Course Description

A central theme in psychological and educational measurement is the establishment of the technical criteria and statistical models for ensuring the reliability, validity, and fairness of the measurement instruments. Whether it is a state-level end-of-grade test, an aptitude test for admissions (e.g., the GRE), a licensure examination (e.g., US Medical Licensing Examination; USMLE), a large-scale educational survey (e.g., National Assessment of Educational Progress; NAEP), a quality of life scale for patients with a chronic disease, or a depression inventory used for clinical diagnosis, the underlying measurement models and methods are similar.

This course is an introductory course to educational and psychological measurement. Classical test theory, generalizability theory, and item response theory are introduced, as well as the fundamental concepts of test reliability and validity. The topics also include several procedures that are commonly used in the development and evaluation of tests including equating, the detection of item bias, and standard setting within the classical test theory framework.

Prerequisites

This is a graduate-level measurement course. The prerequisites of this course include EDMS645 or equivalent. Students should be familiar with correlation and linear regression. Please contact the instructor as soon as possible if you do not think you meet these prerequisites.

Objectives

It is my hope that students will be able to have a solid understanding of reliability, validity, and fairness that are associated with educational measurement instruments so that students become capable researchers, informed consumers, and clear communicators. Students should be able to use fundamental concepts and statistical methods correctly and in a constructive manner in their own research. Students should be able to interpret the results from data analysis and communicate the
results effectively, whether for their own work or for evaluating the adequacy of other researchers’ work. For statistics/quantitative psychology/advanced quantitative methodology students, an additional objective is for them to become familiar with a general measurement framework, so that you may contribute to the educational and psychological measurement literature in the future.

Textbook


Course Delivery

Course slides and supplemental materials (if there are any) will be made available by 9AM of Thursdays on ELMS CANVAS course delivery system (https://elms.umd.edu). An email notification will be sent out when new materials are posted on the board. It is your responsibility to print them or bring them to class.

Software

You may use any competent software program of your choice as long as the program supports the analyses we will conduct in class. For the most part I will use R packages and minimally SPSS for demonstrations.

Formal Course Assessment

**Homework Assignments:** There will be FOUR assignments (total 60%) throughout the semester, each of them designed to give students an opportunity to apply and practice concepts and techniques learned in class. The last assignment will be a "critique" assignment, and more instructions will be provided later.

I do expect that students’ word-processed homework will conform as closely as possible to APA style presentation of tables, graphics, and references. Therefore, students should cut and paste relevant portions of the computer output into the appropriate places in your homework to show how you arrived at your solution.

Students are encouraged to work in groups on homework and to turn in a single homework with the names of the group members (maximum of 3 students per group). It should be understood that all members of a group receive the same score on homework completed together. Moreover, taking turns to complete each homework assignment, while time efficient, is not recommended for the sake of students’ learning.

Please note that late homework assignments will not be accepted unless pre-approval is given for exceptional circumstances. Only a hard copy of the homework assignment is accepted at the beginning of class on the specified due date. It might be wise to keep a photocopy or at the very least save assignments electronically for your own protection. Graded assignments will generally be returned during the next class.
One of the three grades (check minus, check, and check plus) will be given to each homework assignment. Getting a check means that the student or the group gets full credit for the assignment. For the assignments with check minus, there is one more opportunity to re-submit the assignment to get full credit. However, this submission should be made no later than a week from the day the assignment is returned. The second version should be a hard copy as well and the first version should be attached to the second version for comparison. If an assignment ends up with a check minus without resubmission or so, the student will get only partial credit for the assignment depending on the level of completion. A check plus means an excellent work, but there is no extra credit for the work other than getting full credit. So, a check plus is simply an acknowledgement for a great job.

**Exams:** There will be **TWO in-class exams** (midterm and final, 20% each). Two exams will be closed book and closed class notes; however, students may prepare and use up to one letter-sized two-sided pages of note. Students should bring a calculator to the exam, and note the sharing of calculators between students will not be allowed. No electronic devices (other than a calculator) are allowed for calculation during the exams.

**Course Grades**

**Overall Course Percent Grade:**
- 98.00% ~ 100.00%: A+
- 92.00% ~ 97.99%: A
- 88.00% ~ 91.99%: A-
- 85.00% ~ 87.99%: B+
- 82.00% ~ 84.99%: B
- 78.00% ~ 81.99%: B-
- 75.00% ~ 77.99%: C+
- 72.00% ~ 74.99%: C
- 68.00% ~ 71.99%: C-
- 65.00% ~ 67.99%: D+
- 62.00% ~ 64.99%: D
- 58.00% ~ 61.99%: D-
- ≤ 57.99%: F

**Notes:** With exceptions of computational error or human mistakes, grades will not be changed once they are posted. There will be no extra credit opportunities. Incomplete option is not for poor performance in the course. Incomplete for this course will be given on a case-by-case basis. However, unless the student can provide very compelling reasons with proof documents, incomplete will not be given.
## Tentative Course Schedule

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<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
<th>Reading</th>
<th>Assignment Due</th>
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<tr>
<td>1</td>
<td>Sep 1</td>
<td>Introduction, overview, and stat review</td>
<td>Ch.1,2</td>
<td></td>
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<tr>
<td>2</td>
<td>Sep 8</td>
<td>Scaling, and test development</td>
<td>TBA</td>
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<tr>
<td>3</td>
<td>Sep 15</td>
<td>Classical test theory</td>
<td>Ch.5</td>
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<td>4</td>
<td>Sep 22</td>
<td>Reliability I</td>
<td>Ch.6</td>
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<td>5</td>
<td>Sep 29</td>
<td>Reliability II</td>
<td>Ch.7</td>
<td></td>
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<tr>
<td>6</td>
<td>Oct 6</td>
<td>Generalizability theory</td>
<td>Ch.9</td>
<td>Assignment 1</td>
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<td>7</td>
<td>Oct 13</td>
<td>Validity</td>
<td>Ch.8</td>
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<td>8</td>
<td>Oct 20</td>
<td>Midterm exam (in class)</td>
<td>Ch.3</td>
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<td>9</td>
<td>Oct 27</td>
<td>Introduction of factor analysis</td>
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<td>10</td>
<td>Nov 3</td>
<td>Item response theory I</td>
<td>Ch.10</td>
<td>Assignment 2</td>
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<td>11</td>
<td>Nov 10</td>
<td>Item response theory II and equating</td>
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<td>12</td>
<td>Nov 17</td>
<td>Differential item functioning</td>
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<td>Nov 24</td>
<td>Thanksgiving Holiday (no class)</td>
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<td>14</td>
<td>Dec 1</td>
<td>Standard Setting</td>
<td>TBA</td>
<td>Assignment 4</td>
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<td>15</td>
<td>Dec 8</td>
<td>Final exam (in class)</td>
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## Course Procedures and Policies

**Accommodations for Emergencies & Email Communication**:
When the University closes on the day of class, we will have no class. Otherwise, I strongly urge you to be vigilant about your email and/or the course website on CANVAS if there are any threats (e.g. extreme weather) that could potentially prohibit having class at our regular time.

If you need to be absent from class or late for the class significantly (or leaving early), letting me know about it ahead of the time would be much appreciated. All students are expected to take the exams and/or submit assignments on the specified dates and no make-up exams are given. You must contact me before an exam if you are going to be absent or you will receive a zero for that assessment.

The primary communication tool will be emails. However, I would like to remind you that you should allow me at least 24 hours to take care of emails due to my other duties as a faculty member. Emergencies deserve prompt replies, but last minute questions with respect to assignments might not be well taken. I strongly recommend that you should plan ahead to meet the deadlines properly.

**Academic Accommodations**:
In compliance with and in the spirit of the Americans with Disabilities Act (ADA), I would love to work with you if you have a documented disability that is relevant to successfully completing your work in this course. If you need academic accommodation by virtue of a documented disability, please contact me as soon as possible to discuss your needs.

**Academic Integrity**:
The University of Maryland, College Park, has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible to uphold these standards for this course. It is imperative that you are aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the code of Academic Integrity or the Student Honor Council, please visit [http://www.studenthonorcouncil.umd.edu/code.html](http://www.studenthonorcouncil.umd.edu/code.html) for details. Plagiarism and other forms
of academic fraud are a violation of university regulations and unacceptable under any circumstance. These instances have to be and will be reported to the Honor Council in writing. Notes on plagiarism in this class: Due to the nature of reporting statistical results, some expressions are commonly used and should be phrased in the same/similar ways. However, how to approach a problem and end up with the solution is definitely a result of logic process, and this should not be stolen and used with proper citations.

**Religious observances:**
The University of Maryland policy on religious observances states that students not be penalized in any way for participation in religious observances. Students shall be allowed, whenever possible, to make up academic assignments that are missed due to such absences. However, the must contact the instructor before the absence with a written notification of the projected absence, and arrangements will be made for make-up work or examinations.

**Student Participation:**
The classes will be composed of lectures and small group/class discussions. Each student’s meaningful participation is very appreciated and will contribute to entire learning process, promoting critical thinking skills. Throwing questions and bringing in topic-related problems to class are always welcomed.