PSYC*7070, Course Outline: Fall 2017

General Information

Course Title: Psychological Measurement

Course Description:
The purpose of this course is to cover measurement theory, exploratory and confirmatory factor analysis, and structural equation modeling. The course is designed to be helpful to both future clinicians and practitioners, as well as future researchers. From a practice standpoint, the course is intended to provide a background in psychometric methods that is necessary for the appropriate use of psychological tests and measures in the field. From a research standpoint, the course is intended to illustrate the importance of taking measurement issues into account when conducting research; as well providing you with knowledge and skills you need to conduct a variety of useful analytic techniques on your study data.

Credit Weighting: 0.5 credit(s)

Academic Department (or campus): Psychology

Semester Offering: F17

Class Schedule and Location:
Thursdays @ 2:30pm-5:30pm, Rozanski Hall (ROZH), Room 109

Instructor Information

Instructor name: Scott A. Cassidy, M.A.
Instructor email: cassidys@uoguelph.ca
Office hours and location: Available by appointment

Course Content

Specific Learning Outcomes:
By the end of this course, students should be able to:
1. Understand and apply advanced concepts in measurement (e.g., reliability, validity) to psychological research and practice.
2. Understand Classical test theory, and apply it to a range of measurement practices.
3. Identify different forms of test construction, and effectively apply them to a range of research and practice questions.
4. Understand factor analysis, reliability, and validity; and apply these concepts to the creation and application of psychological measures.

5. Analyze and interpret statistical data to test a claim or investigate a research question.
6. Effectively utilize statistical software to aid in data analysis.
7. Apply measurement concepts learned in class to novel research questions.
8. Demonstrate written communication skills - the ability to express ideas in a clear, concise, and professional manner.
9. Manage time effectively, and ensure personal organization.
10. Demonstrate academic and intellectual integrity.

Class Content:
The topics I'll be covering at our class will often build off of one another; so to get the most out of the course, you should try to attend every class if possible. My role as an instructor at our classes is twofold: First, my role is provide background information and some context around the measurement concepts and techniques assigned for the class. Following this, my second role is to facilitate the application of the concepts we cover in class to applied activities and examples. We will use the class sessions to facilitate interactive learning in which we discuss and apply the concepts covered in class, and learn how to apply them to novel situations and research questions. As we do this, I expect you to participate in the active learning activities, ask anything you do not understand, or comment on anything that you are interested in.

Note on Assigned Readings(s):
I will make a number of different readings available for each of the topics that we will cover this semester. However, I do not consider all of these readings to be necessary for you to complete in order to succeed in the class. In many cases, I consider the readings I have listed to be better used as potential sources or reference material that I think you may find useful, either while you're completing your assignments (see below), or in your future research or practical work. To that end, I have divvied the readings for each week into three sections:

Read before class: Readings listed here provide fundamental concepts or other important information on the topic we'll be covering. I will be teaching the class at a level that assumes all students have covered this information. To make sure that everyone in the class begins with what I feel to be essential information, I would ask you to read this before our class. I have kept these readings to a minimum where possible (i.e., a maximum of one to two articles per week), to respect what I understand to be your busy schedules as graduate students.
Technical help: Readings listed here provide technical information on the concepts or techniques that we'll be covering in class. I do not expect you to read these ahead of our class, and do not feel that doing so will provide you with any substantive benefit. Instead, I encourage you to use the chapter(s) or article(s) listed here on an as-needed basis for reference when you are completing assignments or other work based on the topic covered that week. These readings are meant to cover measurement techniques in more detail than I can realistically provide during our class time; and I may refer you back to these readings if there is something that you are struggling with that I feel is best addressed there.
Further reading: Readings listed here go beyond the concepts I expect you to master coming out of this class. You will not be assessed on material covered here (assuming it is not also

covered elsewhere). Instead, these readings provide useful ancillary information on the topic being covered that week; I encourage you to download these articles if they correspond to a concept or technique that you feel you may need to use in your future measurement work, and refer back to it when and if that need arises.

Topics and Class Schedule:

Week	Date	Topic(s) Covered	Assigned Reading(s)
1	September 7	1. Course Overview 2. Why We All Hate Psychometrics (And Why You Should Give Stats a Chance)	Read before class: N/A Technical help: N/A Further reading: Borsboom (2006)
2	September 14	1. The Logic Behind Correlation and Regression, Revisited: A New Look at an Old Topic 2. Advanced Regression: Dealing with Mediation, Moderation, and Suppression Effects in Your Model 3. It's Pronounced "*Arggh*!": A Gentle Re-Introduction to Using *R* and Running Basic Regression Analyses	Read before class: N/A Technical help: Field et al. (2012) Chapter 3 & 7 Further reading: Baron & Kenny (1986) Pandey & Elliot (2010) Motulsky & Ransnas (1987)
3	September 21	1. Classical Test Theory and You: The Things We (Traditionally) Assume about Data and Measurement 2. Generalizability Theory: Like Classical Test Theory, but for Hipsters	Read before class: Nunnally & Bernstein (1994) Ostrlind (2006) Technical help: N/A Further reading: Kieffer (1998)
4	September 28*	1. Reliability and Psychological Measurement 2. Assessing Reliability with a Smaller '*n*': Is it the Size, or Just How you Use It? 3. A Guide to Running Basic Scale Statistics and Reliability Analyses in *R*	Read before class: Thompson (2003) Technical help: Leslie et al. (2008) Cortina (1993) Further reading: Peterson (1994) Cronbach & Shavelson (2004)

5	October 5*	1. Validity and Psychological Measurement 2. The Relationship between Reliability and Validity 3. A Guide to Using a Multi-Trait Multi-Method Matrix to Assess the Validity of a Measure	Read before class: Borsboom et al. (2004) Technical help: Campbell & Fiske (1959) Further reading: Ebel (1961) Moss (1994)
6	October 12*	1. Where do ~~Babies~~ Measures Come From?: The Process of Designing a Psychological Measure 2. Common Method Bias: How Scared Should You Be? 3. A Guide to Interpreting Various Test Scores (and Transforming Them as Needed) 4. A Guide To Transforming Test Scores in *R*	Read before class: Hinkin (1998) Doty & Glick (1998) Technical help: N/A Further reading: Schwarz (1999) Conway & Lance (2010) Johnson & Onwuegbuzie (2004)
7	October 19*	1. Evaluating the Difficulty and Discriminating Power of Items: An Introduction to Item Response Theory 2. A Guide to Running Item Response Models on Test Data in *R*	Read before class: Reise & Waller (2009) Technical help: Rizopolous (2015) Further reading: Fan (1998) Thomas (2011) Scherbaum et al. (2006)
8	October 26*	1. Factor Models I: Exploratory Factor Analysis 2. A Guide to Running Exploratory Factor Analyses in *R*	Read before class: Bollen & Lennox (1991) Technical help: Field et al. (2012) Chapter 17 Further reading: Fabrigar et al. (1999) Costello & Osborne (2005) Hayton, Allen, & Scarpello (2004)

9	November 2*	1. Factor Models II: Confirmatory Factor Analysis 2. A (Very Light) Introduction to Running Confirmatory Factor Analyses in *R*	Read before class: Iacobucci (2009) Technical help: Field et al. (2012) Chapter 18 Rosseel (2017) Further reading: Anderson & Gerbing (1988) Jackson et al. (2009)
10	November 9	1. The Effects of Missing Data and Insufficient Effort Responding (And What You Can Do About Them) 2. A Guide to Imputing Missing Data in *R*	Read before class: Meade & Craig (2012) Schafer & Graham (2002) Technical help: Van Buuren (2017) Further reading: Yuan et al. (2002) Woods (2006)
11	November 16	1. Dyadic and Group-Level Measurement in Psychology 2. A (Very Light) Introduction to Aggregation and Multilevel Regression in *R*	Read before class: Nezlek (2008) Iacobucci & Wasserman (1988) Technical help: Field et al. (2012) Chapter 19 Hoff (2017) Further reading: Baldwin et al. (2014)
12	November 23	1. What do Test Scores *Really* Tell Us?: Epistemology and the Theory of Measurement, Revisited	Read before class: Mari (2003) Fava et al. (2004) Technical help: N/A Further reading: Kvale (1995) Michell (2000) Trendler (2009)

* Indicates a week where there is a minor assignment.

Methods of Assessment:
Classroom Participation (10% of final grade)
You will receive a participation grade for contributing actively and meaningfully to our weekly discussions and the activities in our seminars. At a minimum, I expect you to attend each class (except in the case of emergencies), and to come prepared and willing to discuss the topic we're covering. To receive full participation marks, however, I'd like you to try to go beyond this and actively and critically engage with in the material during class.

Minor Assignments (50% of final grade)
One of the main goals for this course is to practice and build mastery over various data analytic and measurement techniques. To help meet this goal, you will be asked to use the techniques we cover during our classes to complete a series or worksheets and short exercises on your own time. Each minor assignment will primarily cover material that was taught during the corresponding class (although any given assignment may also cover fundamental concepts or technical skills that we covered earlier in the semester; for example, applying Classical Test Theory concepts).

Once completed, each minor assignment should be submitted using the *CourseLink* Dropbox. For full marks on these assignments, please be sure include your *R* script (if applicable for that assignment), any rough work you used (e.g., hand calculations), and any other ancillary materials that you feel are relevant to help interpret your final write-up. Unless otherwise stated, all submissions will be due by 11:59pm the night before our following class.

Final Measure Analysis Project (40% of final grade)
A second goal for this course is to help you integrate the various concepts that we cover during our classes into a holistic assessment strategy that applies best practices to developing measures and using measurement data. To help meet this goal, the other major assessment for this course will involve you independently applying the various techniques we cover in classes to a simulated psychological measure, and submitting a report that summarizes your findings and recommendations for effectively using and interpreting the measure.

I will upload a simulated data file on our *CourseLink* page early in the semester that represents participants' scores on a psychological measure. You will be asked to clean the data (e.g., imputing missing values), and then assess the measure in terms of the concepts covered in class (e.g., factor structure, reliability, etc.). Instead of this simulated data set, you are also welcome to use actual measurement data from other sources (such as archival data from your lab or open source data), pending my approval.

The final deliverable will be a written report that summarizes the measure, gives an overview of the psychometric analyses you ran on it, details your findings from these analyses, and provides your major takeaways and recommendations for using and interpreting the measure.

This paper should not exceed ten double-spaced pages (excluding a cover page, any references you feel are applicable, and any tables, figures, or appendices), and should be written in full-sentence APA style (i.e., 1" margins, 12-point Times New Roman Font). Once completed, your analysis plan should be submitted using the *CourseLink* Dropbox, along with your complete *R* script and any other supporting materials (e.g., hand calculations, the measure data file itself if you use external data, etc.). Your report will be assessed in terms of its numerical accuracy; its replicability (i.e., whether your *R* script runs and is commented appropriately); the appropriateness and thoroughness of your analyses; your adherence to APA formatting guidelines; and the extent to which you report demonstrates your understanding of the concepts we covered in class.

Course Assignments and Tests:

Assignment or Test	Due Date	Contribution to Final Grade (%)	Learning Outcome(s) Assessed
Classroom Participation	Assessed throughout the semester	10%	1, 2, 3, 4, & 10
Minor Assignments	Assessed throughout the semester	50% (10% x 5 weeks)	1, 2, 3, 4, 5, 6, 9, & 10
Measure Analysis Project	November 23, 2017	40%	1, 2, 3, 4, 5, 6, 7, 8, 9, & 10

Additional Notes (if Required):

Given time restrictions, marks of the final measure analysis paper may not be released until the final grade submission at the end of the semester.

Final Examination Date and Time:

There is no final exam for this course.

Course Resources

Required Texts:
There is no required text for this course; all assigned readings will be posted on *CourseLink* prior to the start of class**.**

Recommended Texts:
Field, A., Miles, J., & Field, Z. (2012). *Discovering Statistics Using R*. Sage.

Other Resources:

R **Statistical Software:**
We will be using *R* and *R Studio* to complete exercises in class. Both are free software. You can download and install them with the links below. I encourage you to do so before the first class, as these downloads may be too large to effectively download over the university's wifi network.

You should download the version of *R* that corresponds to your computer's operating system (see headings below). The pieces of software that I've listed here build off of one another; so for best results, please install them in the order that I've presented them in below:

For Windows users:
1) First, install *R*: [here](#)
2) Then, install *R Studio*: [here](#)

For MAC OSX users:
1) First, install *R* compatibility software (*XQuartz*): [here](#)
2) Then, install *R*: [here](#)
3) Then, install *R Studio*: [here](#)

CourseLink:

Assignments will be submitted via the *CourseLink* Dropbox. It is your responsibility to ensure that your assignments are submitted correctly. Please double check that you have done this correctly. Late submission penalties will apply in the case on incorrectly-submitted assignments.

Course Policies

Grading Policies

Please be sure to submit all assignments by 11:59pm on the assigned date using the *CourseLink* Dropbox. Assignments submitted in any other way (e.g., email submissions to the instructor or teaching assistant) cannot be accepted. Marks will be docked for all late submissions (10% per day, including weekends).
Although there are 6 minor assignments in total this semester, only the best 5 of these will be counted towards your final grades (at a rate of 10% for each of the 5 assignments); your lowest-marked minor assignment will be discounted.
Please note that these policies are binding unless academic consideration is given to an individual student.

Graduate Grade interpretation

Course Policy on Group Work:

All assignments must be completed on an individual basis. Collaborations among students for the purposes of writing assignments are prohibited. Any student(s) suspected of unauthorized collaboration will be reported to the dean's office for an academic misconduct investigation (see the university's policy on academic misconduct below).

Course Policy on the Use of Electronic Devices and Recording of Lectures:

As with many classes at the University of Guelph, electronic recording of my classes is not allowed without prior consent. If I do permit recordings of our sessions, they are solely for the use of the authorized student, and may not be reproduced or transmitted to others without my express written consent.

Course Policy on Email Communication:

I prefer that students come to my office hours to ask questions (especially as more substantive questions are often better handled in person, where I can help you look through your data with you); to help with this I am happy to hold office hours on an as-needed basis by appointment when it fits both our schedules.

That said, I am happy to answer emails about course policies, assignment expectations, or general inquiries, as long as I feel your question can be adequately answered in a single email (i.e., not a back-and-forth discussion). I reserve the right to ask students to come to my office hours to follow up on any question if I feel it would be better addressed in person (e.g., *R* help), or requires more substantive discussion than I can provide in a single email. I will do my best to answer any email I receive within 24 hours.

University Policies

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, ID#, and e-mail contact. See the academic calendar for information on regulations and procedures for Academic Consideration:
[Academic Consideration, Appeals, and Petitions](#)

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor. The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

Academic Misconduct Policy

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the [Student Accessibility Services](#) as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 54335 or email accessibility@uoguelph.ca or the [Student Accessibility Services Website](#)

Course Evaluation Information

Please refer to the [Course and Instructor Evaluation Website](#).

Drop Date

The last date to drop one-semester courses, without academic penalty, is Friday, November 3rd, 2017. For regulations and procedures for Dropping Courses, see the Academic Calendar: [Current Graduate Calendar](#)