

UNIVERSITY OF COLORADO AT BOULDER - DEPARTMENT OF ECONOMICS  
ECON 4818 - INTRODUCTION TO ECONOMETRICS  
PROFESSOR CARLOS BRUNET MARTINS-FILHO  
SPRING 2024

**Office.** Economics Building 105.

**Meetings.** MWF 10:10 AM - 11:00 AM at MUEN E432.

**Office hours.** M 8:00 AM - 10:00 AM. If you need an appointment outside these hours send an email to [carlos.martins@colorado.edu](mailto:carlos.martins@colorado.edu) and I will try to accommodate your request.

**Prerequisites.** ECON 3070 and ECON 3818 or one of the following approved statistics substitutes: APPM 4570, CHEN 3010, CSCI 3022, CVEN 3227, MATH 3510, MATH 4520, STAT 3100, STAT 4000, STAT 4520 (all minimum grade C-).

**Class URL.** <http://spot.colorado.edu/~martinsc/4818.html>.

**Course description and objectives.** This course has two main objectives: 1) introduce you to estimation and testing for the multivariate linear regression (MLR) model under classical assumptions; 2) consider the estimation and testing of the MLR model when some of these classical assumptions are violated. Our emphasis will be on the theoretical aspects of estimation and testing with a secondary interest on applications and empirical questions.

**Grades.** Your course grade will be determined by two midterms and a final examination. I will assign homework questions. Answering these homework questions correctly is critical for successful performance on the midterms and final examinations. The homework questions will not be graded, but answers will be provided during the class meeting preceding midterms 1, 2 and the final examination. The homework sets and answers will be posted on the class website given above. The table below lists all evaluations, provides dates, and points.

Evaluation	Points	Date and time
midterm 1	30 points	02.19, 10:10 AM - 11:00 AM
midterm 2	30 points	03.22, 10:10 AM - 11:00 AM
final	40 points	05.04, 4:30 PM - 7:00 PM

**Note.** There are no make-up exams. If you miss one of the midterms, your grade on the final exam will be worth 70 percent of your course grade. If you miss both midterms, your grade on the final exam will be worth 100 percent of your course grade.

**Observations.** Some class meetings will be devoted to the implementation of the estimation and testing procedures we discuss in class. This will involve the use of a numerical/statistical software. The software we will use is called MATLAB. It is available at various computer laboratories on campus. MATLAB is easy to learn and is extensively documented.

**Textbook.**

Wooldridge, J., 2018, *Introductory econometrics: a modern approach, 7th edition*. South-Western Cengage Learning, OH.

**Topics and Readings.**

The Math Refresher A - Basic Mathematical Tools in the textbook is pre-requisite knowledge for this course. Study and/or refresh your knowledge of its content.

All readings, chapters and sections are from the textbook. It is also important to take good notes in class. Some of what I write on the blackboard will not be in the book.

1. The nature of econometrics and economic data: chapter 1 and handout called **Econometrics**
2. Math Refresher B - Fundamentals of probability
3. Math Refresher C - Fundamentals of Mathematical Statistics
4. The simple linear regression model and the least squares estimator: chapter 2.
5. Advanced Treatment D - Summary of matrix algebra
6. Multiple linear regression (MLR) model and the least squares estimator: chapter 3 and Advanced Treatment E - The linear regression model in matrix form
7. Hypothesis testing for the MLR model under normality: chapter 4.
8. Asymptotic properties of the least squares estimator and Hypothesis testing for the MLR model under non-normality: chapter 5.
9. Data scaling, dealing with data transformations, regressor selection, goodness-of-fit and prediction: chapter 6.
10. Regression with binary variables: chapter 7.
11. Accounting for heterocedasticity: chapter 8.
12. Functional form misspecification, regressor misspecification, measurement error: chapter 9, sections 9.1-9.4.
13. Instrumental variable estimation: chapter 15.

### **Important information.**

- Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. For more information, see the policies on **classroom behavior** and the **Student conduct and conflict resolution**.
- As a matter of public health and safety due to the pandemic, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements and all public health orders in place to reduce the risk of spreading infectious disease. Students who fail to adhere to these requirements will be asked to leave class, and students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct and Conflict Resolution. For more information, see the policy on classroom behavior and the **Student Code of Conduct**. If you require accommodation because a disability prevents you from fulfilling these safety measures, please follow the steps in the “Accommodation for Disabilities” statement on this syllabus.

As of August 13, 2021, CU Boulder has returned to requiring masks in classrooms and laboratories regardless of vaccination status. This requirement is a temporary precaution during the delta surge to supplement CU Boulder's COVID-19 vaccine requirement. Exemptions include individuals who cannot medically tolerate a face covering, as well as those who are hearing-impaired or otherwise disabled or who are communicating with someone who is hearing-impaired or otherwise disabled and where the ability to see the mouth is essential to communication. If you qualify for a mask-related accommodation, please follow the steps in the "Accommodation for Disabilities" statement on this syllabus. In addition, vaccinated instructional faculty who are engaged in an indoor instructional activity and are separated by at least 6 feet from the nearest person are exempt from wearing masks if they so choose.

Students who have tested positive for COVID-19, have symptoms of COVID-19, or have had close contact with someone who has tested positive for or had symptoms of COVID-19 must stay home. In this class, if you are sick or quarantined, please send me an email explaining your absence due to illness or quarantine.

- If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to me during the first two weeks of class so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or by e-mail [dsinfo@colorado.edu](mailto:dsinfo@colorado.edu) for further assistance. If you have a temporary medical condition, see [Temporary Medical Conditions](#) on the Disability Services website.
- CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.
- Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, if the midterm, final or homework due dates prevent/inhibit you from exercising your rights to religious observance, please inform me by August 29, so that reasonable accommodations can be made. See full details at [campus policy regarding religious observances](#).
- The University of Colorado at Boulder is committed to maintaining a positive learning, working, and living environment. The University of Colorado does not discriminate on the basis of race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status in admission and access to, and treatment and employment in, its educational programs and activities. (Regent Law, Article 10, amended 11/8/2001). The University of Colorado at Boulder will not tolerate acts of discrimination or harassment based upon Protected Classes or related retaliation against or by any employee or student. For purposes of this The University of Colorado at Boulder policy, "Protected Classes" refers to race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, or veteran status. Individuals who believe they have been discriminated against should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Student Conduct (OSC) at 303-492-5550. Information about the ODH, the above referenced policies, and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at <http://hr.colorado.edu/dh/>
- All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All

incidents of academic misconduct shall be reported to the Honor Code Council [honor@colorado.edu](mailto:honor@colorado.edu); 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at [www.colorado.edu/policies/honor.html](http://www.colorado.edu/policies/honor.html) and at <http://honorcode.colorado.edu>.