

Computational Methods for Economists Syllabus

Spring 2027

Course

Econ 2020: Computational Methods for Economists

Meeting Times & Location

Monday and Wednesday, 1:30 pm - 2:50 pm

see Canvas for location

Instructor

Brendan Chapuis  

Teaching Assistant

[TBD: TA name] 

TA Office Hours:

[TBD: day and time]

[TBD: location / Zoom on Canvas]

Course Site

<https://brendanchapuis.com/Economics-2020-Spring-2027/>

Course Description

This course prepares students to conduct independent research by providing the necessary skills in programming, project organization, and the use of AI tools for research.

The course has two halves.

- **The first half is done without AI.** It covers version control, project organization, programming in R, and an introduction to Python. These are the skills you need to understand your own code and data, and to judge code and output that someone (or something) else produced.
- **The second half covers AI methods for research.** It starts with how large language models work and how to use them as a research tool, then turns to AI agents: tools that read your files, write and run code, and act on your project. The emphasis throughout is on checking results and keeping them reproducible. Agents make producing research output nearly free, but output is only useful once it has been checked and understood, and that work now has to be done on purpose.

By the end of the course students should be comfortable programming in the major languages used in economic research, producing their own work as a reproducible project, and using AI agents in a way they can verify.

Learning Goals

- Write clean, documented, reproducible code in R, with a working knowledge of Python
- Organize a research project with version control and a clear structure
- Understand how large language models work, and use them as a research tool
- Direct AI agents on research tasks, and verify what they produce
- Apply software tools and best practices to economic research projects

Schedule

The schedule is subject to change as the course progresses.

Click on the icons for links to the lecture slides, class feedback surveys, and assignments. Assignments marked with a day are due at 11:59 pm on that day.

Table 1: Class and Assignment Schedule

#	Date	Topic	Lecture Slides	Assignments Due	Class Feedback
1	1/27	Intro, Git & GitHub			
2	2/01	Project Organization & VS Code			
3	2/03	Git Branches & Pull Requests			
4	2/08	Base R			
5	2/10	R Data Wrangling: <code>tidyverse</code>			
	2/15	<i>No Class (Long Weekend)</i>			
6	2/17	<i>Guest:</i> Data Librarian [TBD: confirm]			
7	2/22	R Databases and APIs			
8	2/24	R Functions & Regressions		Proposal (Fri 2/26)	
9	3/01	R Data Visualization			
10	3/03	R Data Wrangling: <code>data.table</code> & Speed			
11	3/08	Python I: Basics			
12	3/10	Python II: <code>pandas</code>		Checkpoint (Fri 3/12)	
13	3/15	<i>Guest:</i> OSCAR High Performance Cluster [TBD: confirm]; Web Basics	 		
14	3/17	How LLMs Work			
15	3/22	LLMs as a Research Tool: APIs & Text Classification	APIs Local		
16	3/24	From Chatbots to Agents		Website (Fri 3/26)	
	3/29	<i>No Class (Spring Recess)</i>			
	3/31	<i>No Class (Spring Recess)</i>			
17	4/05	Directing Agents			
18	4/07	Reviewing Agent Work			
19	4/12	Midterm (in class)			

#	Date	Topic	Lecture Slides	Assign-ments Due	Class Feed-back
20	4/14	Reproducible Documents with Quarto		AI Replication (Fri 4/16)	
21	4/19	Checking Results: Tests & Independent Implementations			
22	4/21	Research Design with Agents			
23	4/26	Final Presentations		Final Project	
24	4/28	Final Presentations			

We will not use the final exam slot given by the registrar. Please use the time to study for your other finals!

Class Feedback

Each lecture will have an accompanying survey for students to fill out (see the schedule). The survey will ask about comprehension of topics covered in the lecture and will have open ended space for questions. These assignments are graded for completion only and are meant as a way to judge if any material needs to be covered again in more detail. Do not fill these out if you miss a class, as they are meant to reflect participation in the class.

Assignments

Research Proposal

Early in the semester you will propose the research project you will work on for the rest of the course. The proposal describes a research question and a data source you have already opened, and includes a first pull of the data with R, committed to your project repository. The proposal is done without AI.

Final Project Checkpoint

Before spring recess you will submit a cleaned dataset and one descriptive figure for your project, made with R or Python without AI. The checkpoint is graded for completion and counts toward the final project.

Personal Website

Every academic should have a website. You will build a personal academic website with an AI agent and host it on GitHub Pages. We will start it together in class.

Midterm

An in-class exam on the first half of the course: R, Python, Git, and project organization. It is taken without AI or internet access. Most of the exam covers R.

AI Replication

You will use an AI agent to reproduce one table or figure from a published paper's replication package, chosen from a list I provide. You will submit the reproduced result, the agent's session transcript, and a short log of what matched, what you checked, and what the agent got wrong.

Final Project

The final project builds on your proposal. You will carry your project forward with AI agents, write it up as a reproducible **Quarto** document in which every number, table, and figure is produced by code, and present it in class during the last week. You will also submit your agent session transcripts and a log of the checks you ran.

Problem Sets

Optional problem sets accompany the lectures. They are not graded, and solutions will be posted. They are the best way to practice for the midterm.

AI Policy

First half (through the 3/15 class): no AI. Do not use AI tools (e.g., ChatGPT, Claude, Google Gemini, GitHub Copilot, or AI features in your editor) for coursework in the first half, including the research proposal and the final project checkpoint. The point of the first half is to build the skills you will need to judge AI output later, and those skills only come from doing the work yourself.

Second half (from the 3/17 lecture on): AI expected. You will use AI tools, including agents, for the website, the AI replication, and the final project. You are responsible for

everything you submit. Submit your agent session transcripts where an assignment asks for them, and be able to explain any code or result in your work.

Grading

Each assignment will be graded out of 100 points.

Table 2: Assignment Weights

Assignment	Weight
Class Feedback	15%
Research Proposal	10%
Personal Website	5%
Midterm	25%
AI Replication	10%
Final Project	35%

The final project grade includes the checkpoint, the paper, and the presentation.

Letter grades will be given according to the following rubric:

Table 3: Letter Grade Calculation

Letter Grade	Numeric Grade
A	[90, 100]
B	[80, 89)
C	[70, 79)
NP	[0, 69)

Late assignments will be penalized 10 points per day late. Late final presentations will lose full points, given the need to present in class. If you contact me ahead of time explaining why you need an extension, I may be able to accommodate.

Credit Hours

You are expected to spend 180 hours on this course. You will spend approximately 32 hours in lectures, 60 hours on readings, review, and the optional problem sets, 15 hours preparing for the midterm, and 73 hours on the graded assignments (about 40 on the final project).

Accessibility and Accommodations Statement

Brown University is committed to full inclusion of all students. Please inform me early in the term if you may require accommodations or modification of any of course procedures. You may speak with me after class, during office hours, or by appointment. If you need accommodations around online learning or in classroom accommodations, please be sure to reach out to [Student Accessibility Services \(SAS\)](#) for their assistance (sas@brown.edu, 401-863-9588). Undergraduates in need of short-term academic advice or support can [contact an academic dean](#) in the College by emailing college@brown.edu. Graduate students may contact one of the deans in the Graduate School by emailing graduate_school@brown.edu.

Acknowledgements

Material in this course comes from many locations, but I am especially thankful to the lecturers for this course before me, [Matthew DeHaven](#), [Michael Neubauer](#), and [Shunsuke Tsuda](#) for sharing their materials.

The framing of the second half draws on [Scott Cunningham](#)'s talk "AI Methods for Research Workers" (2026).

I also want to acknowledge the excellent [lecture slides](#) by [Grant McDermott](#) for teaching a course on R at the University of Oregon.