



# Quantitative Methods for Social Science

Welcome to the course Quantitative Methods for Social Science. I have designed this syllabus to help you understand which topic and important questions we will consider in each week's class. I recommend that you use this document each week prior to undertaking the readings.

## Information

<b>Class:</b>	Quantitative Methods for Social Science (ENS-2352)
<b>Term:</b>	Winter Semester 2023/2024 (WiSe23/24)
<b>Seminar:</b>	Wednesdays 09:00–11:00 <b>Room:</b> CP18
<b>Office Hours:</b>	Virtual (Zoom), by appointment, email to arrange.
<b>Me:</b>	Dr. Mike Cowburn (he/him)
<b>Email:</b>	<a href="mailto:cowburn@europa-uni.de">cowburn@europa-uni.de</a>
<b>TA:</b>	Felix Trojan ( <a href="mailto:trojan@europa-uni.de">trojan@europa-uni.de</a> )
<b>You:</b>	Who you are isn't defined by records or bureaucracies, so if you prefer a name or a pronoun other than the one listed, please let me know.

## Course Description

This course has been designed to further your understanding and proficiency in the realm of social science research and quantitative analysis in three ways. First, it will provide with a comprehensive introduction to research methodologies and quantitative techniques within the social sciences. Second, it seeks to cultivate your critical thinking, enabling you to discern and assess the application of quantitative analysis both within and beyond academia. Third, this course will give you with the capability to address inquiries of social scientific significance using data.

Throughout the semester, we will examine the process of designing research. We will start by learning how to ask interesting questions and measure concepts important to social scientists and ensure our quantitative approaches are firmly grounded in theory. Having done so, we will move on to think about data, including the challenges of data collection and limitations of our chosen methodological toolkits for answering questions. We will look to



understand how we assess the validity of different methods, considering how we use statistical tools to evaluate ideas.

The cultivation of critical thinking is integral to this course. One aim of this course is to improve your ability to scrutinize and analyze the application and potential misuse of data by analysts, reporters, politicians, and policy advocates. Our syllabus will therefore encompass not only the development of your own technical skills such as coding but also the capacity to assess and interpret data. By the end of the course you will know how to recognize and interpret quantitation information and understand both the theoretical basis of quantitative reasoning and the practical application of quantitative data analysis.

This course caters not only to students with a specific focus on political science but also welcomes those from diverse social science disciplines who are interested in employing quantitative approaches to address pertinent issues and cultivate analytical proficiencies. By the end of the semester, you will have acquired the skills to tackle important problems using data-driven methods that transcend disciplinary boundaries.

## Communication

For short questions, email is the best way to contact me. I endeavor to respond to all emails within twenty-four hours Monday to Friday, I will respond to most emails considerably quicker than this. If I haven't responded within twenty-four hours, please feel free to email again.

If you wish to go over material covered in class, talk about connections between class material and other ideas, and so on, I will be happy to schedule time in my virtual office hours. Please email me to arrange. These discussions are generally student-led but I can help you formulate questions and point you in the direction of additional material for your term papers based on my sense of your strengths and interests. I encourage you to take advantage of this time and I will be flexible enough to accommodate most appointments.

I also encourage students to take advantage of my office hours to ask questions or discuss issues related to the course, the discipline of political science, or academia more generally. If you have any comments about or problems with the course itself, I encourage you to share them in my office hours.



# Course Requirements

This class is worth 2 ECTS credits. All students will contribute work during the semester and receive a grade based on their in-class participations and the completion of a series of problem sets assigned during the course.

## In-Class Participation

Attendance, participation, and preparedness are important to your success in this course (and, I find, in life generally). Therefore, it is expected that you come to each class prepared, having read, and thought about the course material, and ready to engage. Class time will be divided between lecture and in-class activities. The way you are going to learn best, especially when it comes to working with statistical software, is through practice. Active involvement in activities is crucial to success in this class and serves as an easy way to boost your participation grade (and therefore your overall grade). Class attendance is mandatory, to fulfil the attendance requirement, you must be physically (and mentally) present in our classroom, **and have brought your laptop to class**. We are going to be doing a lot of work on the computer, especially with statistical programming software. Please email me if you do not have access to a laptop and we will find a solution. Moreover, when in the classroom you are expected to contribute to discussion, be active in answering questions and be able to talk about the themes and topics at hand. Both your attendance and oral contributions will therefore count towards your final grade.

## Problem Sets

Nine problem sets will be assigned via Moodle with deadlines throughout the semester. In order to receive a grade in this class, **students must submit at least eight problem sets before the deadlines given**. For students who submit eight problem sets, an average grade will be given. For students who submit all nine problem sets, the lowest grade received during the semester will not count towards their average. Problem sets may be completed at any time from the start of the semester, but we will cover some of the materials and approaches needed to complete the problem sets during the semester so it likely makes sense to complete these in the final week before the deadline. We will discuss the problem set in class the day after the deadline meaning that late submissions will not be accepted under any circumstances. You are



welcome to collaborate with your peers in answering the problem sets but the final code that you submit should be your own.

## Grading Schema

- In-class participation (attendance & oral contributions): **50%**
- Problem sets: **50%**

## Civility Policy

In accordance with the philosophy of an institution for higher learning, the classroom should be a place where diverse ideas can be explored with respect to promote learning and growth. We each come from a variety of backgrounds and bring with us different experiences to the classroom. Regardless of whether we share similar opinions and beliefs, I expect us to remain respectful of each other as we explore ideas. I encourage and expect you to express yourself with reason, clarity, courtesy, and compassion. This ensures that we may be comfortable learning and growing without fear of judgment, ridicule, or intimidation. I welcome each of you as worthy contributors in the classroom. **Student conduct that disrupts the learning process will not be tolerated.** Similarly, if any student feels unsafe or discriminated against during in the class, please contact me immediately. While academic discourse should be intellectually challenging, it should never be discriminatory, and **it is my responsibility to ensure everyone feels safe and able to participate in our classroom.**

In the same spirit, we should adopt inclusive language both in our discussions and written work. In line with recent style guide changes from the Associated Press, *The New York Times*, *The Washington Post*, and others, students should capitalize “Black” when describing this racial group in their written work. “White” should also have a capital letter, in line with recommendations of the National Association of Black Journalists, except when it is an adjective (white nationalism etc.). Similarly, we should use terms that acknowledge the humanity of people we are discussing, recognizing that individuals are not defined by their conditions or circumstances; for example, “enslaved people,” not “slaves.” Gender neutral terms should be used both in discussions and written work, so “member of Congress” not “congressman.” **Racist, sexist, homophobic, or any other offensive terms will not be tolerated in the classroom, regardless of the context in which they are used.** More generally, we should reflect upon our positionality as researchers in our contributions. If



students have specific feedback on any of these points that they wish to discuss I welcome these conversations either directly or as part of our wider class discussions.

## Prior Knowledge & Resources

This is an introductory level course into quantitative methods in social science meaning that there are no prerequisites for participation. All levels of prior knowledge are therefore welcome in our classroom.

Throughout our course we will use the programming language R and the accompanying software R Studio. We will cover the installation of these resources in the first week of class but if you have a chance it would be fantastic if you could install both in advance of our first session. **You are expected to bring your laptop to class each week.**

### R

<https://cran.r-project.org/>

### R Studio

<https://rstudio.com/products/rstudio/download/>

We will also use two textbooks during the semester:

- Huntington-Klein, Nick. 2022. *The Effect: An Introduction to Research Design and Causality*. Chapman and Hall/CRC. <https://theeffectbook.net/>
- Llaudet, Elena, and Kosuke Imai. *Data Analysis for Social Science (DSS)*, 2022. <https://press.princeton.edu/books/hardcover/9780691199429/data-analysis-for-social-science>

*The Effect* is available for free online at the above website. We will discuss access options for *DSS* in our first session. Given that we will be using these books throughout the semester and all of the course readings will come from these texts you may want to consider purchasing physical copies of these books for your reading convenience, though digital versions are all that are required.

## Course Structure

Below is our schedule for the semester, depending on our progress through the course we may choose to expand or reduce certain sections. In such a scenario I will inform you of any changes sufficiently in advance. Each week we have one ninety-minute session. Most weeks we will



begin with a short lecture by me on the topic that we have read for the week's class followed by some practical lab work in R. **To reiterate, this means you need to bring your laptop to class each session.** For clarity, the pages for each reading are shown in parentheses. All readings are required.

### **Wednesday 18<sup>th</sup> October 2023 – Introduction**

- Expectations
- Discussion of Syllabus
- No readings, please download R & R Studio on your laptop before class.

### **Wednesday 25<sup>th</sup> October 2023 – Research Design & Intro to R**

*Effect:* Introduction, Chapter 1, 2 (xix–19)

*DSS:* 1–1.6 (1–14)

### **Wednesday 1<sup>st</sup> November 2023 – Variables**

*Effect:* Chapter 3 (19–45)

*DSS:* 1.7–1.10 (14–27)

### **Problem Set #1: Tuesday 7<sup>th</sup> November**

### **Wednesday 8<sup>th</sup> November 2023 – Describing Relationships**

*Effect:* 4 (45–67)

*DSS:* 2–2.7 (27–51)

### **Problem Set #2: Tuesday 14<sup>th</sup> November**

### **Wednesday 15<sup>th</sup> November 2023 – Descriptive Statistics**

*Effect:* no reading

*DSS:* 3–3.7 (51–96)

### **Wednesday 22<sup>nd</sup> November 2023 – Reading Week, No Class**

### **Problem Set #3: Tuesday 28<sup>th</sup> November**



## Wednesday 29<sup>th</sup> November 2023 – Linear Regression

*Effect:* 13 (175–226) – not whole chapter! (stop at 13.2.6 *Nonlinear Regression*)

*DSS:* 4-4.4.1 (98–113)

## **Problem Set #4: Tuesday 5<sup>th</sup> December**

## Wednesday 6<sup>th</sup> December 2023 – Beyond Linear Regression

*Effect:* 13 (226–266) – rest of chapter (13.2.6 *Nonlinear Regression* to end)

*DSS:* 4.6-4.9 (120–129)

## **Problem Set #5: Tuesday 12<sup>th</sup> December**

## Wednesday 13<sup>th</sup> December 2023 – Identifying Causal Effects

*Effect:* 5 (67–87)

*DSS:* 5-5.4.2 (129–153)

## **Problem Set #6: Tuesday 19<sup>th</sup> December**

## Wednesday 20<sup>th</sup> December 2023 – Validity

*Effect:* no reading

*DSS:* 5.5–5.7 (153–162)

## **Problem Set #7: Tuesday 9<sup>th</sup> January**

## Wednesday 10<sup>th</sup> January 2024 – Probability

*Effect:* no reading

*DSS:* 6–6.8 (162–196)

## **Problem Set #8: Tuesday 16<sup>th</sup> January**

## Wednesday 17<sup>th</sup> January 2024 – Hypothesis Testing

*Effect:* no reading

*DSS:* 7–7.7 (196–231)



## **Problem Set #9: Tuesday 16<sup>th</sup> January**

### **Wednesday 24<sup>th</sup> January 2024 – Fixed Effects & Diff-in-Diff**

*Effect:* 16, 18 (381–407; 435–469)

*DSS:* no reading

### **Wednesday 31<sup>st</sup> January 2024 – IV & RDD**

*Effect:* 19, 20 (469–555)

*DSS:* no reading

### **Wednesday 7<sup>th</sup> February 2024 – Housekeeping (if needed)**

No reading