**Psychometric Theory and Test Construction**

**PSY 818, Spring 2021**

# Mondays & Wednesdays 4:10pm-5:30pm

Instructor: Chris Nye Phone: 355-3408

Office: 316 Psychology Email: *nyechris@msu.edu*

Office Hours: By appointment

## REQUIRED TEXT

There will be no textbooks for this course. All course material is either available online or will be distributed on the course website. These materials will also serve as useful references later in your careers, and might help when you study for qualifying exams.

*Suggested Texts:*

Some of the material in this class can get complicated. If you are struggling with the material, please do set up a meeting to talk with me. However, below are some additional resources that can also help you to study the material and provide additional details about many of the topics discussed in this class. **These are NOT required for this class** and are only provided as additional potential resources that may be helpful.

Allen, M. J., & Yen, W. M. (2001). *Introduction to measurement theory*. Long Grove, IL: Waveland Press.

Raykov, T., & Marcoulides, G. (2011). *Introduction to Psychometric Theory*. New York: Routledge.

**COURSE WEBSITE**

**https://d2l.msu.edu/** (Please note that there is no “www” for d2l). On this page, you will find course-related materials, including the readings for each week.

**COURSE OBJECTIVES & ORIENTATION**

The overarching goal of this course is to provide a graduate-level introduction to the major issues relevant when constructing and evaluating psychological measures. The focus is largely conceptual and geared towards applications in psychological research. A secondary goal is to provide an introduction to factor analysis, the evaluation of measurement equivalence, and item response theory (note, however, this class is largely based upon classical test theory approaches). In addition, we will discuss some broader methodological and statistical issues as they relate to psychological research such as effect size estimation and interpretation.

**CLASSROOM POLICIES AND PROCEDURES**

The class is scheduled to meet from 4:10pm-5:30pm on Mondays and Wednesdays. However, given the virtual format of this section, we will be having a combination of both synchronous and asynchronous material. The **synchronous meetings** will be held approximately every 2 weeks, though the frequency of these meetings will depend on the needs of the class. For example, we may add additional synchronous meetings as needed if there are important issues to discuss or topics that a number of people are having a hard time understanding. The goal of the synchronous meetings will be to discuss course material, answer questions about the topics covered during the previous two weeks, and go over “Learning Checks” for the class. Therefore, please read the material and watch the relevant videos before all synchronous meetings. Then, come to each synchronous meeting with any questions that you may have. The Learning Checks that will be discussed during these meetings are short lists of questions about the material to help check understanding and facilitate further learning. The Learning Checks are NOT graded but students are strongly encouraged to complete them prior to the synchronous sessions in which we will discuss them. The Learning Checks are designed to be similar to the types of questions one might see on the exam and will be very helpful for both learning the materials and studying for exams. During the synchronous meetings, **students will be randomly selected to discuss the answer to one of the learning check questions.** Therefore, you should come prepared to share your thoughts on these questions during the meeting.All planned synchronous meetings are noted on the course schedule below. However, although these meetings will always be held during one of the normally scheduled meetings for this course, **the exact dates for the synchronous meetings may change depending on the flow of the class and where we are at in the material**. All changes to the schedule of synchronous meetings will be sent out by email.

For the **asynchronous class material**, I will post videos of short lectures on the various topics that we will discuss in this class. Each video will cover a focused topic (e.g., estimating reliability) and is generally shorter than a typical class period (typically 10-20 minutes). Therefore, there will be several videos to watch each week and all videos will be posted on D2L. Note that it is vital for you to not only watch the asynchronous lectures but to also devote ample time and effort to the readings so that you can acquire an in-depth understanding of the material.

Given the virtual nature of this class, **I will also send out a weekly email on Monday before our schedule class period** to clarify 1) what we are doing that week, 2) what students need to do/turn in that week (e.g., Learning Check, readings), and 3) what topics we will be discussing. Any updates to the schedule and/or announcements will also be sent out in this weekly email.

## STUDENT EVALUATION

The following components will be considered in the determination of your grade in the course:

1. **Exams** (80%): There will be two exams administered throughout the semester. Each exam is worth 100 points and will consist of problems and/or short essays. The exams will be administered online and you are expected to take each exam. **Make-up exams will only be given if you miss a scheduled exam for health reasons or an emergency.** To schedule a make-up exam you must contact me as soon as possible.
2. **Class Participation** (20%): It is critical that everyone actively participates in this course. Accordingly, you are required to carefully read/watch the assigned material in advance of our synchronous meetings. I also require you to **post 1 question/ comment about the readings for that week by Friday at 11:59pm**. These discussion questions/comments will be used to assess students’ understanding of course material and identify problems that students are having with some material so that this can be addressed. Your participation grade will be based on the questions/comments you post and the discussions during the synchronous meetings.

## ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at [rcpd.msu.edu](http://rcpd.msu.edu). Once your eligibility for an accommodation has been determined, you will be issued a Verified Individual Services Accommodation ("VISA") form. Please present this form to me at the start of the term and/or **two weeks prior to the accommodation date** (test, project, etc.). Requests received without sufficient lead time will not be honored.

**If you require testing accommodations (additional time, etc.) you must contact me and *present your VISA at least two weeks before the exam date* to schedule an alternative exam.**  Typically, I will schedule a time for you to take the exam that is mutually convenient. If you are unable to make any of those times, or that option does not meet your VISA accommodations, you may be able to take your exam at the RCPD office. In either case, the exam must be scheduled well in advance, so you need to adhere to the two-week prior notification requirement.

**Tentative Course Schedule**

Note: The schedule provided below is tentative. We may move at a faster or slower pace. However, the exam dates are fixed and exam content will only cover the material discussed in class since the previous exam (or the start of class).

**Week 0 (Week of Jan. 11)**

**Reading, Reviewing, Reflection**

**Week 1 (Week of Jan. 18)**

**January 18 University Holiday-Martin Luther King Jr. Day**

See the link below for information about scheduled events at MSU:

 <https://inclusion.msu.edu/awards/mlk-commemorative-celebration/>

**January 20 Synchronous Meeting #1** (4:10-5:00pm)

 **Topic:** Introductions and Questions

**Zoom Meeting:** <https://msu.zoom.us/j/99492565219>

Meeting ID: 994 9256 5219

Passcode: 837031

**Topic:** Effect Sizes and Null Hypothesis Significance Testing

**Weekly Readings:** Cumming (2014)

 Cohen (1990)

**Weekly Videos:** To be posted on D2L

**Weekly Discussion:** Students post one question on D2L by Jan. 22

**Week 2 (Week of Jan. 25)**

**Topic:** Effect Sizes

**Weekly Readings:** Baguley (2009)

Meyer et al. (2001) – Just Skim Tables!

Rodgers & Nicewander (1988)

**Weekly Videos:** To be posted on D2L

**Weekly Discussion:** Students post one question on D2L by Jan. 29

**Week 3 (Week of Feb. 1)**

**Topic:** Prediction and Meta-Analysis

**Weekly Readings:** Rosenthal & Rubin (1982)

Schmidt, 1996

Hunter, Schmidt, & Le, 2006 (read the whole paper but we are only going to focus on the material up to p. 599—pay particularly close attention to Table 1)

**February 1:** **Synchronous Meeting #2** (4:10-5:00pm)

 **Topic:** Effect Sizes and Null Hypothesis Significance Testing

**Zoom Meeting:** <https://msu.zoom.us/j/99492565219>

Meeting ID: 994 9256 5219

Passcode: 837031

**Weekly Videos:** To be posted on D2L

**Weekly Discussion:** Students post one question on D2L by Feb. 5

**Week 4 (Week of Feb. 8)**

**Topic:** Meta-Analysis

**Weekly Readings:** Review Meta-Analysis Readings

**Weekly Videos:** To be posted on D2L

**Weekly Discussion:** Students post one question on D2L by Feb. 12

**Week 5 (Week of Feb. 15)**

**Topic:** Scale Construction

**Weekly Readings:** Crocker & Algina (1986): Chapters 5 & 14

Krosnick & Presser (2010)

Drasgow, Nye, & Tay (2010) (you can skim the sections on reliability and validity)

**February 17:** **Synchronous Meeting #3** (4:10-5:00pm)

 **Topic:** Meta-Analysis

**Zoom Meeting:** <https://msu.zoom.us/j/99492565219>

Meeting ID: 994 9256 5219

Passcode: 837031

**Weekly Videos:** To be posted on D2L

**Weekly Discussion:** Students post one question on D2L by Feb. 19

**Week 6 (Week of Feb. 22)**

**Topic:** Reliability

**Weekly Readings:** Crocker & Algina (1986): Chapters 6 & 7

Schmitt (1996)

**Weekly Videos:** To be posted on D2L

**Weekly Discussion:** Students post one question on D2L by Feb. 26

**Week 7 (Week of March 1)**

**Topic:** Reliability Continued

**Weekly Readings:** Review Reliability Readings

**March 1:** **Synchronous Meeting #4** (4:10-5:00pm)

 **Topic:** Test Construction and Reliability

**Zoom Meeting:** <https://msu.zoom.us/j/99492565219>

Meeting ID: 994 9256 5219

Passcode: 837031

**March 2-3:** **Wellness Days** – No Instruction

**Weekly Videos:** No new videos this week. Review for Exam 1

**Weekly Discussion:** No need to post discussion questions. Review for Exam 1

**Week 8 (Week of March 8)**

**March 8:** **Exam 1** (Online from 4:00-6:00)

**Topic:** Validity

**Weekly Readings:** Cronbach & Meehl (1955)

Campbell & Fiske (1959)

Newton & Shaw (2013)

**Weekly Videos:** To be posted on D2L

**Weekly Discussion:** Students post one question on D2L by March 12

**Week 9 (Week of March 15)**

**Topic:** Exploratory Factor Analysis

**Weekly Readings:** Lee & Ashton (2007)

Sass & Schmitt (2010)

Preacher & MacCallum (2003)

**March 17:** **Synchronous Meeting #5** (4:10-5:00pm)

 **Topic:** Review Exam 1

**Zoom Meeting:** <https://msu.zoom.us/j/99492565219>

Meeting ID: 994 9256 5219

Passcode: 837031

**Weekly Videos:** To be posted on D2L

**Weekly Discussion:** Students post one question on D2L by March 19

**Week 10 (Week of March 22)**

**Topic:** Confirmatory Factor Analysis

**Weekly Readings:** Brown and Moore (2012)

 Hurley et al., (1997)

Jackson, Gillaspy, & Stephenson (2009)

Marsh, Morin, Parker, & Kaur (2014)

**Weekly Videos:** To be posted on D2L

**Weekly Discussion:** Students post one question on D2L by March 26

**Week 11 (Week of March 29)**

**Topic:** Item Response Theory

**Weekly Readings:** Hulin, Drasgow, & Parsons, Chapters 2

Embretson & Reise (2000), Chapters 5 & 9

 Nye, Joo, Zhang, & Stark, 2020

**March 31:** **Synchronous Meeting #6** (4:10-5:00pm)

 **Topic:** Validity and Factor Analysis

**Zoom Meeting:** <https://msu.zoom.us/j/99492565219>

Meeting ID: 994 9256 5219

Passcode: 837031

**Weekly Videos:** To be posted on D2L

**Weekly Discussion:** Students post one question on D2L by April 2

**Week 12 (Week of April 5)**

**Topic:** IRT cont. and Test Bias

**Weekly Readings:** Drasgow, Chernyshenko, & Stark (2010)

 See also the commentary by Brown & Maydeu-Olivares

 Chernyshenko, Stark, Drasgow, & Roberts (2007)

Vandenberg & Lance (2000)

**Weekly Videos:** To be posted on D2L

**Weekly Discussion:** Students post one question on D2L by April 9

**Week 13 (Week of April 12)**

**Topic:** Test Bias

**Weekly Readings:** Aguinis, Culpepper, & Pierce (2010)

Nye, Brummel, & Drasgow (2010)

Nye & Sackett (2017)

**Weekly Videos:** To be posted on D2L

**Weekly Discussion:** Students post one question on D2L by April 16

**Week 14 (Week of April 19)**

**Topic:** Finish up and Exam 2

**Weekly Readings:** No new readings this week

**April 19:** **Synchronous Meeting #7** (4:10-5:00pm)

 **Topic:** Item Response Theory and Test Bias

**Zoom Meeting:** <https://msu.zoom.us/j/99492565219>

Meeting ID: 994 9256 5219

Passcode: 837031

**April 21:** **Exam 2** (Online from 4:00-6:00)

**Weekly Videos:** No new videos this week. Review for Exam 2

**Weekly Discussion:** No need to post discussion questions. Review for Exam 2