

S-061A2: Statistical and Psychometric Research for Educational Measurement
Harvard Graduate School of Education
October 21 – December 18, 2015

Class meets Mondays and Wednesdays, 10:10-12:00 in Longfellow 229

Instructor: Andrew Ho
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Instructor Office Hours: After class or email Wendy_Angus@gse.harvard.edu for appointments.

Description

This is the second of two sequential modules on quantitative methods for educational measurement. Students will continue their training in psychometric and statistical methods of measurement, with greater emphasis on understanding and critiquing recent research, as well as the development of an individual research proposal that has promise for advancing the field. Training will continue in reliability, generalizability theory, validation, differential item functioning, item response theory, scaling, linking, standard setting, and adjustments for measurement error. Contexts of assessment include small-scale educational and psychological assessments for targeted research studies as well as large-scale district, state, and national assessments for formative, summative, and evaluative purposes. Students are strongly encouraged to bring their own score-level or item-level data although this is not required. In the preceding module, S-061A1, which is a prerequisite, students will have learned and applied methods in class and through completion of data analytic assignments. In this second module, students will complete assignments, participate in class discussions on current research in educational measurement, and develop their own research proposal, which they will present at the end of the semester.

Prerequisite: S-061A1 in the same semester or a previous version of S-061A2. This course complements S-043 and S-090, and students may enroll in these courses in any order. Students who do not meet the prerequisite may enroll instead in S-011, which provides a nontechnical introduction to educational measurement.

Grading

The requirements of the course include regular attendance (10%), active participation in class and in out-of-class discussions (25%), satisfactory completion of preliminary proposal (15%), and satisfactory completion and in-person presentation of a full research proposal or project (50%). These weights are approximate—the final course grade may factor in improvement over time and exemplary performance on one or more dimensions.

This course is letter-grade-only; students may not take this course on a Satisfactory/No Credit basis. Registered students must submit a course evaluation form at the end of the semester in order to fulfill the requirements of the course.

Support

Our TF, John Hansen, will hold weekly office hours by appointment. Occasionally, John may also offer optional discussion sections as he sees necessary. Participation is strongly recommended. Office hours with the instructor are typically available after class meetings and are also available by appointment. Contact my assistant, at Wendy_Angus@gse.harvard.edu to schedule appointments. Occasional one-on-one check-ins with the instructor are strongly recommended.

October 2015						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
18	19 – A1 Class 12	20	21– Class 1	22 – A1 final out: 12PM	23 – A1 final due: 5PM	24
25	26 – Class 2	27	28 – Class 3	29	30 – 1-page proposal due	31

November 2015						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 – Class 4	3	4 – Class 5	5	6	7
8	9 – Class 6	10	11 – Holiday	12	13	14
15	16 – Class 7	17	18 – Class 8	19	20 – Prelim proposal due	21
22	23 – Class 9	24	25 – Holiday	26 – Thanksgiving	27	28

December 2015						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	30 – Class 10	1	2 – Class 11	3	4 – Full drafts due	5
6	7 – Presentation Session 1	8	9 – Presentation Session 2	10	11	12
13	14	15	16 – Final Projects Due (5PM)	17	18	19

Course Project

To complete the course, you must develop an original research project, present it to other class members, and submit a final written product. In conducting this research project, you may collaborate with a partner in the class. While my vision of what constitutes a viable project is somewhat contextual and subject to negotiation, there are two broad possibilities:

1. A complete and extended outline of a research paper, including results from data analysis that uses the methods introduced in this course. I will provide more detail on what is meant by “complete and extended outline”, but in essence this will require you to write down the underlying structure of the paper from start to finish. This includes (in order): 1) Introduction / motivation; 2) Background / literature review; 3) Data and sample; 4) Methods; 5) Results; and 6) Discussion and implications for policy and/or practice. To be clear, while this is less effort than a completed final paper, it also means that you must produce the main tables and figures that you intend to include in a final version of your paper.
2. In the event that producing results is not possible, I will require you to write a “pre-analysis plan”. This is very similar to #1 above, except that the “Results” section will instead require a full list of models that you wish to estimate, a detailed discussion of what you expect to find, and what you might learn from your study (regardless of how the analysis turns out). This option is available primarily for students who are working on a project that has scholarly promise, but also logistical headaches that are beyond your control (for example, if you are collecting data or waiting on the acquisition of a restricted-use data set).

Your grade on the course project will depend on the contribution of the project is and how well you implement it. In addition to the scheduled deadlines on the syllabus, I encourage you to keep me informed on the progress of your project throughout the semester.

In order to ensure that you make an early start and continue to make progress on your project, you must submit an initial one-page, single-spaced overview of your proposed project, or a short list of concise research possibilities to me by 5PM on Friday, October 30, a draft by 5PM, November 20, make a presentation of your project to me and other class members on December 7 or 9, and submit a final version by 5PM, Wednesday, December 16, that reflects your responses to the feedback that we provide on your initial draft. The maximum length of the extended outline or pre-analysis plan (not counting references, tables, and figures) is 20 pages of double-spaced 12 point type with one-inch margins. During the course, we will provide explicit guidance and support tailored to each research project. I expect that your course project will eventually (after the course is complete) result in a published research paper that can appear on your Curriculum Vitae.

To help you prepare the presentation of your course project, we will devote class time to discussing the components of a good scholarly talk. We may also be available to help you practice a “dry run” of your presentation. You (and perhaps your research partner) should make

an appointment with me to discuss the feedback I provide on your draft. You should also see John or me for ongoing support for your project. Prior to any meetings with either of us, please prepare a brief memo describing your agenda for the meeting and email it the day before our meeting. This will help us to help you.

Readings –
THESE ARE SUBJECT TO CHANGE
IN RESPONSE TO STUDENT RESPONSE FROM STUDENTS IN S-061A1

All readings must at least be opened and glanced over. I intend noncentral readings to provide additional context and citations for future reference. Other readings are central and should be read closely. Central readings that are very technical need not be mastered in detail, but do pay attention to notation and the underlying motivation of derivations. I will be attempting to provide discussion questions for central readings in advance. Links will work on campus and, if you are off campus, if you have a VPN connection.

1. Reliability and validation of large-scale assessments

AERA/APA/NCME Standards, Chapters 1, 2, 12, & 13.

MCAS Tech Report,

<http://www.mcasservicecenter.com/documents/MA/Technical%20Report/2013/2013%20MCAS%20and%20MCAS-Alt%20Technical%20Report.pdf>

California (CST) Tech Report,

<http://www.cde.ca.gov/ta/tg/sr/documents/cst14techrpt.pdf>

2. Reliability and validation of psychological and sociological instruments

Duckworth & Quinn (2009)

<http://www.sas.upenn.edu/~duckwort/images/Duckworth%20and%20Quinn.pdf>

Cowan et al. (2012)

https://nces.ed.gov/nationsreportcard/pdf/researchcenter/Socioeconomic_Factors.pdf

3. Generalizability Analyses

Ho & Kane (2013)

http://www.metproject.org/downloads/MET_Reliability_of_Classroom_Observations_Research_Paper.pdf

Hill, Charalambous, & Kraft (2012).

<http://edr.sagepub.com/content/41/2/56.full.pdf+html>

Cronbach, et al. (1997) <http://epm.sagepub.com/content/57/3/373.full.pdf+html>

4. Item Response Theory

Mislevy et al. (1992) <http://www.jstor.org/stable/1165166>

Lockwood & Castellano (2015)

<http://amstat.tandfonline.com/doi/pdf/10.1080/2330443X.2014.962718>

Ho & Yu (2015) <http://epm.sagepub.com/content/75/3/365.full.pdf+html>

5. Scaling and Value-Added Models

Briggs & Domingue (2013) <http://jeb.sagepub.com/content/38/6/551.full.pdf+html>
Castellano & Ho (2015) <http://jeb.sagepub.com/content/40/1/35>

6. Standard Setting

McClarty et al. (2013) <http://edr.sagepub.com/content/42/2/78.full.pdf+html>
Haertel (2005) <http://onlinelibrary.wiley.com/doi/10.1111/j.1745-3992.2002.tb00081.x/epdf>
Ho (2012) http://scholar.harvard.edu/files/andrewho/files/off_track_-_andrew_ho_working_paper.pdf

7. Bias and Differential Item Functioning

Martiniello (2009) <http://www.tandfonline.com/doi/full/10.1080/10627190903422906#.Vd2cIfIviko>
Hamilton (1999) http://www.tandfonline.com/doi/pdf/10.1207/S15324818AME1203_1
Varni et al. (2014) <http://link.springer.com/content/pdf/10.1007%2Fs11136-013-0439-0.pdf>

8. “Scale-invariant,” Ordinal, Nonparametric Distributional Recovery

Ho (2009) <http://jeb.sagepub.com/content/34/2/201.full.pdf+html>
Quinn (2014) <http://epa.sagepub.com/content/early/2014/06/02/0162373714534522>
Reardon et al. (under review)

Statistical and psychometric computing

Statistical computing is an integral part of S-061. I will be using Stata this year, and you will require Stata 14 to use Item Response Theory methods.

I do not teach programming during class time, although code is threaded through the lecture slides. We provide resources to help you learn how to program on your own at your own pace. John may also cover coding issues in their sections.

There are two ways you can access Stata. The least expensive option is to use one of the networked workstations available in the Learning Technology Center (LTC) on the 3rd floor of Gutman Library and elsewhere on the HGSE campus (e.g., on the 2nd and 4th floors of Gutman Library). For students who would like to use Stata on their own PCs, you may purchase Stata following this link: <http://www.stata.com/order/new/edu/gradplans/student-pricing/>. Stata/IC, which will be sufficient for this course, is available for \$75 for a 6-month license and \$198 for a perpetual license.

Collaboration and study groups

When collaborating across groups, **students must turn in work as pairs or individuals where specified above, not group work. Papers should be written in the pair’s own words—your text should reflect your own understanding of the material.**

Accommodations

Students needing accommodations in instruction or testing must notify the instructor early in the semester, and HGSE’s policies must be followed. Late requests for accommodations will not be honored unless there is a pressing reason, such as a recent injury.

A Note on Plagiarism

Please read the School's policy on plagiarism in the HGSE Student Handbook, which includes the statement, "Students who submit work either not their own or without clear attribution to the original source, for whatever reason, ordinarily will be dismissed from the Harvard Graduate School of Education." Attention to this policy is particularly important in a course like S-061, in which collaboration with other students is often required and generally encouraged. If you work closely with other students or partnerships—a process that I encourage and fully support—recognize the other students' contributions explicitly in your written account (a footnote is fine for this purpose). This helps avoid the natural questions that arise when similarities are detected at grading. **If you have any questions about what constitutes appropriate collaboration, or how to define what constitutes your own work, please see me or a Teaching Fellow.**

I cannot overemphasize the need for all students to monitor their own behavior. Assignments are structured such that you can receive feedback on your and your partner's understanding of the material. The consequences for plagiarism are appropriately severe.

Other Writing Resources

- HGSE Academic Writing Services: Gutman Library
- APA Online Tutorial: http://isites.harvard.edu/icb/icb.do?keyword=apa_exposed
- Writing Resources (including *Writing Like an Educator* Course and Reference Materials): <http://isites.harvard.edu/icb/icb.do?keyword=awrs&pageid=icb.page48297>
- Sign-up for Individual Sessions at the Writing Center: <http://www.appointmentquest.com/provider/2030159020>