

PP 5376 Applied Quantitative Methods

Fall 2023

School of Public Policy
University of Connecticut

Class hours and location: Thursday 4:00-6:30 pm, HTB 219

Office hours: By appointment

Instructor: David Mitre Becerril (pronunciation: Me·tre Beh·se·reel)

Email: david.mitre@uconn.edu

Overview

This course will provide you with the application of the tools and methods of quantitative methods and research design. The course topics will cover three main modules. Module one will include the basics of research design and evaluation research, such as theory and concepts of statistical inference, measurement error, experimental design, and best practice research. Module two will cover applied concepts of basic descriptive statistics, probability theory, statistical inference, and hypothesis testing. Module three will familiarize the student with basic and advanced applications of Excel to analyze quantitative data in social science research. This course will prepare you for more advanced quantitative research methods courses, including PP 5331 Quantitative Methods for Public Policy and PP 5370 Applied Research Design.

Course objectives

This course will help you develop the skills to be a better consumer and translator of research based on applied quantitative methods. Specifically, at the end of the semester, students should gain:

- An understanding of the logic of social research.
- An understanding of the application of concepts of evaluation research.
- An ability to conduct basic statistical analysis.
- An ability to effectively present quantitative data.

Textbooks

There are **no required textbooks**. Students looking for additional material beyond class content may find the following useful:

- Mendenhall, W., Beaver, R., & Beaver, B. *Introduction to Probability and Statistics*. Cengage Learning
- Anderson, D., Sweeney, D., Williams, T., Camm, J., Cochran, J. *Statistics for Business and Economics*. Cengage Learning.

Use of technology and required software

We will use **Microsoft Excel** for all the statistical analysis and data visualization. Students are responsible for having Excel installed on their computers or devices by **the second week of class**. Microsoft Office (including Excel) is available for download for current UConn students at: <https://software.uconn.edu/microsoft-products-students/>.

Unless specified for in-class exercises or students' particular circumstances, electronic devices such as laptops and smartphones are not permitted in the classroom. Evidence suggests

electronic devices are likely to be used for non-class topics, distract your classmates, and affect your grades.¹

Course communication

All course announcements and materials (e.g., class notes, assignments, required readings) will be posted and made available on the course website on HuskyCT. For any class question, please **email** me only if my answer is expected to be a few sentences and **include “PP 5376” on the subject** for a timely response. Expect responses within 24 hours on weekdays and 48 hours on weekends. Come to office hours if you have any other class questions or concerns you want to discuss more broadly.

Class meetings

We will meet regularly in person and, on exceptional occasions, online, as described in the class plan. The class meetings will consist of lectures and in-class exercises.

Evaluation

Grades will be based on problem sets, quizzes, a group project, and participation.

- **Problem sets.** There will be **three take-home problem sets**. Students can work individually or pairs (submit only one problem set per group). Problem sets will be submitted electronically via the course website. The problem sets will consist of statistical problems solvable by hand or using Excel. They will be an application of the knowledge learned in class.
- **Quizzes.** There will be **eight take-home, open-book quizzes**. Students will solve these quizzes individually. There will be weekly conceptual quizzes starting the third week, except for the weeks when the problem sets are due. The quizzes require no or minimal calculations and are due one day before class. They will cover concepts from the previous week. Students can take the quizzes twice until the due date; the highest grade will be counted. The lowest student's quiz score will be dropped from the final grade at the end of the semester. The quizzes will assess your understanding of key concepts.
- **Group project.** The students will present a group project at the end of the semester. Students can work in groups of two or three people. Your grade will be the average of your group's grade and a peer-evaluation grade. The project will be a statistical analysis and presentation of a topic and dataset chosen by the group. The project will allow students to apply the skills learned in class. It will include three components that will be submitted at different points in time:
 - **Proposal.** The group will submit a one-page document stating their proposed research question conducive to statistical analysis and explaining their motivation, importance for social research, and data sources.
 - **Written report.** A five-page document answering the research question, providing key summary statistics to understand the study population and identifying any measurement errors and limitations, and a statistical appendix specifying the methods and variables used in the analysis.
 - **Presentation.** Effectively communicate and present the statistical analysis to the class, summarizing your most relevant findings and technical considerations. The presentation will be done in front of the classroom.

¹ <https://doi.org/10.1016/j.econedurev.2017.02.004>, <https://doi.org/10.1080/01443410.2018.1489046>,
<https://doi.org/10.1177/1469787417721382>

- **Participation.** Effective participation involves reading assigned readings before class and being prepared to discuss the material. Students must be present to participate; therefore, absences will impede your ability to participate and thus harm your achievement.

Evaluation method

Your grade will be determined as follows:

| Assignment | Percentage | Due date |
|-----------------|------------|--|
| Problem set 1 | 14 | 10/7 |
| Problem set 2 | 16 | 10/30 |
| Problem set 3 | 16 | 11/19 |
| Concept quizzes | 14 | 9/13, 9/20, 9/27, 10/11, 10/18 11/1, 11/8, 11/29 |
| Group project | | |
| Proposal | 5 | 11/4 |
| Written report | 10 | 12/2 |
| Presentation | 20 | 12/7 |
| Participation | 5 | 12/7 |
| Total | 100 | |

Late Assignments

All assignments are due at 11:59 pm EST on the due date. Late assignments will result in a 5% cumulative grade deduction per late day (e.g., 5% for one day late, 10% for two days late, 15% for three late days, etc.) up to a 100% deduction. Contact me ahead of time if there are any particular circumstances.

Re-grade policy

If you wish to have an assignment regraded, send me an email writing down the reasons within one week after you receive it. Only on-time requests will be considered. Re-grading an assignment can increase or decrease your grade. If there was an arithmetic error in adding points to your assignment, let me know immediately, and I will correct it. Generic concerns or explanations on how to solve an assignment will not lead to a regrade. Students are encouraged to contact me for advice on any class question.

Grading Scale

| Grade | Letter Grade | GPA |
|--------|--------------|-----|
| 93-100 | A | 4.0 |
| 90-92 | A- | 3.7 |
| 87-89 | B+ | 3.3 |
| 83-86 | B | 3.0 |
| 80-82 | B- | 2.7 |
| 77-79 | C+ | 2.3 |
| 73-76 | C | 2.0 |
| 70-72 | C- | 1.7 |

| | | |
|-------|----|-----|
| 67-69 | D+ | 1.3 |
| 63-66 | D | 1.0 |
| 60-62 | D- | 0.7 |
| <60 | F | 0.0 |

Students with disabilities

Please contact me to discuss academic accommodations needed during the semester due to a documented disability. The University of Connecticut is committed to protecting the rights of individuals with disabilities and assuring that the learning environment is accessible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let me know immediately to discuss options. Students who require accommodations should contact the Center for Students with Disabilities, Wilbur Cross Building Room 204, (860) 486-2020 or <http://csd.uconn.edu/>.

Academic integrity

Plagiarism, cheating, and other forms of academic misconduct will not be tolerated. All work that you submit for credit during this course must represent your own work and no one else's. Students should be especially careful in their writing to properly cite material and ideas taken from other sources. A link to the policy on scholarly integrity for graduate students may be found at <https://provost.uconn.edu/faculty-and-staff-resources/syllabi-references/>.

Disclaimer

Syllabus information may be subject to change, except for materials for purchase. The most up-to-date syllabus is located on the course website on HuskyCT.

Weekly course plan

| Week Date | Topic | Readings |
|----------------------|--|--|
| Week 1 8/31 | Introduction <ul style="list-style-type: none">▪ Syllabus review & expectations▪ In-class assessment test (not graded) Data and statistics <ul style="list-style-type: none">▪ Measurement scales▪ Types of variables▪ Types of data | |
| Week 2 9/7 | Data and statistics <ul style="list-style-type: none">▪ Data sources▪ Data preparation▪ Excel basic topics Graphical descriptive statistics <ul style="list-style-type: none">▪ Frequency distributions▪ Excel data visualization | Rosling, H. (2006) <i>The best stats you've ever seen</i> . TED talk. Video link . |
| Week 3 9/14 | Numerical descriptive statistics <ul style="list-style-type: none">▪ Measures of central tendency▪ Measure of dispersion▪ Excel descriptive statistics | |
| Week 4 9/21 | Probability <ul style="list-style-type: none">▪ Basic probability▪ General probability rules▪ Bayes' theorem | |
| Week 5 9/28 | Discrete probability distributions <ul style="list-style-type: none">▪ Discrete random variables▪ Binomial distribution | |
| Week 6 10/5 | Continuous probability distributions <ul style="list-style-type: none">▪ Continuous random variables▪ Normal distribution▪ t-distribution | |
| Week 7 10/12 | Sampling <ul style="list-style-type: none">▪ Sample vs population▪ Law of large numbers▪ Central limit theorem | |

| | | |
|-------------------|--|--|
| Week 8 10/19 | Interval estimation <ul style="list-style-type: none"> ▪ Large vs small samples ▪ Inference estimation ▪ Confidence intervals | |
| Week 9 10/26 | Hypothesis testing <ul style="list-style-type: none"> ▪ Hypothesis development ▪ Type I and II errors ▪ P-values ▪ Difference of means tests ▪ Excel t-test | |
| Week 10 11/2 | Experimental designs <ul style="list-style-type: none"> ▪ Theory ▪ Applications | |
| Week 11 11/9* | Advanced excel topics <ul style="list-style-type: none"> ▪ Effective data visualization ▪ Pivot tables ▪ Complex formulas ▪ Conditional formatting ▪ Data validation | |
| Week 12 11/16* | Research design <ul style="list-style-type: none"> ▪ Research questions ▪ Concepts and measurements ▪ Best practice research ▪ Causation | |
| Week 13 11/23 | <u>No class - Thanksgiving recess</u> | |
| Week 14 11/30 | TBD <ul style="list-style-type: none"> ▪ Review session** ▪ Additional advanced stats topics** **Depending on class progress | |
| Week 15 12/7 | Group presentations | |

*Remote, online class