University of Colorado at Boulder
Department of Economics
Syllabus
ECON 7800 (Math Camp) - July/August 2026
Professor Carlos Brunet Martins-Filho

Office. Economics Building 105

Meetings. From July 28 until August 17. Meetings will be held every weekday from 9:00 AM to 12:00 PM at Econ 119.

Office hours. Office hours will be held on the following days,

July 30 and August 4, 6, 11 and 13 from 3:30 PM to 5:00 PM.

Class URL. https://spot.colorado.edu/~martinsc/mathcamp.html

Prerequesites. Students must be prequalified by the Department of Economics before enrolling in Math Camp.

Objectives. The main purpose of Math Camp is to introduce and review basic mathematical concepts and results necessary for successful completion of first-year PhD economics courses.

Grades. Your course grade depends on your performance on a final examination that will be held August 17. I will assign problem sets but they will not be graded. They are a good way to exercise your knowledge of the concepts and results we discuss in class. The questions on the problem sets are similar to those that will appear on the final examination.

Notes and supporting books.

Class notes are available at the class URL. What follows is a short list of supporting books.

a. **Analysis**

1. Apostol, T., 1974, Mathematical Analysis, Addison Wesley, New York.
2. Bartle, R., 1966, Elements of Integration, John Wiley and Sons, New York.
3. Kolmogorov, A., and S. Fomin, 1975, Introductory Real Analysis. Dover Publications, new edition.
4. Royden, H., 1988, Real Analysis. Macmillan, New York.

b. **Optimization and vector spaces**

1. Luenberger, D., 1969, Optimization by vector space methods. John Wiley and Sons, New York.
2. Sundaram, R., 1996, A first course in optimization theory. Cambridge University Press, Cambridge.

c. **Matrices and linear algebra**

1. Bernstein, D. S., 2005, Matrix mathematics. Princeton University Press, Princeton, NJ.
2. Gentle, J. E., 2007, Matrix algebra. Springer, New York, NY.

d. **Mathematics for economists**

1. Corbae, P. D., Stinchcombe, M. B., and Zeman, J., 2009, An introduction to mathematical analysis for economic theory and econometrics. Princeton University Press, Princeton NJ.

2. De la Fuente, A., 2000, Mathematical methods and models for economists. Cambridge University Press, Cambridge.

Topics.

1. Algebra: vector spaces; subspaces; linear dependence and bases; orthonormal bases; dimension of a vector space; normed vector spaces; metric spaces; inner product spaces; linear functions; image, rank and kernel of linear functions; inverse of linear functions; isomorphisms; the matrix of a linear function; bounded linear functions; linear operators; invertibility; determinants, eigenvalues and eigenvectors; orthogonal complements and projections; determinants; quadratic forms.

2. Analysis: basic set theory; relations and functions; open and closed sets; compactness; convergence of sequences and functions; continuity of functions; Cauchy sequences; completeness; Banach spaces; Bolzano-Weierstrass Theorem; Heine-Borel Theorem; Intermediate Value Theorem; correspondences; Berge's Maximum Theorem.

3. Calculus - Differentiability; derivatives; partial derivatives; gradients and Hessians; differentiability and extrema; Gâteaux and Fréchet differentiability; Mean Value Theorem; Taylor's Theorem; chain rule for differentiation; Inverse and Implicit Function Theorems; mathematical programming; concavity, convexity and related concepts; Envelope Theorem; measure spaces; Riemann integration; integration by parts; change of variables in integration; First and second fundamental theorems of integral calculus.

Important information.

- If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner 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 dsinfo@colorado.edu for further assistance. If you have a temporary medical condition or injury, see Temporary Medical Conditions under the Students tab on the Disability Services website.

- Students and faculty each have responsibility for maintaining an appropriate learning environment. 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 Code of Conduct.

- The University of Colorado at 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.

- All students enrolled in a University of Colorado at Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu); 303-492-5550). Students found responsible for violating the academic integrity

policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the Honor Code Office website.

- The University of Colorado at Boulder is committed to fostering a positive and welcoming learning, working, and living environment. The University of Colorado at Boulder will not tolerate acts of sexual misconduct, intimate partner abuse (including dating or domestic violence), stalking, or protected-class discrimination or harassment by members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or cureport@colorado.edu. Information about the OIEC, university policies, anonymous reporting, and the campus resources can be found on the OIEC website.

  Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources.

- 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 final examination date prevents/inhibits you from exercising your rights to religious observance, please inform me by August 3, 2020 so that reasonable accommodations can be made. See campus policy regarding religious observances for full details.