



PSYC 520 Fundamentals of Psychological Measurement

Units: 4

Term–Day–Time: Spring 2025–Tues & Thurs–10:00-11:50 am

Location: KAP 158

Instructor: Hok Chio (Mark) Lai

Office: SGM 621

Office Hours: Tues 12:00–1:00 pm, and by appointment.

Contact Info: (Email) hokchiol@usc.edu, (Slack) <https://usc.enterprise.slack.com/>.

Timeline for replying to emails: within 48 hours.

IT Help: ITS, Brightspace

Contact Info:

ITS (Email, Monday – Friday, 8:00 A.M. – 6:00 P.M.) consult@usc.edu, (Phone, 24/7/365)

213-740-5555, (Online) [ServiceNow Portal](#)

Brightspace (Email, 24/7/365) usc@d2l.com, (Online Help) [Brightspace Student Guides](#)

Course Description

This is a graduate-level class covering topics in test theory for psychological measurement. Topics covered included factor analysis; latent variable; scaling; test construction; classical true score reliability model; generalizability theory; validity; decision-theoretic approaches to selection; item analysis; item response theory.

Learning Objectives

After the successful completion of this course, students will be able to

1. Describe the theoretical foundation of psychological measurement;
2. Explain concepts pertaining to reliability and validity in psychological measurement;
3. Summarize the standards for test development;
4. Analyze item-level data using classical test theory, generalizability theory, and item response theory;
5. Conduct a research project analyzing real data with scale items;
6. Communicate research findings/products in an oral presentation and a written report.

Prerequisite(s): PSYC 501 (or a similar graduate-level introductory statistics class)

Co-Requisite(s): None

Concurrent Enrollment: None

Recommended Preparation: Experience with statistical software (preferably R)

Course Notes

Students are expected to finish the reading assignments before class meetings and actively participate in class discussions and activities. A typical class meeting will include lectures, quizzes, and small-group discussions/activities. This class also includes lab sessions for software demonstrations and for students to work on assignments. Lecture slides/notes will be available at <https://marklhc.quarto.pub/psyc520-2025spring>.

Please note that the lectures will not cover everything in the textbook, and is not a replacement for completing the reading assignments. Similarly, the lecture slides only serve to guide class discussions and cannot replace the assigned readings.

Students are expected to bring their own laptops to class to follow the software demonstration and work on assignments during lab sessions.

Communication

To promote independence and critical thinking, students are encouraged to work through the following process for obtaining answers to course-related questions before contacting the instructor:

- consult the course syllabus;
- consult a classmate or post your questions on Slack;
- meet with the instructor during office hours or Q&A sessions on Tuesdays;
- for personal questions, email the instructor at hokchiol@usc.edu

Technological Proficiency and Hardware/Software Required

- [R](#) and [RStudio](#) are needed to complete the course assignments. It is highly recommended that students update to the latest versions of both software (R 4.4.1, RStudio 2024.12.0, or above). We will briefly discuss setting up R and RStudio in Week 1.
- The textbook and most of the supplemental readings can be accessed through the USC Libraries at <https://libraries.usc.edu/>.

USC Computing Center Laptop Loaner Program

If you need a laptop to successfully participate in this class, you may be eligible for the [USC Computing Center Laptop Loaner Program](#).

USC Technology Support Links

[Zoom information for students](#)

[Brightspace Student Guides](#)

[Slack information for students](#)

[Software available to USC Campus](#)

Required Readings and Supplementary Materials

- Bandalos, D. L. (2018). *Measurement theory and applications for the social sciences*. Guilford.
- AERA, APA, and NCME (2014). *The standards for educational and psychological testing*. Author. [A free copy can be downloaded at <https://www.testingstandards.net/open-access-files.html>]
- Other required readings will be posted on Slack

Description and Assessment of Assignments

1. In-class exercises (10%). During some of the class sessions, students will participate in quizzes or group exercises. If students miss an exercise for participation credit, they can complete the exercise posted on Brightspace within 24 hours to get credits.
2. Mid-term examination (15%). The mid-term exam will assess students understanding of concepts covered in the class, up to Week 6 (e.g., test development, reliability, and validity). It is tentatively scheduled on February 27. More information about the exam will be announced in class.
3. Homework problems (40%). There will be six homework assignments for students to apply the concepts and techniques discussed. You must submit your work electronically to Brightspace by the assigned due date, typically **Monday 11:59 p.m. Pacific Time** the week after the homework is assigned. See policy on [late work](#).

4. Final project (35%). You will complete a research project analyzing some real data involving psychological measurement. Students can use either data they have collected or have access to, or publicly available data. Alternatively, the project can be a theoretical/methodological paper about certain aspects of psychological measurement. Students interested in other project ideas (e.g., software package development) should discuss their ideas with the instructor. Each student can choose to work on their own or with a partner. Each student/group will schedule an appointment with the instructor to talk about their project during Week 9 (before Spring recess).

The final project will include three components. Details will be announced during class.

- **Prospectus (5%)**

A prospectus about your project should be submitted by **Monday, March 10**. The prospectus should contain a concise description of what you (or your group) plan to do for your project, including a preliminary plan for statistical analysis. The prospectus should be limited to 1 single-spaced page (excluding tables, figures, references, and other supplemental materials).

- **Oral Presentation (15%)**

On **May 1 or 6**, you or your group will give a 15-minute presentation (including Q&A) on your project. You will also need to submit your slides to Brightspace for grading **on the day of your presentation**, which should include a link to the reproducible code for your analyses. A grading rubric on the final presentation will be posted on Brightspace.

- **Final paper (15%)**

The final paper is due **Tuesday, May 13, at 1:00 pm Pacific Time** (the assigned final exam time for the class). There should also be a link to the reproducible codes for your analyses. The final paper should be 8-15 double-spaced pages of text (i.e., excluding the title page, abstract, references, tables, figures, and appendices). A grading rubric on the final paper will be posted on Brightspace.

Participation

Participation accounts for 10% of the course grade. To earn full credit for participation, students should complete and turn in all in-class exercises.

Table 1: Grading Breakdown

Assignment	% of Grade
In-class exercises	10
Mid-term exam	15
Homework	40

Assignment	% of Grade
Prospectus	5
Oral Presentation	15
Final paper	15
TOTAL	100

Grading Scale

Course final grades will be determined using the following scale

Table 2: Course Grading Scale

A	93-100
A-	89-92
B+	85-88
B	81-84
B-	77-80
C+	73-76
C	70-72
C-	Below 70 (failing)

Assignment Submission

The assignments should be submitted through Brightspace by Monday at 11:59 p.m. Pacific Time.

Grading Timeline

Generally, all graded work will be returned no later than one week from the submission deadline. However, given the high number of students in the class, the instructor may only grade selected questions in each assignment. Solutions will be posted so that students can check their own work.

Course Specific Policies

Late work

Late work will be penalized by a 10% reduction in the assignment grade every 24 hours late unless due to an emergency excused by the instructor. Please email the instructor as soon as possible to discuss alternate arrangements due to an emergency.

Technology in the classroom

Phones

Your phone should be turned off or in silent mode (not on vibrate), and should not be used in the classroom.

Tablets and Laptops

During lecture time in the classroom, students can use tablets and laptops only for purposes of viewing course materials and taking notes. During the in-class exercises, students should use their laptops to complete the assignments.

Attendance

Students are expected to attend all Thursday class sessions on time. If they miss a session, they should complete the class exercises and turn in their work within the timeframe specified in [Description and Assessment of Assignments](#).

Classroom Norms

The following applies to both in-person and online communications (e.g., Slack discussions and email communications)

- Respect each other's views.
- In written communication messages, make sure they are something you could say to someone to their face.
- Recognize and/or remember that we have different backgrounds.
- Criticize ideas, not individuals or groups.
- Either support statements with evidence, or speak from personal experience.

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

In this course, you are allowed to use artificial intelligence (AI)-powered programs to help you with coding in R, but you should also be aware that AI text and code generation tools may present incorrect information, biased responses, and incomplete analyses; thus they may not produce text and analysis that meet the standards of this course. If you use AI tools beyond generating R code, to adhere to our university values and the guidelines from professional organizations, you must cite any AI-generated material (e.g., text, images, etc.) included or referenced in your work and provide the prompts used to generate the content. Please refer to the [Citing Generative AI Research Guide](#) by the USC Libraries. Using an AI tool to generate content without proper attribution will be treated as plagiarism and reported to the Office of Academic Integrity.

Course Content Distribution and Synchronous Session Recordings Policies

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relation to the class, whether obtained in class, via email, on the internet, or via any other media. Distributing course material without the instructor's permission will be presumed to be an intentional act to facilitate or enable academic dishonesty and is strictly prohibited. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Course Evaluation

Student feedback is essential to the instructor and the Department to keep improving this course and faculty pedagogy. Students are encouraged to share their feedback and suggestions in a mid-semester feedback survey around week 5, and respond to the standard USC course evaluation survey at the end of the semester.

(Tentative) Course Schedule

Table 3: Course schedule

	Topics	Readings	Assignment Dates
Week 1 Jan 14 & 16	• Course Introduction	• MT ch 1 • Quarto Tutorial • Markdown Basics	
Week 2 Jan 21 & 23	• Quarto • Norms & Standardized Scores	• MT ch 2 • Standards ch 5 (pp. 95–97; 102–105)	• HW 1
Week 3 Jan 28 & 30	• Test Development Process • Cognitive & noncognitive items	• MT ch 3, 4 (pp. 63–70), 5 • Standards ch 4	• HW 2
Week 4 Feb 4 & 6	• Item analysis	• MT ch 6, 7 • Standards ch 7	
Week 5 Feb 11 & 13	• Reliability I • Reliability II	• MT ch 8 • Standards ch 2	• HW 3
Week 6 Feb 18 & 20	• Validity	• MT ch 11 • Standards ch 1	
Week 7 Feb 25 & 27	• Mid-Term	• study guide	
Week 8 Mar 4 & 6	• Interrater reliability	• MT ch 9	
Week 9 Mar 11 & 13	• Generalizability theory	• MT ch 10	• HW 4
Mar 18 & 20 Week 10 Mar 25 & 27	Spring Recess • EFA	• MT ch 12	

	Topics	Readings	Assignment Dates
Week 11 Apr 1 & 3	• CFA	• MT ch 13	• HW 5
Week 12 Apr 8 & 10	• IRT	• MT ch 14	• HW 6
Week 13 Apr 15 & 17	• Bias & Fairness	• MT ch 16 • Standards ch 3	
Week 14 Apr 22 & 24	• Equating	• MT ch 18	
Week 15 Apr 29 & May 1	Oral Presentation		
FINAL			Final paper (due May 13, 1:00 pm PDT)

MT = Bandalos (2018, Measurement Theory). Standards = AERA, APA, and NCME (2014, Standards).

Statement on University Academic and Support Systems

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. [The Office of Student Accessibility Services](#) (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Student Financial Aid and Satisfactory Academic Progress:

To be eligible for certain kinds of financial aid, students are required to maintain Satisfactory Academic Progress (SAP) toward their degree objectives. Visit the [Financial Aid Office webpage](#) for [undergraduate](#)- and [graduate-level](#) SAP eligibility requirements and the appeals process.

Support Systems:

[Counseling and Mental Health](#) - (213) 740-9355 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

[988 Suicide and Crisis Lifeline](#) - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline consists of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

[Relationship and Sexual Violence Prevention Services \(RSVP\)](#) - (213) 740-9355(WELL) – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

[Office for Equity, Equal Opportunity, and Title IX \(EEO-TIX\)](#) - (213) 740-5086

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

[Reporting Incidents of Bias or Harassment](#) - (213) 740-2500

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

[The Office of Student Accessibility Services \(OSAS\)](#) - (213) 740-0776

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

[USC Campus Support and Intervention](#) - (213) 740-0411

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

[Diversity, Equity and Inclusion](#) - (213) 740-2101

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

[USC Emergency](#) - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

[USC Department of Public Safety](#) - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call

Non-emergency assistance or information.

[Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or otfp@med.usc.edu

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.