STATISTICS 40991 SYLLABUS
Fall 2026

Ph.D. Program in Social and Political Sciences
Bocconi University

Instructor	Bernard "Chip" Cole, PhD bernard.f.cole@gmail.com
Office Hours	By appointment. Location: TBA
Description	This course further discusses the fundamental concepts of statistical inference and modeling, with the aid of computer simulations (using the R program) throughout the course to understand deeply and apply the statistical concepts. The course is compulsory for the PhD program in *Social and Political Sciences*. Interested students from other PhD programs may also enroll.
Recommend text	Pruim, R.J. (2018). *Foundations and Applications of Statistics: An Introduction Using R* (second edition). American Mathematical Society. Providence, RI. USA. This book is optional. Class notes will be made available after the lectures. These notes, combined with your own, will ordinarily be sufficient for successful completion of course. The text is recommended for learners who might benefit from having another resource available.
Meeting times	Monday, Wednesday, Friday 10:15–11:45 a.m.; 2 October to 30 October (12 meetings)
Classroom	TBA
Assignments	There will be two projects, a midterm project and a final project—due dates to be announced
Examinations	None
Grade	Your course grade will be based 30% on class participation, 35% on the midterm project, and 35% on the final project
Website	TBA
Software	R available at https://www.r-project.org/. R is free-of-charge, open-source software. You might also wish to install the R Studio, which provides an easy-to-use interface (https://posit.co/download/rstudio-desktop/)

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Class Schedule

Week starting	Topic(s)	Reading (text sections)
28/9	Introduction to the statistical software environment R and to the use of computer simulations for the illustration of properties of procedures	4.1, 4.3
5/10	Principles of frequentist statistical inference: sampling distributions (in theory, simulations, and practice). Experimenting with convergence in probability and in distribution	2.3, 2.7.1, 3.1, 3.2, 3.4.1, 4.4.1
12/10	Properties of point estimators, confidence intervals, tests of hypotheses. The (simple) linear model: illustration of the joint distribution of parameter estimators	4.5, 4.7, 4.8, 4.9
19/10	Review of the multiple linear model with matrix algebra: testing nested models, and statistical inference.	6.1, 6.2, 6.3
26/10	General statistical models: Maximum Likelihood estimation and statistical inference	5.1, 6.4, 6.5, 6.8