S-052: Intermediate and Advanced Statistical Methods for Applied Educational Research
Harvard Graduate School of Education, Fall 2023 (also offered Spring 2024)

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Links to all course materials are available on Canvas:
Fall: https://canvas.harvard.edu/courses/131763 Spring: (forthcoming)

Synchronous meeting times

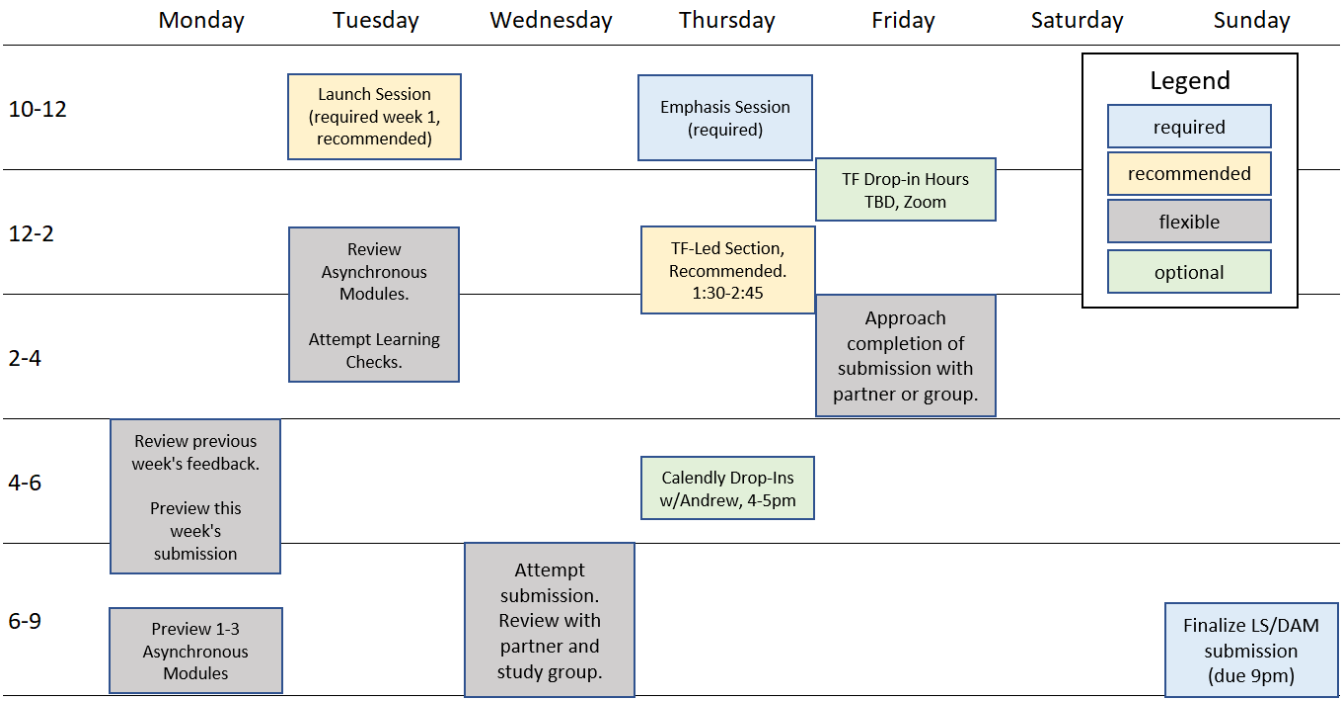
Weekly "Launch Sessions," required Week 1 and additional weeks, otherwise recommended.
Tuesdays, 10:30-11:45am, Location TBA

Weekly required "Emphasis Sessions"
Thursdays, 10:30-11:45am, Location TBA, occasionally on Zoom due to faculty travel.

Andrew's optional drop-in hours ("Please Drop By My" Office Hours)
Thursdays, 4-5 on Zoom.

Weekly recommended sections with Teaching Fellows (assigned)
Thursdays, 1:30-2:45pm, in person, Location TBD

An illustrative week for an S-052 student:



Course overview

Welcome to *S-052: Intermediate and Advanced Statistical Methods for Applied Educational Research*. This course is offered twice: in the fall for students who have had a previous semester of applied regression analysis, and in the spring as an integrated continuation of the fall course, *S-040*. *S-052* is part of the *HGSE* school-wide network of courses in quantitative methods. The *S-040* and *S-052* courses form the foundation of a sequence of courses in applied statistical methods for consumers and producers of rigorous educational, social, and psychological research.

The course develops and extends the data-analytic skills that you began to acquire in earlier courses and helps you learn to communicate your findings clearly to audiences of other empirical researchers, scholars, policymakers, practitioners, students, and parents. We have designed *S-052* to contribute to the diverse data-analytic toolkit that you will need in order to perform sensible and useful analyses of complex educational, psychological, and social data.

Core topics such as multiple regression analysis, introduced in prior coursework, continue to be the foundation of *S-052*. However, we extend your use of these techniques to cover a wider variety of conditions encountered in the world of real data-analysis, including multilevel models and selected multivariate methods. A listing of major course topics is provided later in this document.

True to its name, *S-052* is an *applied* (not a *theoretical*) course in which you will learn by observing and engaging in the authentic activities of real applied data analysis. We will model the use of new statistical techniques in class, and then you will apply these new techniques to real problems using real data in "data-analytic memos" (DAMs) and a significant final take-home assignment that is affectionately known as, "the celebration of learning."

In all these assignments, we ask you to interpret the outcomes of your data-analyses in words, and to communicate these interpretations clearly and concisely in writing. You also have the opportunity to acquire the basic programming skills necessary for hands-on data analysis in *Stata* or *R*.

Library reserves and other text resources (on Canvas)

Many students learn well from textbooks. Unfortunately, few textbooks cover the range of methods we teach in this course. Instead we provide a range of resources you can find on Canvas's library reserves, here. Recommended texts, some of which we provide excerpts for in our Canvas reserves, include:

For causal inference and quasiexperimental methods in education (M&W):
Murnane, R. J., & Willett, J. B. (2010). *Methods matter.* Oxford University Press.

For linear and logistic regression and random effects modeling in Stata (RH&S):
Rabe-Hesketh, S., & Skrondal, A. (2022). *Multilevel and longitudinal modeling using Stata, Volumes I and II* (4th ed.). College Station, TX: Stata Press. Only Volume I is recommended for this course. One chapter in Volume II is relevant and available freely here.

For event history analysis and longitudinal models (S&W):
Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis.* Oxford University Press.

A general text covering most topics:
Kleinbaum, D. G., Kupper, L. L., Nizam, A., & Rosenberg, E. S. (2013). Applied regression analysis and other multivariable methods (5th ed.). Cengage Learning.

Overview of course topics

Although the topics in each week may seem distinct to novice learners, we work to establish conceptual and formal connections across weeks. The goal is for students to understand and feel that these concepts and techniques are a coherent conceptual and empirical toolkit by the semester's end. To accomplish this, we emphasize certain perspectives and concepts repeatedly through the course. These include: 1) The 5 Gs: Teaching and communicating through Greek (mathematical notation), Graphs (visual representations), Grammar (words and sentences), Gadgets (physical representations), and Games (puzzles and competitions); 2) real-world examples and real-world data from education, health, and other disciplines and fields; 3) model comparisons and tradeoffs; 4) counterfactuals, particularly the logic of differences in differences; and 5) evaluating effects both statistically and substantively.

The approximate week-to-week flow of S-052 follows. Students should expect some adjustment, particularly by the end of the semester.

Week 1: Exploratory Data Analysis and Statistical Inference

- "Verbatim" vs. "Gist" interpretations of descriptive statistics.
- Five ways to interpret a) means, b) SDs, c) standard errors, d) scatterplots, e) correlations.
- Five steps to accurate interpretation and explanation of null hypothesis significance tests.

Week 2: Building Regression Models, Interpreting Interaction Terms (RH&S Ch. 1, Beck&Beck)

- Building a model is like building an argument.
- Five guidelines for interpreting and explaining models with interaction terms.
- Five regression assumptions and when and why assumptions matter for practical purposes.

Week 3: Causal Inference, Randomized Controlled Trials, Differences in Differences (M&W Ch. 4&8)

- The Neyman-Rubin Causal Model.
- The logic of random assignment, Average Treatment Effects, internal vs. external validity
- The logic of differences-in-differences. Parallel trends. Connections to interaction terms.

Week 4: Regression Discontinuity (M&W Ch. 9)

- Assumptions. Comparing Average Treatment Effects and Local Average Treatment Effects
- Bandwidth selection and validation checks.
- Connections to interaction terms.

Week 5: Nonlinear Relationships: Polynomials and Logarithms

- Polynomial regression
- Connecting polynomial regression to regression discontinuity and interaction terms.
- Logarithmic transformations of predictors or outcomes.

Week 6: Logistic Regression and the Generalized Linear Model (Pampel, 2000; RH&S Ch. 10)

- Logistic regression v. the Linear Probability Model
- Logistic regression and log-odds units (logits)
- Interpreting and avoiding odds ratios.

Week 7: Interpreting Sociodemographic Variables (Castillo & Gillborn, 2022). Maximum Likelihood.

- Improving our use of sociodemographic variables through critical quantitative perspectives.
- Maximum likelihood.
- Chi-square tests for model comparisons.

Week 8: Event History Analysis (S&W Ch. 10)

- Questions about whether and when: Event History a.k.a. Survival Analysis
- Time fixed effects and Discrete Time Survival Analysis
- Using Event History Analysis to answer questions about persistence and attrition.

Week 9: Multilevel Models and Random Effects (RH&S Ch. 2, 3)

- Multilevel models and cluster-robust standard errors approaches to cluster randomized trials.
- Variance within, variance between, and intraclass correlations.
- Within vs. between relationships

Week 10: Within- vs. Between-Effects and the Mundlak Specification

- Within vs. between effects, compositional vs. contextual effects.
- Mundlak specifications for comparing within-group and between-group relationships.
- Cross-level interactions

Week 11: Multivariate Methods: Measurement and Reliability (AERA/APA/NCME, RH&S Ch. 9)

- Measurement, validation, and interrater reliability
- The 5 Cs of Validation
- Crossed random effects, reliability, and Cronbach's alpha

Week 12: Multivariate Methods: Principal Components Analysis (Dunteman)

- Comparing regression, measurement, and compositing.
- Eigenvalues, eigenvectors, and scree plots.
- Assessing dimensionality.

Week 13: Review: The Seven Levels of S-052

- 1) Effects, 2) Control, 3) Interaction, 4) Nonlinearity, 5) Likelihood, 6) Context, and 7) Combination.

Course activities and participation

Most of our time—both in and out of the classroom—will be spent learning how to understand and enact data analysis. Sometimes understanding is enhanced by knowing more about the mathematical underpinnings. However, we also offer straightforward conceptual explanations that do not sacrifice intellectual rigor.

We will devote time to illustrating how to present results in words, tables, and figures. Good data analysis is craft knowledge. It involves more than using software to generate reams of output. Thoughtful analysis can be difficult and messy, raising delicate problems of model specification and parameter interpretation. We'll confront such issues directly, offering concrete advice for sound decision making.

Class participation is an important part of learning, even in a relatively large lecture course like S-052. If you have a question, it is likely that others do as well. I encourage you to collaborate in live, open-edit documents as well as raise your hands. If students make efforts in and out of class to engage actively with course content to the benefit of themselves and their fellow students, I may factor this into grades that fall near grading cutpoints. For in-class participation, please do not be offended if I defer your contribution to another time, if I feel addressing the question may take us too far astray.

Meeting times and the attendance policy

Class will start promptly at the official start time. Please arrive a bit early to ensure you are settled in by this time. I often take attendance digitally through in-class online "learning checks." We use attendance data formatively, to ensure that students are staying on pace and to direct additional support.

All class meetings are recorded and available on Canvas. "Launch Sessions" on Tuesdays are recommended and sometimes required, for example in Week 1. "Emphasis Sessions" on Thursdays are always required. They will occasionally meet on Zoom due to the instructor's travel constraints. We appreciate your commitment to synchronous in-person attendance as we endeavor to build a coherent and lasting community. In the event of unexpected conflicts, simply let us know by email.

Professional behavior in a digital age

All of us are likely to face distractions during meeting times in person and online. Sometimes these distractions are in our control, and other times they are not. We encourage you to stay focused and engaged during synchronous sessions, even as we understand when other events or priorities arise unexpectedly. I encourage you to read this review article by our HGSE colleague Susan Dynarski about the risks of distraction to learning and do your best to monitor your engagement accordingly.

Ongoing Assessments: Learning Checks, Learning Submissions, and Data Analytic Memos

We use three types of assessments to help you and us monitor and support your learning.

Learning Checks. In synchronous class sessions and asynchronous modules, we will use "learning checks," 1-3 structured questions that you will discuss with your fellow students and then submit responses. Correct answers will be provided immediately after your response to support your learning. We will not provide individual feedback on learning checks but use your responses simply to track attendance and progress. The goal is to give you and us a sense of your learning and engagement.

Learning Submissions. At the end of the first two weeks of class, and every other week thereafter, students will submit responses to a brief series of questions on Canvas. These must be submitted by 9pm on Sunday. Example walkthroughs and solutions will be provided immediately after your submission to support your learning via immediate feedback. Like learning checks, we will not provide individual feedback on learning checks. Instead, we review these at the whole-class level to help us monitor and support your learning. We encourage you to give them careful consideration and due effort to achieve this goal.

Data Analytic Memos. The best way to understand statistical analysis is to actually conduct statistical analysis. To help you develop your skills, we distribute and provide feedback for 6 assignments. In honor of my predecessor, John Willett, we call these "Data Analytic Memos" (DAMs) which he referred to lovingly as "those DAM things." These will be due every other Sunday at 9pm. To maximize your learning, we encourage you to open each DAM early (a good habit is to open it the day after you submit the previous DAM) and reference it often as you engage with synchronous and asynchronous material. We encourage you to have it complete or near-complete before the weekend on which it is due.

Learning Submission Due Dates (individual, Sundays 9pm ET): 9/10, 9/17, 10/1, 10/15, 10/29, 11/12,

DAM Due Dates (partnered, Sundays 9pm ET): 9/24, 10/8, 10/22 (individual), 11/5, 11/19, 12/3.

Design and Purpose of S-052 Assessments

Assessment Type	Length	Completion	Collaboration	Feedback	Purpose
Learning Checks	Very brief	In synchronous sessions	Individual submission after consultation with peers	Correct answers provided immediately.	Formative Attendance.
Learning Submissions	Moderate	Due Sundays at 9pm ET in Week 1, 2, 4…	Individual submission after consultation with peers	Correct answers provided immediately.	Formative. Engagement.
Data Analytic Memos	More extended	Due Sundays at 9pm ET in Week 3, 5, 7…	Partnered submission except Week 7 (individual).	Detailed, approximately 1 week later.	Formative and summative.

Statistical computing with Stata 17 or R and the Programming vs. Critical Reading Pathways

Writing and running statistical code helps to make statistical practice active rather than passive. It is an important way to learn. At the same time, learning to code can be immensely frustrating in practice, leading to hours spent looking for a missing comma or quotation mark. At worst, programming tasks can encourage rote "copy-paste-find-replace" behavior rather than inspired creation. In S-052, we provide statistical code in Stata and R for all examples and graded assignments and require students to run this code and interpret output. We also provide an optional online video "coding walkthrough" that helps students to understand the intricacies of code we use to generate results in lecture slides and assignments.

For assignments, we give students the choice to learn programming or spend additional time learning to read quantitative articles critically. We do this by providing students a branching pathway toward the end of each graded assignment that leads to either a statistical programming task or a critical reading task. Students can select which path they would like to choose on an assignment-to-assignment basis.

The quantitative methods sequence at HGSE supports both Stata 17 and R. For novice programmers, we recommend Stata, and our slides are often Stata-based. We do not assume that you have used Stata or R before. We recommend recent versions of Stata, but if you have Stata 12 and up, you should be fine. Students who are more comfortable with programming can use the statistical program, R.

You can download Stata and R here: https://its.gse.harvard.edu/research-software-support

Culminating Assessments: Final "Celebration of Learning" and Optional Course Projects

The final "celebration of learning" is a partly collaborative and partly individual affair that will be posted during the examination period beginning Monday, December 11, at 9am. It consists of two documents. The first document, the "evidentiary materials," contains an extended amount of Stata/R code and output. The second document is a list of questions similar to those in assignments. The first document may be discussed in groups of any size. The second document, once opened, must be completed individually, and no subsequent discussion of the evidentiary materials nor the content of the questions is allowed until the celebration is complete.

Most students begin the first day of the celebration by reviewing the first document individually for a short time, then transitioning to group discussion to ensure that all members understand the evidentiary materials. Students generally transition to the individual component of the celebration after they are comfortable with the evidentiary material.

The questions sum to the magnitude of a large DAM, without coding. To provide flexibility, the assessment window is open from Monday, December 11 through Thursday, December 14. Like

assignments, we encourage you to plan in advance to ensure that final celebrations will be submitted on time. Please contact me early if you have any conflicts with this date.

For students who wish to apply the skills they develop in this class to their own data, we encourage the submission of a course project. The course project will usually be 5-10 written pages, including a statement of the research questions, a methods section describing the analysis, and a writeup of the results and conclusions. Students who opt to submit a course project must still complete the celebration of learning, but they may answer fewer (around 60%) of the questions. Students who wish to develop their project over the course of the semester may also offset some DAM parts with progress reports on their project. Criteria for the optional final project follow:

1. A final project should demonstrate fluent application or conceptualization of course content beyond S-040 (beyond multiple regression).
2. Students may take on projects individually or in partnerships. Partnerships may be but need not be the same as DAM partnerships.
3. Examples of projects include analysis of your own data and interpretation of results, extensions of DAMs, and development (including schematics if construction is not possible) of teaching tools.
4. Individuals or partners who take on a final project will complete ~60% of the final celebration of learning.
5. Projects should be around 5 pages double spaced, not including tables, figures, code, and references. Stylistically, many final projects will look like DAMs, with an introduction of the data and the context, a motivation of the question, exploratory data analysis, model building, testing of relevant hypotheses, and interpretation.

Slack, collaboration, and study groups

We will be using Slack for collaboration and communication in this course. You can access the S-052 Slack by clicking on the link to the left on the Canvas site at https://canvas.harvard.edu/courses/131763 . Standard Slack norms are here:

- Be good citizens of Slack: answer questions, assume best intent, try not to sidetrack conversations.
- Understand **public and private channels**, and try to communicate with the proper audience.
- Use **threads** to organize smaller group discussions around specific topics.
- **Format messages** so that they're easier to read.
- **Use emoji reactions** liberally to acknowledge messages while keeping channels from becoming inundated with reaction messages.
- Use the search function to try to find an answer, reducing duplicate questions.
- Manage **notifications** to reduce information overload and maintain focus.
- Remember that there are situations when it's best to move the conversation off of Slack messaging. Students can meet face-to-face using Zoom or **Slack calls.**

To mimic statistical work in the real world and to provide a chance for you to use statistical language actively, I mandate completion of DAMs in partnerships throughout the course.

We mandate collaboration for at least three reasons. First, learning statistics is like learning a language. To learn it, one must "speak" it actively and in a genuine context with other individuals. Second, collaborative statistical analysis is the norm and individual work is the exception in the world of statistical practice. Third, my experience has been that, on average, students who work in partnerships and groups both perform better and enjoy themselves more than students who work individually. Statistical collaboration is a case where the whole is greater than the sum of its parts. (Note that the Week 7 DAM is

an individual submission. We do this to ensure that individual as well as partnership learning goals are advancing at the midterm mark.

Beyond partnerships, larger study groups can be helpful to you as you prepare to do the assignments, both in terms of how to approach the work and in terms of how to think about important concepts. **However, students must submit work as pairs, not group work. Papers should be written in your own words—your text should reflect your own understanding of the material.**

A couple of rules will help to avoid misunderstandings and violations. First, never send electronic documents with your responses to members outside of the partnership. Second, never compose collaborative documents with members outside of the partnership; beyond the partnership, do not cowrite answers to be shared.

Each group will undoubtedly develop its own structure; nevertheless, here are a few suggestions:

- Groups with six or more members become less useful and may be harder to organize because finding common meeting times becomes increasingly problematic.
- Plan at least one session of 1½ to 2 hours (early enough so that there is sufficient time if an additional session is necessary). After 2 hours of statistics, everyone's eyes will be glazing over.
- Schedule the meetings so that you have sufficient time afterwards to write in pairs or individually. When we read your assignments, we focus on what you say and how you say it. The assignments require not only statistical techniques but skills in analyzing and reporting the material.
- Use the groups to ask questions, try out interpretations, and so on. Often one person can explain something that makes you see something in a new way. Different people have different insights and strengths – some are good programmers, some ask good questions, others value contextual analysis—and you can learn from listening to what others in a group have to offer.
- Be sensitive to the distinction between collaboration to plan for and interpret the assignment and collaboration to write up the assignment. The former is encouraged; the latter is forbidden beyond, when applicable, your partner. If the distinction begins to feel murky, refocus your group's work on lecture content and course materials.

Grading

You will be evaluated based on your engagement with learning checks and learning submissions (15%), the learning you demonstrate on DAMs (50%), and the final celebration and (if applicable) your final project (35%).

We use arithmetic computations to arrive at a first approximation of your course grade. We then conduct a number of checks to ensure that no individual assignment or score takes on undue weight. We consider your growth as well as your average performance. And we look at your whole portfolio of work when assigning course grades. For more details, see our handout entitled, *How We Evaluate Assignments*.

Students may choose to take the course on a satisfactory/unsatisfactory basis on the condition that can find another partner who can take it on this basis. Satisfactory performance requires course attendance, an average of B or better, and completion of all assignments and the final celebration.

Avoiding plagiarism and ensuring appropriate use of Artificial Intelligence (e.g., ChatGPT)

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, face sanctions up to and including dismissal and expulsion." Attention to this policy is particularly important in a course like S-052, in which collaboration with other students is

encouraged. If you work closely with other students during the planning of your analyses—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.

Please also read the School's policy on the appropriate use of generative artificial intelligence (AI), including tools like ChatGPT. Acknowledge and document any use of these tools in your DAM. You are welcome to use these tools to refine or translate your code and to refine or translate your ideas. However, you should "lead" and not "follow" any AI tool. The "seed" of every answer in any submitted assignment must be your own, and you must acknowledge and cite any way that AI has helped that seed to grow.

If you have any questions about what constitutes appropriate collaboration or use of AI, or how to define what constitutes your own work, please see me or a Teaching Fellow.

Accommodating Students with Disabilities

I and the Harvard Graduate School of Education strive to make all learning experiences accessible by providing reasonable accommodations for students with disabilities. If you anticipate or experience academic barriers based on your disability (including mental health, cognitive, learning, sensory, physical, chronic or temporary medical conditions) please contact KellyAnn Robinson, Ph.D., Senior Associate Director of Student Support Services in the Office of Student Affairs, as soon as possible, to explore what arrangements need to be made to assure access to course work and classroom learning experience. Please contact me if there are additional accommodations you would find useful.

Our use of electronic data on Google and Canvas

I am always trying to improve my teaching and your learning. As part of my effort to improve my teaching and your learning, I will use data from online resources to provide feedback to myself and, of course, to you.

You should be aware that all these resources record data from your interactions in their server logs. Sometimes this will seem obvious to you, such as when you submit an assignment, answer an assessment question, or ask a question. Other times it will seem less obvious, such as when you log in and download a handout. It is important for you to understand that, while all these data exist, I will always make it clear when and how I will use this data for grading.

You should also be aware that, like all educational data collected in the natural course of an educational process, these data may support future research endeavors, provided that your identity is masked, or exemptions required by federal law apply.

For more details, see Harvard's Canvas Privacy Policy, linked here.

(Boilerplate) Required Information for Students Included in a Zoom Classroom Recording

Note that my travel may require me to conduct a class session by Zoom. If I do, I typically record the class so that students can review the lecture later. The following boilerplate applies to those recordings:

- Instructors may use Zoom to record class sessions.
- If an instructor uses Zoom to record a class session, Zoom provides audio and visual indicators to inform you when the recording starts, stops, is in progress, and is paused or unpaused.

- You, as a student, may not yourself record a class session. (More generally, you should not record a class session using any other technology.)
- You have the option to appear in an audio-only mode, such that your webcam is disabled (turned off) during the class.
- You have the option to access Zoom class sessions using a pseudonym.
- In order to facilitate class participation, you are expected to communicate any pseudonym to your instructor in advance of the class.
- Links to class session recordings, if available, will be posted in the Zoom meetings section of the Canvas course webpage. More generally, any class recording must only be posted inside of the Canvas site for the course.
- Links to Zoom class session recordings will be removed and videos deleted at the end of the academic term.
- You may not disclose the link to a class session recording or copies of recordings to anyone, for any reason. It is available to your class only.

Frequently Asked Questions: Is S-052 right for me?

Can I attend synchronous sessions as a guest or an auditor?
Unfortunately not. Synchronous attendance at lectures and sections is restricted to enrolled students. Because I have explicit learning goals related to creating community among enrolled students, I do not allow formal auditing or guest attendance. Students interested in asynchronous resources may email my assistant to receive guest access to the course website. I allow this access in certain cases, such as for alumni and for interested students with conflicts who cannot otherwise enroll.

I am not a HGSE student. When should I file a cross-registration petition?
Cross-registration opens on August 25 at http://my.harvard.edu. I ask that you file your petition by Friday, September 1, at 12PM. When you cross-register, you may email me to let me know how you have satisfied the prerequisites, or I will reach out to you directly. There is no enrollment limit in the course.

I intend to cross-register. Do I need to demonstrate my prerequisites now?
Not before August 25. You should decide whether this course is best for you, including whether you meet prerequisites, below. Then you should file a cross-registration petition by Friday, September 1, at 12PM. I will then contact you to determine your eligibility. If you meet the requirements, I will approve you.

What are the prerequisites for S-052?
Successful completion of S-030 or S-040 (A- or A) or the equivalent: We expect you to have successfully, a) fit a regression model, b) with an interaction term, c) to real data, d) with a computer program, and e) interpreted the statistical significance of the coefficient for the interaction term as well as, f) written out the meaning of the coefficient for the interaction term in writing, g) in the context of a research question.

Is S-030 or S-040 a better choice for me?
Maybe! S-040 is offered in the fall by Dr. Joe McIntyre and assumes no statistical background. S-030 is offered in the spring by Dr. Hadas Eidelman and supports students with limited exposure to multiple regression. The depth of coverage of multiple regression in S-030 and S-040 is considerable. In contrast, coverage of multiple regression in S-052 is limited to a brief review. Students with limited past exposure who wish to develop real comfort and expertise with multiple regression will be better off in S-030 than in S-052. S-052 offers a much broader introduction to more advanced statistical methods but cannot compensate for a student's limited exposure to multiple regression on its own. Note: Students who take S-040 in the fall should enroll in S-052 in the spring, not S-030. You can see more here.

I just took an introductory statistics course (e.g., in SPH, BIO201 or ID201) this fall. Is that sufficient?
An A- or an A in a recent, rigorous introductory statistics course like BIO201 or ID201 will suffice as a prerequisite for S-052 if you have estimated and interpreted regression models with interaction terms as described above. However, S-030 remains complementary, and we strongly suggest that you consider it. Again, S-030 is a deep dive into applied multiple regression, and it builds analytical and interpretive skills that a typical introductory statistics class does not.

I earned a B+ in an introductory statistics course like BIO201 or ID201. Should I take S-052?
We do not recommend this. S-052 moves quickly, demands deep conceptual understanding, and covers several advanced topics. We recommend that students at this level take advantage of S-030 as an option to truly master foundational regression analysis first.

I don't meet the prerequisites, but I really want to learn survival analysis/multilevel modeling/principal components analysis. Should I take the course?
We do not recommend this. Our goal is not superficial acquisition of methods but deep conceptual mastery. For this, the foundations are necessary, and we recommend S-030 as a rigorous alternative.