

# Keck School of Medicine of USC

## PM 516a: Statistical Problem Solving (Biostatistical Consulting)

Units: 1  
Term: Spring 2025  
Location: TBD, Mondays 5:10-6:00pm  
Instructor: Trevor A. Pickering (tpickeri@usc.edu)

Office hour times and locations will be posted on Brightspace.

## Course Overview

### Course Description

This course will teach students about key principles in the field of biostatistical consulting and will help statisticians and data analysts develop the necessary skills for successfully interacting with non-statistician collaborators in a medical school environment. We will focus on two main goals: 1) developing the qualities necessary for an effective statistical consultant and 2) working with an investigator on an actual analysis problem (determining research questions and scope, formulating and implementing our analysis, and conveying our findings).

### Learning Objectives

Through this course, students will become familiar with the process of statistical consulting.

Students will learn to:

- Understand the importance of statistical consulting and its usefulness in the public health environment
- Apply techniques to improve their understanding of an unfamiliar topic and translate researchers' questions into a statistically testable set of hypotheses
- Evaluate the best statistical approaches to address collaborator's questions and apply such techniques
- Apply effective communication by clearly explaining statistical concepts
- Understand ethical considerations faced by statisticians
- Create analyses and results for dissemination to the client and other stakeholders

### Foundational Knowledge Needed

Prerequisites	PM510 or equivalent course covering intermediate statistical techniques (through basic regression/correlation analysis).
Recommended Preparation	The course may be more useful for students who have training in generalized linear modeling (e.g., logistic, Poisson regression). However, accommodations will be made to match students with a project that meets their skill level.

## Course Requirements

### Communication

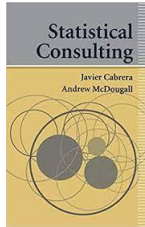
Brightspace (slides, data sets, assignment submission), USC e-mail (formal communication), Slack (informal communication)

## Technological Proficiency and Hardware/Software Required

Students must have proficiency in at least one statistical program, but may choose which use for this course (e.g., R, SAS, Stata, SPSS).

## Required Textbook

Note: Textbook may be available through the USC Libraries ([libraries.usc.edu](http://libraries.usc.edu))



Cabrera J, McDougall A. Statistical consulting. Springer Science & Business Media; 2002 Jan 2.

## Assessments

There are three broad categories of activities for this course:

- Skills development for consultants, which will prepare the student to interact with a client and improve the quality of their consultations.
- Skills development for presenting statistical results, which will improve the effectiveness of the statistician with being able to communicate results to their client.
- Participation in a real consultation as a group with an investigator client at USC.

Students will be assessed on the following:

### Required Trainings

Students will be working with real data from investigators at USC and must complete the appropriate required trainings. There are three trainings offered by CITI (<https://about.citiprogram.org/>) that must be completed by the third class session:

- CITI Biomedical Human Subjects
- CITI Responsible Conduct of Research
- CITI Research HIPAA
- Students may need to complete additional project-specific trainings

### Weekly Activities

Students will participate in weekly activities to improve their consulting and statistical analysis skills. To get the most of these activities, students must complete required pre-class preparation, which may include reading articles, excerpts from the textbook, or watching videos. Students will use the information from these pre-class preparation activities in the live session.

### Investigator Meeting

Students will be meeting with a collaborator at USC (e.g., from Keck School of Medicine, Children's Hospital Los Angeles, etc.) and will work on a project as a group. Any meeting with the investigator is mandatory. Because this course teaches skills applicable in a consulting setting, students must be on time for the meeting and must be an alert, active participant with their camera on.

## Final Presentation

The final day of class will be a presentation to the client collaborator. Students will present in groups, and each student must contribute to the presentation. At the end of the meeting, there will be a brief period for the students and client to provide feedback on the experience.

## Grading Breakdown

The course is graded credit/no credit and there is no point breakdown. Instead, students must successfully complete all the following:

Assignment	Criteria
Weekly Activities	Actively participate in at least 10 sessions. Half-credit will be given if the student attends but does not actively participate.
Required Trainings	Complete the required trainings by the third class session.
Investigator Meeting	Actively participate in the preliminary investigator meeting.
Final Presentation	Substantially contribute to the final project, including presenting part of the final group presentation.

## Course-Specific Policies

### Policy on Participation & In-Class Work

Participation is essential in a consulting environment - students are expected to do all pre-class activities to prepare them for the weekly session, and be an active, engaged participant during class.

### Assignment Submission

As many of the assignments pertain to preparation for in-class activities, late assignments are not accepted. However, there may be opportunities to make-up assignments in rare circumstances.

### Classroom Norms

1. **Take Charge of Your Learning** – As a graduate-level course, this is an opportunity to deepen your expertise and develop new skills in your academic field. Your success depends on active engagement and responsibility in the learning process. Feel empowered to ask questions, seek clarification, and communicate barriers early with the instructor. Make use of all resources available to you, including office hours, peer support, and additional readings.
2. **Be Present** – This is a practice-based course, and active participation is key to your success as a consultant. “Being present” means not just physically attending class sessions, but fully engaging in every class session through focus, contribution to discussions, and participation in activities. Your active involvement during class time will deepen your understanding of the field and help you develop useful skills.
3. **Practice Professionalism** – In this course, you will engage with your fellow students, but also external collaborators who are professionals in the field. It is essential to conduct yourself with professionalism in all interactions with them and with your fellow classmates.

This includes being punctual, communicating clearly and respectfully, and representing you and your program with integrity. Come to sessions prepared, showing respect for the time and expertise of others. The way you conduct yourself in these interactions will contribute to your growth and future success in the field.

### **Zoom Etiquette**

In this course we may meet with other faculty at USC, Keck School of Medicine, or Children's Hospital Los Angeles. This may include medical students, faculty researchers, or practicing doctors. Please come to consultations prepared, and on your best professional behavior.

### **Content Distribution and Recording Policies**

As befitting a consulting-type environment, synchronous sessions will not be recorded.

### **Course Evaluation**

End of semester surveys will gather student opinions about the course. Your opinion is valued and can make a difference in how this course is conducted in future semesters. Please give your honest and constructive recommendations for ways that the course can be improved. Additionally, there will be a mid-semester evaluation. The purpose of this evaluation is to identify any barriers to student success in the course.

### **Policy on the Use of AI Generators**

The use of AI (e.g., ChatGPT) can sometimes be helpful when conducting statistical analysis and interpreting results. However, in my experience the use of AI has led to incorrect, misleading, or otherwise false results in a surprising number of cases. As such, I discourage the use of AI as the "final arbiter" of conducting and interpreting data analyses. Keep in mind the following:

- You may use AI tools to help aggregate and/or explain ideas related to this course, and some assignments will ask you to use these tools to generate hypothetical scenarios for you to examine.
- Only use these tools if you have sufficient training and experience in the methods you are asking AI tools to help you with. The output of such tools must be examined through a critical lens, and using such tools blindly can be dangerous.
- Be mindful of when AI is most useful. Consider its appropriateness in each situation.
- Do not assume the information provided by AI tools is accurate or trustworthy. In fact, assume all information is incorrect unless you can verify its accuracy with another source. You will be responsible for any errors or omissions provided by the tool.
- If you use AI tools for any deliverable, you are expected to clearly attribute any material generated by the tool used.

## Alignment Grid

<b>Learning Objective</b> By the end of this course, students are expected to be able to:	<b>Learning Activities</b> The learning objective will be facilitated by:	<b>Assignment/Assessment</b> This learning objective skill is measured by:
Understand the importance of statistical consulting and its usefulness in the public health environment	Weekly activities emphasizing statistical consulting in public health	Weekly activity assessments and in-class discussion
Apply techniques to improve their understanding of an unfamiliar topic and translate researchers' questions into a statistically testable set of hypotheses	Weekly activities emphasizing translating research questions into statistical analyses	Weekly activity assessments
Evaluate the best statistical approaches to address collaborator's questions and apply such techniques	Weekly activities covering choosing the correct analytical method	Weekly activity assessments and group meetings
Apply effective communication by clearly explaining statistical concepts	Weekly activities outlining ways to communicate statistical concepts, investigator meetings	Weekly activity assessments, group meetings, and final presentation
Understand ethical considerations for statisticians	Weekly activities describing ethical considerations and scenarios	Weekly activity assessments and in-class discussion
Create analyses and results for dissemination to the client and other stakeholders	Weekly activities and meetings regarding the final project	Weekly activity assessments and final project

## Course Schedule

	Topic	Before Class	In Class
<b>Week 1</b> M 1/13	<b>Communication</b>	Relationships & Interactions Active Listening Tips That'll Make Others Open Up To You Textbook 2.1, 2.2	Communication Activity
<b>No Class</b> M 1/20	<b>MLK Holiday</b>		
<b>Week 2</b> M 1/27	<b>The Practice of Statistical Consulting</b>	What to Ask in A Consultation	Training Videos Discussion
<b>Week 3</b> M 2/3	<b>Exploratory Analysis</b>	Data Quality Control Exercise	EDA Review
<b>Week 4</b> M 2/10	<b>Practice Consultations</b>	The PICOT Format Textbook 4.1-4.4	Practice Consultations
<b>No Class</b> M 2/17	<b>President's Day</b>		
<b>Week 5</b> M 2/24	<b>Investigator Meeting</b>	Intake Form	Investigator Meeting
<b>Week 6</b> M 3/3	<b>Statistical Mistakes</b>	Ten Common Statistical Mistakes Guideline for Reporting Results	Statistical Mistakes Exercise
<b>Week 7</b> M 3/10	<b>Communicating Statistical Concepts</b>	The ADEPT Method 25 Analogies for Statistical Concepts Communicating Statistics to Non statisticians	Statistical Analogies Exercise
<b>No Class</b> M 3/17	<b>Spring Break</b>		
<b>Week 8</b> M 3/24	<b>Check-In I</b>	Exploratory Data Analysis Choosing the Right Statistical Test	Workshop
<b>Week 9</b> M 3/31	<b>Practice Consultations II</b>	Myers-Briggs Personality Test How Each Personality Type Communicates	Practice Consultations
<b>Week 10</b> M 4/7	<b>Presenting Statistical Information</b>	How to Graph Badly Rudiments of Numeracy	Graphs and Tables Exercise (MDM)
<b>Week 11</b> M 4/14	<b>The Statistician's Role</b>	STROBE and CONSORT	Communicating Results Video
<b>Week 12</b> M 4/21	<b>Check-In II</b>	Statistical Consulting Clients What to Expect When You Consult	Consulting Videos
<b>Week 13</b> M 4/28	<b>Ethics</b>	The Potti Case Chocolate Is Good	Ethics Discussion
<b>Week 14</b> M 5/5	<b>Final Presentation</b>		Presentation and Debriefing

## Statement on Academic Conduct and Support Systems

### Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” <https://policy.usc.edu/scampus-part-b/>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

### Support Systems:

*Student Counseling Services (SCS)* - (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. <https://engemannshc.usc.edu/counseling/>

*National Suicide Prevention Lifeline* - 1-800-273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. <http://www.suicidepreventionlifeline.org>

*Relationship and Sexual Violence Prevention Services (RSVP)* - (213) 740-4900 - 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. <https://engemannshc.usc.edu/rsvp/>

*Sexual Assault Resource Center*

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: <http://sarc.usc.edu/>

*Office of Equity and Diversity (OED)/Title IX compliance* – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. <https://equity.usc.edu/>

*Bias Assessment Response and Support*

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. <https://studentaffairs.usc.edu/bias-assessment-response-support/>

*The Office of Disability Services and Programs*

Provides certification for students with disabilities and helps arrange relevant accommodations. <http://dsp.usc.edu>

*Student Support and Advocacy* – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. <https://studentaffairs.usc.edu/ssa/>

*Diversity at USC*

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. <https://diversity.usc.edu/>

*USC Emergency Information*

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible, <http://emergency.usc.edu>

*USC Department of Public Safety* – 213-740-4321 (UPC) and 323-442-1000 (HSC) for 24-hour emergency assistance or to report a crime

Provides overall safety to USC community. <http://dps.usc.edu>