EPSY 546 Educational Measurement

Online Spring 2021 (Jan 11 – May 12)

Instructor:	Yue Yin, Ph.D.
Learning Material Release Time:	By 1:00 AM (Central US Time), Every **Monday** The course materials will be released by the scheduled day. After the course materials are released, you can work on the course materials at any time and any pace before the corresponding homework assignment is due.
Weekly Homework Due Time:	11:59 PM (End of the day, Central US Time), Every **Monday**, if any.
Office Hour:	By Appointment. You can email me to make an appointment for a talk on the phone or via zoom. When you schedule a call with me, you may provide several time slots that work for you.

Recommended Textbook (Either one works)

Crocker, L., & Algina, J. (1986). *Introduction to Classical and Modern Test Theory*. Belmont, CA: Wadsworth.

- The course content is mainly aligned with this textbook. This textbook is more mathematical and dense than the other one.
- In 2006, the book was reprinted (ISBN-10: 0495395919; ISBN-13: 978-049539591). So the 2006 print is perfectly OK too.

Allen, M. J., & Yen, W. M. (1979). Introduction to measurement theory. Long Grove, IL: Waveland Press.

- This book might be helpful for those who would like to have a more conceptual understanding of the content.

Note: Homework assignments and exams are not directly from the textbook. However, reading the textbook can help you understand the related topics better and deeper.

Reference Books (No need to purchase them)

Brenna, R. (Ed.). (2006). *Educational Measurement* (4th Edition). Westport, CT: Praeger Publishers (Considered as the bible in Educational Measurement)

Hambleton, R. K., Swaminathan, H., and Rogers, H. J. (1991). *Fundamentals of Item Response Theory*. Newbury Park, CA: Sage Publications. (Note: If you want to know more about IRT)

Shavelson, R. J., and Webb, N. M. (1991). *A Primer on Generalizability Theory*. Newbury Park, CA: Sage Publications. (Note: If you want to know more about G-theory)

Supplementary Articles

I will also upload articles related to some topics on blackboard as supplementary course materials, so that you can learn more about those topics.

Course Description

This course introduces classical test theory, including test reliability and validity. It also introduces the processes of item analysis, factor analysis, the major extensions and alternatives to classical test theory: Generalizability (G) theory and item response theory (IRT); and methods of detecting item bias, correcting for guessing, and setting standards and norms.

This course is intended to equip you with the skills needed to read literature in your substantive areas more critically, to use tests more intelligently in research, and to pursue further studies in psychometrics. Although the focus of the course is on cognitive measures, most of the concepts and methods can be applied to the measurement of behavioral and affective constructs, such as performance, attitude, and personality, and other kinds of assessments of individuals or groups.

Prerequisites

The Prerequisites for this course are ED 501 and ED 503/EPSY 503 or equivalent courses. Ideally, students have learned about assessment and/or survey development.

Required Technology

Internet Access

Instruction and all course materials will be delivered online. Communication with the instructor will be conducted online as well. Students are responsible to maintain access to the internet throughout the semester to ensure a smooth and complete delivery of course materials and timely communication with the instructor.

Software

You will also need the following software for the course:

- SPSS
    - Free SPSS download: It is provided by the College of Education at UIC for you to use. Please see the course blackboard for detailed instructions.
    - Purchase SPSS software: You can purchase SPSS from UIC webstore at https://webstore.illinois.edu/shop/product.aspx?zpid=4022 If you have specific questions, please contact them using the form on their website.
- GENOVA (for G theory)
  I will provide the program package online for you to download and install when the relevant topic is taught.
- The Microsoft Office suite of software (including Word, PowerPoint, and Excel)
- Adobe Acrobat Reader to open PDF files
- Internet browser that is compatible with the Blackboard Academic Learning Suite

Hardware

To fully use the course materials, you must have a computer that has audio capabilities (i.e., a working sound card and speakers [or headphone]).

Learning Materials

Each **Monday**, the following learning materials will be available for you to view and/or download from the "Content" section in Blackboard. You are responsible for reviewing all of these materials thoroughly and completing the assigned activities. The table below lists the specific accessibility features and times when course materials will be made available to you.

Materials	Access	Latest Time
Slide handout	PowerPoint Slides: can be downloaded and printed and also have scripts of the lecture in the notes	1:00 AM
Audio lecture	Audio PowerPoint Presentation: can only be played online	1:00 AM
Data sets (as needed)	Can be downloaded	1:00 AM
Homework assignment (hw) [a]	Can be downloaded	1:00 AM
Answer key to previous module's homework assignment (hw solution)[b]	Can be downloaded	As early as 1:00 AM[c]
Other course materials, such as required or supplementary readings	Can be downloaded	1:00 AM

Note:

a. The homework assignment is in the folder that contains the corresponding learning materials. e.g., homework for module 2 is in the folder of Module 2.
b. The answer key to the homework assignment is in the folder that contains the next topic. E.g., the solution to the hw for Module 2 is in the folder of Module 3. You are expected to review the solution to the previous homework assignment before you start to learn a new topic.
c. The answer key to the homework assignment is only available to those who have submitted their corresponding homework assignment. If you submit a homework assignment late, the corresponding homework answer key will not become available for you until you submit that homework assignment.

Suggested Learning Sequence

You are responsible for reviewing ALL of the course materials and completing the homework assignments and exams as assigned. To assist you with managing your time effectively, the following list of actions is a suggested sequence for using the course materials.

1. Read the assigned textbook chapter(s) and journal article(s) for the current module.
2. Print the lecture handout for the current module.
3. View and listen to the lecture for the current module, and carefully complete the exercises given during the lecture. **Important:** Each lecture presentation contains exercises and answer keys to help you apply the content of the lecture. During the lecture, when I suggest that you pause the presentation and complete an exercise, you should do so to gain the maximum benefit from the exercise. Please do not skip the exercise or check the key beforehand. Otherwise, you will lose an opportunity to practice what you are learning and

provide feedback to yourself: If you do well on the exercise, you may move forward; If you miss something, you may review the previous slides or ask me for help.

4. If a demonstration of data analysis is available, follow the slides and practice it on your computer.
5. Complete the homework assignment, and submit it on time.
6. When the solution is provided for the homework assignment: Correct your homework assignment by using the answer key, and review the course materials related to the items that you answered incorrectly or with uncertainty.
7. Due to its online nature, we cannot meet each other regularly. Therefore, you need to take initiative and contact me whenever you need help. Please contact me or discuss with your classmates on time if you have questions. DO NOT skip contents that you do not understand, and DO NOT allow confusion to build over time.
8. Some previous students found that talking to me on phone or via zoom is an efficient way to help them understand the contents that they have trouble with. Therefore, I encourage you to do so when needed.

Course Requirements

Homework Assignment (HW) -- 96 points

Purpose: In almost every module, you will be given a homework assignment to complete. The homework assignments serve three purposes: (1) to reinforce your learning, as the best way of learning is by doing; (2) to self-evaluate your ongoing learning, so that you can get timely feedback on how well you meet the instructional objectives and how you can improve learning; and (3) to give me feedback to improve my teaching. When you find anything confusing, please let me know as soon as possible, so that I can help you and/or modify the teaching materials timely. Doing and reviewing your homework assignments are critical for you to learn the course materials and prepare for the exams. **Based on my previous experience, those who completed their homework assignments carefully and timely tend to learn well, do very well on the exams, and gain good grades in the course. Plus, homework assignments are worth a lot of points. If you miss one homework assignment, it means that you need to get 8 more points on your exam to make it up, which is NOT easy.**

Due date/time: Unless specified otherwise, a homework assignment is due on the day when the next module is available, e.g., hw for module 2 is due when module 3 is available. Homework assignments are due at 11:59 PM (central US time) on the due day (Monday). You must upload your completed assignment on Blackboard *before* the due date/time.

Homework Submission: You are required to submit your completed homework assignments electronically on the Blackboard site by using the corresponding homework assignment link in the "Content" folder so that I can track everybody's work. Please do not send me your homework assignment via email. Even if it is a late submission, please still submit it via the homework submission link on Blackboard, so that your homework assignment will be recorded appropriately and you will be able to see the corresponding answer key.

Discussion and Group Work: While working on the homework assignments, you are welcome to discuss the assignment using the Blackboard discussion boards or through personal emails. However, you are not allowed to copy each other's work. If evidence of copying is detected, all parties involved will receive a 0 for the particular homework assignment.

Scoring: I will check your homework assignment for completion rather than correctness. (Each of you is responsible for reviewing the correctness of your homework assignment using the solution provided.) A homework assignment completed and submitted on time will earn full credit (8 points each) regardless of whether all of the problems are solved perfectly. If you don't know how to solve a problem, try your best and complete it as much as you can.

An assignment that is submitted on time but incomplete without trying will lose points proportionally. An assignment that is submitted late (i.e., after 11:59 PM central US time on the due day) will earn 0 points. I understand that everybody may have some emergency to deal with sometimes. Therefore, each of you will be allowed TWO opportunities to submit homework assignments up to one week late and still gain full credit for the homework assignment. When you need to use your late submission opportunities, please inform me as soon as you can. Again, when you submit your homework after the due time, please still submit your completed homework assignment on Blackboard.

You will be able to check your homework grade in "Tool→ My Grades" after the points have been awarded by the following week.

Answer Key (Feedback) and Self-Evaluation: I will provide a detailed solution file as a type of feedback for each homework assignment soon after you submit your completed homework assignment on the due day. As it is a graduate-level course and we have frequent homework assignments, it is your responsibility to carefully compare your completed homework assignment with the answer key and correct any mistakes. However, if you have any questions about the homework assignments or you have trouble understanding the solution, please let me know or share your thoughts on the discussion board as soon as possible.

Discussion Board Contribution -- 4 points

Students are encouraged to discuss course contents and share course-related resources on the discussion board of blackboard, so that students can build a learning community and learn from each other, just like what you do in a regular classroom! You are also encouraged to read the discussion board regularly in case that any of the information is helpful for you.

To promote online discussion, besides self-introduction at the beginning of the class, each student is required to post on the discussion board at least once. Your post could be asking a question, answering a question, sharing your research design, or sharing a research article. Details about sharing research design and articles will be given on the homework assignments. When you fulfill the requirements, you will gain 4 points.

Exams -- 200 points

There will be two exams during the course and each exam is worth 100 points. The midterm exam will focus on all the content up to and include G-theory. The final exam will focus on the content from validity, but will not exclude the basic information covered before the midterm.

You will take the midterm and final exams online. On the exam week, the exam will be available on Blackboard from 12:00 AM (early morning) Sunday to 11:59 PM (midnight) Wednesday on the dates listed on the course schedule. You can start to take the exam anytime during this 96-hour time window, but you will have to complete and submit your exam within 4 hours once you start the test. If you submit the exam late or fail to submit the exam at all, your

score on the exam will be a 0. During the exam, you can log off and login to the test if only you have not submitted the test. However, the 4-hour timer keeps running from the moment that you first log in to the test, even when you log off the test temporarily. Therefore, you may schedule 4 uninterrupted hours for the exam to fully use the time when needed. Please make sure that your computer, internet, software, and everything related to the test-taking are all working well before you start the test.

Both exams are open-book and open-notes, so you can use any course materials or even search online for information when taking the exams. However, you must take the exams independently and should NOT consult any other people inside or outside the class. Also, for test security, you should NOT release the exam information to anybody. Otherwise, it is unfair to any honest students, including yourself. If any cheating behavior or exam releasing behavior is detected, anybody involved will be scored a 0 on the exam.

After all the students have finished the exam, the instructor will double-check computer scoring and send each student a feedback file with all the items he/she missed. However, if your total score is lower than 70, such a file will not be sent because too many items and keys will be released. However, if you are interested in knowing what items you have missed, you are welcome to schedule a phone call with the instructor, so that the instructor can go over the items you missed with you.

To help students prepare for the online exam format, a sample exam will be available for students to practice before the midterm exam. However, students' scores on the sample exam will NOT be counted as part of your course score.

Grading

The final letter grade received for the course will be based on homework assignments and two exams. The relative contribution of each element is as follows: homework assignment (96 points), discussion board contribution (4 points), midterm (100 points), and final (100 points). Your total course score = (homework assignment + discussion board contribution + midterm score + final score)/3.

The letter grade will be assigned according to the following scale:

90 – 100%	A
80 – 89%	B
70 – 79%	C
60 – 69%	D
59% or below	F

For example, you turn in 10 homework assignments in time (8 * 10 = 80 points), use the one late submission opportunity and turn in one homework assignment one week late (8 points), and miss one homework assignment (0 point). You contribute to the discussion board by asking a question (2 points) and sharing an article (2 points). Also, you score 90 on the midterm exam and 95 on the final exam. Your total score = (80 + 8 + 0 + 2 + 2 +90 + 95)/3 = 92.33. You will obtain an A for the course.

Communication with Instructor

If you ask clarification questions about the course contents (such as lectures, homework assignments, and solutions), please post your questions on the discussion board so that other students can participate in the discussion and benefit from your questions as well, just like in a regular classroom! I will also check the discussion board regularly and respond when needed. Even if you do not have questions about a topic, you are highly encouraged to read the discussion board regularly in case that you would like to share your ideas, contribute to the discussion, and learn from the discussions. If you have to email me your question and I find that your questions might be common or helpful for other students' learning, I will share your question anonymously and my answers on the discussion board, unless you ask me not to.

When you ask a personal question that is irrelevant to others, e.g., asking for a deadline extension for a homework assignment, you may email me at yueyin@uic.edu. When emailing me, **please include "546" in the subject line, so that your email would be less likely to be missed.**

When you post your question on the discussion board or email me, I will try my best to respond in 24 hours on weekdays. When you send me an email or post questions on the blackboard after 5:00 PM Chicago time on Friday, most likely I will respond on the following Monday. If you have not received my reply within this planned time, please repost/resend your question, as I may have missed your earlier message somehow. I would appreciate your reminder.

When you post your research design or share research articles, which are required in some homework assignments, I will provide feedback on your research design within a week after the assignment is due.

Technical Support

If you are having technical problems with the course, please click on the "Technical Support" link in the Blackboard course site to submit a request for assistance or call (312) 996-5948. A staff member will respond to inquiries Monday - Friday, 8 a.m. - 8 p.m. CST and Saturday - Sunday, 11 a.m. - 3 p.m. CST.

Special Needs

UIC strives to ensure the accessibility of programs, classes, and services to students with disabilities. Reasonable accommodations can be arranged for students with various types of disabilities, such as documented learning disabilities, vision or hearing impairments, and emotional or physical disabilities. If you need accommodations for this class, please make sure that you register with the Office of Disability Services (1190 SSB, 312-413-2183 (voice), 312-413-0123 (TTY only).

Academic Honesty

As an academic professional, you should understand the norms of academic integrity, and in particular, what counts as plagiarism. A useful treatment of forms of academic dishonesty, including plagiarism, can be found at http://www.uic.edu/depts/sja/integrit.htm (see #3 & #7, specifically). Please familiarize yourself with the forms of academic dishonesty as recognized by the University. If you have any questions about whether a particular activity constitutes

academic dishonesty, you can ask me, or contact UIC administrator Belia Gonzalez McDonald, beliag@uic.edu or 312-996-4857.

Course Schedule and Topics

Week	Date	Topic	Reading	HW Due
1	01/11 (M)	Introduction and review of mathematical and statistical concept for test theory	CA[a] 1 – 3 or AY[b] 1 - 2	
2	01/18 (M)	Test scores as composites	CA 5 or AY 3	
3	01/25 (M)	Reliability and the classical true score model	CA 6 or AY 4	# 1
4	02/01 (M)	Estimating reliability	CA 7 or AY 4	# 2
5	02/08 (M)	Generalizability theory -1	CA 8 or AY 10	# 3
6	02/15 (M)	Generalizability theory -2	CA 8 or AY 10	# 4
7	02/22 (M)	Validity	CA 10 or AY 5, Messick (1995)[b]	# 5
8	02/28 (Sun) ~ 03/03 (W)	Midterm		
9	03/08 (M)	Factor analysis	CA 13 or AY 5	# 6
10	03/15 (M)	Test item analysis	CA 14 or AY 6	# 7
11	03/22 (M)	Spring Break		
12	03/29 (M)	Item response theory	CA 15 or AY 11	# 8
13	04/05 (M)	Detecting item bias	CA 16	# 9
14	04/12 (M)	Correction for guessing	CA 17 or AY 7	# 10
15	04/19 (M)	Setting standards and norms	CA 18, 19 or AY 7	# 11
16	04/26 (M)	Wrap up and review		# 12
17	05/02 (Sun)~ 05/05 (W)	Final		

Note:

a. CA refers to the textbook written by Crocker & Algina (1986).
b. AY refers to the textbook written by Allen & Yen (2001).
c. The articles will be provided on the blackboard. Messick, S. (1995). Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning. *American Psychologist*, 50 (9), 741-749.

GSIG Initiative

The GSIG initiative is a program created by and for graduate students to increase opportunities for interdisciplinary collaboration and socialization so students build a strong research community for graduate school and beyond. GSIGs are special interest groups in which graduate students engage in an interdisciplinary research community around common interests. GSIGs meet monthly to discuss research and developments in topic areas, collaborate on ongoing projects, and support one another through the academic process with a shared goal to

connect, commune, research, and expand knowledge. The initiative also hosts multiple signature events throughout the academic calendar that include: research workshops, graduate community conversations, and writing retreats. https://education.uic.edu/our-research/graduate-research-opportunities/gsigs/

I sincerely welcome everyone's input, suggestions, and feedback anytime during the course. Let's work together to have a fun and rewarding course!