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**BUSINESS 9712 –Winter 2017**  
**Special Topics in Statistics**

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**Fridays 3:00 pm – 6:00 pm**  
**Location: IVEY 2125**  
**(12 Sessions)**

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**COURSE DESCRIPTION**

This course is designed to develop data analysis skills using structural equation modeling (SEM) and multilevel modeling techniques. During the course, students will learn the basic concepts and knowledge associated with SEM and multilevel analyses. In addition to gaining content-related knowledge about the methods, students will also gain hands-on experience by analyzing the datasets. It is expected that students entering this course already have general knowledge about research methods used in organizational science (e.g., theory development, hypothesis testing, construct validity, etc.). Students should also have basic understanding of regression analysis.

The topics include measurement models, path analysis, latent factor models, latent growth models, and multilevel models. The primary objective is to apply the appropriate statistical techniques to test the research questions. Software packages used in this course would primarily be SPSS and Mplus. These software packages are available on Ivey Research Server. You are also welcome to use other software (e.g., AMOS, R, STATA) to complete the home assignments and reports.

**COURSE OBJECTIVES**

Students who successfully complete this course will be able to:

- Understand the basic statistic assumptions and theoretical concepts associated with the different SEM models (e.g., confirmatory factor analysis, latent factor models) and multilevel models (e.g., ICC, fixed vs. random effects).
- Be able to graphically draw a SEM model that corresponds to the theoretical model proposed.
- Be able to estimate using the software different SEM and multilevel models and evaluate the model fit and model assumptions.
- Know how to appropriately report the model estimation results in research papers.
- Be able to understand and critically read the research articles that use the collection of methods learned in the course.

### COURSE ACTIVITIES / GRADING / METHODS OF EVALUATION

Student grades will be derived from a combination of homework (35% of grade, 7 home assignments in total), in-class contributions (15% of grade), and a final project (50% of grade, including written and oral presentations).

**Homework:** There will be home assignments for the majority of our sessions. The homework is assigned at the end of the class and due by 6pm of the *Wednesday* prior to our next class. Homework turned in after the due time will have its grade 40% deducted. You may only turn in late homework up until the next homework is due, after that no credit will be given.

**Individual project.** You will be required to conduct analyses for an individual project. Your analyses in this project include a test of your hypothesized model using either SEM and/or multilevel approach (e.g., multilevel SEM models). In your analyses you are expected to include at least one of the following elements: (1) a mediation analysis, (2) a moderation (interaction) analysis, (3) a longitudinal analysis, or (4) multilevel analysis. If you choose to use other analytical techniques, please consult with me.

You will need to use a real (or simulated) data set for this individual project. Please consult with me before you decide your topic and the type of data for your individual project. In this individual project, you are required to develop hypotheses/research questions, conduct the SEM/HLM and related analyses, and write up a report of the results and your interpretations. The report should be about 15-20 pages in length (double spaced, 12-font size), which includes describing your theoretical model and hypotheses (2-3 pages), the method (e.g., sample, study design, measures, etc.) of your study (2-4 pages), detailed analyses and results (8 – 10 pages, including Tables/Figures), and the discussion of the results and conclusions (2-3 pages). The APA or AMJ format is recommended for the written report. However, you are free to write your paper following the format of the toper-tier journals in your own discipline. Please prepare your term paper in word document so that I can provide edits/comments.

You will be presenting your report at the last session of our class. You will have 10-15 minutes to present your project in class, depending on the number of individuals enrolled. The final written report is due one week following our last class (i.e., April 13). Your oral presentation constitutes 20% and the written report constitutes 30% of your final grade.

**In-class contribution:** You are expected to comment on the readings assigned for each class and to participant in class discussions. Both your peers (50% weight) and I (50% weight) will evaluate your class contribution at the end of the semester. The average of ratings by your class peers and me constitutes your class contribution grade.

### EXPECTATIONS / CLASS CONTRIBUTION / ATTENDANCE

Each class will consist of lecturing and discussion on assigned readings. You are required to read the assigned articles before each class. You are also expected to complete and turn in your homework by time. During the class discussion, you are expected to contribute to the learning of the group by offering valuable ideas, knowledge, and perspectives.

### MATERIALS / REQUIRED READING

**Recommended textbooks:** The following books can be helpful if you want to better understand the topics discussed in this class. These books also offer a broader range of topics of which some will not be covered in this seminar. However, you are not expected to purchase these books for this class.

Kline, R. B. (2011). *Principles and practice of structural equation modeling*. New York: Guilford Press.

Bollen, K. A. (1989). *Structural Equations with Latent Variables*. New York, NY: Wiley.

Hoyle, R. H. (Ed.). (2012). *Handbook of structural equation modeling*. Guilford Press.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods*. Thousand Oaks, CA: Sage.

#### Other Readings and Resources:

We will cover a number of readings each week. Electronic copies of the readings will be posted on the class web site on e-zone one week prior to our class.

There are also free resources available on the internet:

Mplus User's Guide:

<https://www.statmodel.com/download/usersguide/Mplus%20Users%20Guide%20v6.pdf>

Mplus Forum:

<http://www.statmodel.com/cgi-bin/discus/discus.cgi?pg=instructions>

### PLAGIARISM / ACADEMIC INTEGRITY

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_grad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf)

All required papers may be subject to submission for textual similarity review to the commercial plagiarism-detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).”

### HEALTH AND WELLNESS

As part of a successful graduate student experience at Western, we encourage students to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. For example, to support physical activity, all students, as part of their registration, receive membership in Western's Campus Recreation Centre. Numerous cultural events are offered throughout the year. Please check out the Faculty of Music web page <http://www.music.uwo.ca>, and our own McIntosh Gallery <http://www.mcintoshgallery.ca>. Information regarding health- and wellness-related services available to students may be found at <http://www.health.uwo.ca>.

Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (graduate chair), or other relevant administrators in their unit. Campus mental health resources may be found at [http://www.health.uwo.ca/mental\\_health/resources.html](http://www.health.uwo.ca/mental_health/resources.html).

To help you learn more about mental health, Western has developed an interactive mental health learning module, found here: [http://www.health.uwo.ca/mental\\_health/module.html](http://www.health.uwo.ca/mental_health/module.html). This module is 30 minutes in length and provides participants with a basic understanding of mental health issues and of available campus and community resources. Topics include stress, anxiety, depression, suicide and eating disorders. After successful completion of the module, participants receive a certificate confirming their participation.

### DETAILED SESSION SCHEDULE

| Session | Date     | Topic  |
|---------|----------|--|
| 1       | Jan 12   | Introduction to SEM  |
| 2       | Jan 19   | Confirmatory factor analysis *   |
| 3       | Jan 26   | Path models and model comparisons *  |
| 4       | Feb 2    | Latent factor models *   |
| 5       | Feb 9    | Mediation and moderation in SEM *  |
| 6       | Feb 16   | Latent Growth Models *   |
|         |          | Spring break and preparation for your individual project; email me your initial ideas on your individual project (e.g., dataset, model, and analyses). |
| 7       | Mar 2    | Introduction to multilevel models  |
| 8       | Mar 9    | HLM *  |
| 9       | Mar 16   | MLM - Multilevel SEM *   |
| 10      | Mar 23   | Multilevel SEM – Mediation & Moderation  |
| 11      | Mar 30   | Special topics - Meta-analysis   |
| 12      | Apr 6    | Individual project presentation  |
|         |          |  |
| 13      | April 13 | <i>Individual project paper due</i>  |
|         |          |  |

*Note.* For the topics denoted by an asterisk, home assignments are expected