

ALP 308 - Designing Experiments for Impact

Professor

Susan Athey

athey@stanford.edu

Faculty Assistant

Madelyn Dubon

gsb_athempa@stanford.edu

Course Assistants

Ryan Brennan

rtbrenn@stanford.edu

Thomas Cao

qitong@stanford.edu

Scheduled Class Meetings

MWTh 8:10-9:30am

Course Overview

This course will prepare students to design and execute high quality experiments that inform decisions about product innovation, in order to drive business outcomes and social impact. Students will learn a broad set of skills that will prepare them to be effective team members in settings where data is an integral part of decision-making.

The course will guide students to learn and share strategies for building effective teams, designing experiments, applying data analysis methods, and communicating them to inform organizational decisions.

This is a team-based course where students will work on a project to improve a product using experimentation. We will cover key considerations for designing and executing high-quality research for product innovation to drive business outcomes and social impact. Students will have the opportunity to apply methods from experimental design, causal inference, and machine learning to a real-world scenario provided by a partner organization. Lectures and tutorials will guide students through research and experiments, data analysis, experimental methods for estimating the impact of product features, as well as management consideration for the delivery of actionable research.

The course involves three weekly meetings. Lectures will focus on research methods and will provide examples of research outputs for students to discuss and evaluate. Labs will comprise technical training in experimental design and data analysis and structured team meetings.

This course is part of the GSB's new Action Learning Program, in which you will work on real business challenges under the guidance of faculty.

This course has been designated as a Cardinal Course by the Haas Center for Public Service. Cardinal Courses apply classroom knowledge to pressing social and environmental problems through reciprocal community partnerships. The units received through this course can be used towards the 12-unit requirement for the Cardinal Service transcript notation.

Prerequisites

Some experience with statistical analysis and the R statistical package is required. Students with an advanced understanding of tools and methods from data science and machine learning as well as a strong familiarity with Python, SQL, and other similar high-level programming languages are encouraged to enroll. Students who need a refresher on using R are encouraged to go through [R for Data Science](#) by Garret Golemund and Hadley Wickham, with particular attention to Chapters 1-8 and 26-30. R Video Tutorials from Stanford GSB are also available on the [Canvas course site](#).

Course Experience

Class Meetings

The class meets three times per week — Mondays, Wednesdays, and Thursdays. **You are required to attend class all three days.** (See the [Attendance Policy](#) section.)

During the first few weeks of the quarter, the class sessions will include lectures on topics essential for the project work. Students will also complete tutorials that will allow them to apply the data science methods discussed in the lectures.

After learning basic concepts and methods, student teams will begin working on their projects. Many class sessions will be dedicated to project team work, and you will have check-ins with Prof. Athey and the teaching team to discuss your project. There will also be lectures on advanced topics and on-demand lectures as the need arises from the project work. Some class time will also be dedicated to discussing or presenting your project progress with the other teams in the class.

There is class time dedicated for project teamwork; however, your team will also find it necessary to meet with each other outside of scheduled class times in order to complete your project.

You will need access to a computer during all class sessions in order to complete your project work. (See section [Laptop Requirements](#) below.)

Attendance Policy

All scheduled class sessions are mandatory. Given that this course is team-oriented, project-based, and involves a commitment to a sponsor organization, it is important to be present and on time for each class session.

If you will be absent, we ask that you notify Madelyn Dubon (gsb_atheypa@stanford.edu) as soon as possible and within 24 hours of advance knowledge of the absence, or immediately after an unexpected absence. Only absences that are considered excused (per [GSB policy](#)) will be considered excused; all other absences are unexcused. Failing to notify in advance of or immediately after an unexcused absence will count as two unexcused absences. Three unexcused absences will reduce your final grade by one grade. Four unexcused absences will lead to a failing grade.

Given the team-based nature of the course, as well as the work with partner organizations, tardiness is especially of concern. Any tardiness beyond 10 minutes will negatively impact your grade. Please take steps to inform colleagues if you are going to be late for a team meeting.

Laptop Policy

You will need access to a computer in class and during team meetings. You should only use your computer for class-related work during class.

Software

Much of the work will be in a web environment hosted by Stanford. We will be using RStudio Cloud throughout the course for instruction, tutorials, assignments, and project activities. To emulate a real-world data-intensive project environment, all work of record must be able to run in the web environment. More information will be posted on Canvas. You are not required to install any software on your computer; all of the software you need is available in the web environment offered by Stanford (R, RStudio Cloud, Google Drive, Canvas, Qualtrics).

Projects and Teams

Your project will be your primary focus in this course. You will work on your project during scheduled class sessions. Teams must also plan to spend several hours per week outside of class working on their projects.

Students will work in cross-functional teams of 5-6 students. The class will include a mix of students with different backgrounds and skills. Students will be assigned to teams based on a combination of factors including: expression of interest in projects, student experience, and student skills as they relate to building a multi-functional team. Each team will have at least one member with significant experience with data analysis. Teams will be formed and announced at the beginning of the quarter.

Together, the team will complete milestone deliverables during the quarter. The final deliverable will be a presentation that highlights the team's work and delivers actionable recommendations that draw from the team's research.

Because your experience in this course will be primarily in teams, effective teamwork is very important to your success in this class. We will be providing you with activities, structure, and other support throughout the quarter to promote good teamwork. Through your team project work, you will hone professional skills required for effective teamwork that will serve you well in the future.

Team Roles

While all students will work on tasks across roles, team members will have a specific set of responsibilities.

Each student will be assigned two roles on their team — a **lead** role and a **supporting** role. When you are assigned to a team, you will be assigned to your roles.

Lead Role: You will have a set of project tasks that you are primarily responsible for in your lead role. You will be assigned to your lead role because you have the relevant background and expertise to lead your project team in this area.

Supporting Role: You will work with your lead in the role to identify one or two tasks that you will be responsible for to help the lead on your team. You will also work with the lead in the role to ensure that the work is sufficient for the project. You will be assigned to your supporting role because it is related to a learning goal that you have.

Code of Conduct for Interacting with External Stakeholders

Completing the course project may require you to meet with stakeholders of the organization sponsoring the project. Through these interactions, you are ambassadors of the GSB. As such, we expect you to:

- Be courteous
- Arrive on time to scheduled meetings
- NOT cancel meetings
- Follow up on introductions made within 24-48 hours
- Treat the information you get during these meetings as information that you should not share with anyone who is not registered in the class.

Failure to adhere to this code of conduct can result in a failing grade in the course.

Ethics of Working with Data

- Data should be kept confidential, and raw data obtained from companies needs to remain on servers.
- Summary statistics (KPIs) derived from the data that would reflect on company performance, such as number of active users, measures of average user engagement, time spent with the application, etc. are also confidential and should not be shared outside of the class.
- Students will sign agreements for all projects in the course, thus are bound by any terms of the agreements for their own project as well as the other projects in the course.
- Projects are intended for educational purposes and should not be considered formal research projects. If students wish to pursue research for public release after the class ends, they must discuss their proposal with Professor Athey, and it may or may not be straightforward or possible to do so. There are different requirements for institutional approval and data sharing for research than for the educational purposes of the class. Moreover, additional use of data or results must comply with the project agreements.

Failure to adhere to these ethical guidelines may result in a failing grade.

Legal Agreements

In past years students have signed a “Compensation Agreement and Waiver,” as well as an “Approved User Acknowledgement” for each project in the course - including projects that students are not assigned to - acknowledging the following:

- You have read the Data Access Agreement signed by Stanford and the project sponsor, and you agree to uphold Stanford’s and the faculty’s obligations and responsibilities, in particular:
 - The project sponsor retains ownership of the data provided
 - You will use the data only for the purposes of the project
 - You will not transfer the data to any third party
 - You will protect any confidential information disclosed by the project sponsor
- You waive all compensation for work done as part of the course

- The project sponsors have rights to any intellectual property that may result from your project work.

Kinsey Haffner, an attorney from the University Office of the General Counsel, is available to answer your questions related to the agreement. If you would like to contact Kinsey, please notify the ALP team [gsb_actionlearning@stanford.edu].

Course Details

Grading

30% Participation

50% Project work

20% Individual assignments

Participation

- Attendance at all class meetings is mandatory. (See [Attendance Policy](#))
- Lectures are designed to permit time for discussion and interaction with the subject material. Students are expected to come to each class meeting prepared to comment on the topics covered by asking questions and responding to questions from instructors and other students.
- Students will be evaluated on their engagement with the course material and the quality of their contribution to class discussions.
- Students will be evaluated on their active participation in group exercises and discussions.

Project Work

Throughout the quarter, teams will work together to make progress on the data-driven project that they are assigned to. Team's will be expected to complete group assignments and deliverables including:

- Project Tutorials (to kickstart project data analysis)
- Project Plan Memo
- Progress Reports
- Intermediate Presentation
- Final Presentation

Individual Assignments

In addition to team project assignments, students will be expected to complete a few individual assignments during the quarter:

- Methods tutorials: These tutorials require students to work through a prepared data analysis notebook and display an understanding of the methods and ability to interpret the findings. Each tutorial will require approximately 2 hours of work, thus are meant to be a rapid method of

introducing students to methods covered in the course.

- Reflection assignments: These assignments will guide your reflection on your learning and performance, your team's performance, and your project. They will also help you synthesize what you are learning in the course and think about how what you are learning may be applied to future work.

Resources

Recommended books for this course:

- Taddy (2019) "Business Data Science"
- Glennerster and Takavarasha (2013) "Running Randomized Evaluations"
- Luca and Bazerman (2020) "The Power of Experiments: Decision Making in a Data-Driven World"

Course Schedule

See the [course site in Canvas](#) for assignments and required preparation for each class meeting.

Students with Documented Disabilities

Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Office of Accessible Education (OAE). Professional staff will evaluate the request, review appropriate medical documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty. The letter will indicate how long it is to be in effect. Students should contact the OAE as soon as possible since timely notice is needed to coordinate accommodations. Students should also send your accommodation letter to instructors as soon as possible. The OAE is located at 563 Salvatierra Walk (phone: 723-1066, URL: <http://oae.stanford.edu>).

In particular, students with academic accommodations related to assignment extensions and/or attendance are encouraged to reach out to the instructor at the beginning of the quarter about their specific needs. We will consult with your advisor at the Office of Accessible Education and with the Student Life Office to determine what will be feasible given the unique nature of this course.