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<td>Kline 9</td>
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<td>7</td>
<td>February 18 Invariance Testing</td>
<td>Paper Outline and Diagram Due</td>
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<td>Kline 9; AMOS 159-207</td>
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<td>8</td>
<td>February 25 Invariance Testing Continued</td>
<td>AMOS 363-375</td>
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<td>9</td>
<td>March 4 Full Models and Other Applications</td>
<td>Homework 3 Due</td>
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<td>Kline 10</td>
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<tr>
<td>10</td>
<td>March 11 Full Models and Other Applications Continued</td>
<td>Homework 3 Due</td>
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<td>Kline 11-12</td>
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<td>11</td>
<td>March 18 Finals Week</td>
<td>Paper due</td>
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COURSE POLICIES

Course Incomplete Policy
Students are expected to be familiar with university policy regarding grades of “incomplete” and the time line for completion. For details on the policy and procedures regarding incompletes, Please see: https://education.uoregon.edu/academics/incompletes-courses. Course Incompletes will be offered only rarely in unusual circumstances that truly prevent the student from completing course work during the regular course schedule. Incompletes will NOT be awarded simply because you have not been able to finish course work. Incompletes will only be awarded when there is a documented medical or similar unforeseen emergency that prevents the student from completing course work.

Attendance Policy
Attendance is required to succeed in this course and master the course material. If a student does miss class, it is the student’s responsibility to get class notes, and handouts or other distributed materials. Contact the instructor in case of illness or emergencies that preclude completing assignments as scheduled or attending class sessions. Communication via Blackboard is encouraged and preferred. Messages can be left on the instructor's voice mail and via e-mail prior to class. If no prior arrangements have been made before class time, the absence will be unexcused.

Diversity
It is the policy of the University of Oregon to support and value diversity. To do so requires that we:
- respect the dignity and essential worth of all individuals.
- promote a culture of respect throughout the University community.
- respect the privacy, property, and freedom of others.
- reject bigotry, discrimination, violence, or intimidation of any kind.
- practice personal and academic integrity and expect it from others.
- promote the diversity of opinions, ideas and backgrounds which is the lifeblood of the university.

Documented Disability
Appropriate accommodations will be provided for students with documented disabilities. If you have a documented disability and require accommodation, arrange to meet with the course instructor within the first two weeks of the term. The documentation of your disability must come in writing from the Accessible Education Center in the Office of Academic Advising and Student Services. Disabilities may include (but are not limited to) neurological impairment, orthopedic impairment, traumatic brain injury, visual impairment, chronic medical conditions, emotional/psychological disabilities, hearing impairment, and learning disabilities. For more information on Accessible Education Center, please see http://aec.uoregon.edu

Mandatory Reporting
UO employees, including faculty, staff, and GTFs, are mandatory reporters of child abuse and prohibited discrimination. This statement is to advise you that that your disclosure of information about child abuse or prohibited discrimination to a UO employee may trigger the UO employee’s duty to report that information to the designated authorities. Please refer to the following links for detailed information about mandatory reporting:
https://hr.uoregon.edu/policies-leaves/general-information/mandatory-reporting-child-abuse-and-neglect/presidents-message
http://around.uoregon.edu/mandatoryreporting
Academic Misconduct Policy
All students are subject to the regulations stipulated in the UO Student Conduct Code [http://conduct.uoregon.edu](http://conduct.uoregon.edu). This code represents a compilation of important regulations, policies, and procedures pertaining to student life. It is intended to inform students of their rights and responsibilities during their association with this institution, and to provide general guidance for enforcing those regulations and policies essential to the educational and research missions of the University.

Conflict Resolution
Several options, both informal and formal, are available to resolve conflicts for students who believe they have been subjected to or have witnesses bias, unfairness, or other improper treatment. It is important to exhaust the administrative remedies available to you including discussing the conflict with the specific individual, contacting the Department Head, or within the College of Education, you can contact Angie Whalen, Assistant Dean for Academic Programs and Student Services, at 346-2898 or awhalen@uoregon.edu; Lauren Lindstrom, Associate Dean for Research and Academic, at 346-1399 or lindstrm@uoregon.edu; or Surendra Subramani, Diversity Coordinator, at 346-1472 or surendra@uoregon.edu.

Outside the College, you can contact:
- **UO Bias Response Team**: 346-1139 or [http://bias.uoregon.edu/whatbrr.htm](http://bias.uoregon.edu/whatbrr.htm)
- **Conflict Resolution Services**: 346-0617 or [http://studentlife.uoregon.edu/SupportandEducation/ConflictResolutionServices/tabid/134/Default.aspx](http://studentlife.uoregon.edu/SupportandEducation/ConflictResolutionServices/tabid/134/Default.aspx)
- **Affirmative action and Equal Opportunity**: 346-3123 or [http://aaeo.uoregon.edu/](http://aaeo.uoregon.edu/)

Grievance Policy
A student or group of students of the College of Education may appeal decisions or actions pertaining to admissions, programs, evaluation of performance and program retention and completion. Students who decide to file a grievance should follow the student grievance procedure, or alternative ways to file a grievance outlined in the Student Grievance Policy ([https://education.uoregon.edu/academics/student-grievance](https://education.uoregon.edu/academics/student-grievance)) or enter search: student grievance.

In Case of Inclement Weather
In the event the University operates on a curtailed schedule or closes, UO media relations will notify the Eugene-Springfield area radio and television stations as quickly as possible. In addition, a notice regarding the university’s schedule will be posted on the UO main home page (in the “News” section) at [http://www.uoregon.edu](http://www.uoregon.edu). Additional information is available at [http://hr.uoregon.edu/policy/weather.html](http://hr.uoregon.edu/policy/weather.html).

If an individual class must be canceled due to inclement weather, illness, or other reason, a notice will be posted on Blackboard or via email. During periods of inclement weather, please check Blackboard and your email rather than contact department personnel. Due to unsafe travel conditions, departmental staff may be limited and unable to handle the volume of calls from you and others.