

## Psychology 9548G. Advanced Latent Variable Models (Winter 2020)

### COURSE OUTLINE

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Lectures: Tuesdays 1:30 – 4:30 (starting January 7) Rm SSC 7405/7409

### I. COURSE DESCRIPTION

This course is a continuation of the PSY9555 Structural Equation Modeling course and focuses on the conceptualization and measurement of latent variables using mainly Item Response Theory (IRT) for measures of ability/performance/achievement and the common self-report measures using rating scales. A second-type of latent variable that will be considered at the end of the course is the categorical latent class/profile variables that fall under the general category of mixture modeling. Mixtures are essentially subpopulations (e.g., different typologies of people) that can be uncovered from patterns of responses to a set of variables. Students need to have completed the Structural Equation Modeling (PSY9555) course prior to enrolling in this course.

IRT provides a number of benefits over the classical test theory approach to measurement and test construction. For example, in IRT, measurement error and reliability can be quantified and assessed at different levels of the scale. IRT provides a flexible way to identify and select items that will discriminate well at various levels of the dimension. IRT also provides techniques to investigate differential item functioning to assess item bias across groups. My aim in this course is to help you develop a solid conceptual and theoretical understanding and ability to use IRT and its extensions correctly and effectively in your own independent research.

The course topics include an overview of various latent trait models, IRT ability models, IRT rating scale models, item bias, item calibration and equation, computer adaptive testing, and mixture modeling (including latent class analysis, latent profile analysis, and models with covariates and outcomes).

### II. COURSE READINGS

Key articles will be assigned. (**List to be added soon!**). These will be available in the course OWL site.

### III. METHOD OF EVALUATION

**40%: 4 lab/assignments.** You will have two weeks to complete an assignment (due at the beginning of class). These assignments will include data analysis, reporting, interpretation, discussion of results, and other questions. My official rules regarding late assignments include a 5% deduction per 24 hours, and assignments that are more than one week late will not be accepted for partial marks. If you anticipate any problems meeting deadlines, please contact me prior to the due date.

**10%: Participation.** Attending lectures and participation in class discussion of the articles.

**50%: Individual project.** You will be required to conduct analyses for an individual IRT or latent profile/class project. You will have the choice to use a large data set that I will provide, providing one yourself (approved by the instructor), or creating a simulation data set as part of a research proposal (I will explain this option in class). The project will have three components:

- a one-page research proposal outlining your project worth 5%
- a 20-min presentation of your project worth 15%
- a final write-up of the project worth 30%

### IV. STATEMENT OF ACADEMIC OFFENCES

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>).

### V. LECTURE SCHEDULE AND TOPICS (specific readings to be added soon!)

**Jan 7.** Overview of latent trait models

**Jan 14.** Overview of IRT

**Jan 21.** IRT ability models

**Jan 28.** IRT ability models continued

**Feb 4.** Item bias

**Feb 11.** Item calibration and equating

**Feb 25.** IRT rating scale models

**Mar 3.** IRT rating scale models continued

**Mar 10.** Computer adaptive testing

**Mar 17.** Mixture modeling

**Mar 24.** Mixture modeling continued

**Mar 31.** Presentations