

MODULE SPECIFICATION • ELECTIVE

Monte Carlo Simulation: Methods and Design

The purpose of this course is to provide students with an introduction to Monte Carlo methods as used in econometrics. Most research papers use Monte Carlo, and the course aims to understand its foundations, use and limitations. The Ox language is used to understand and create Monte Carlo experiments. There are no prerequisite modules required before taking this course.

10	15h	85h	100h
CREDITS	CONTACT HOURS	PRIVATE STUDY	TOTAL STUDY

COURSE CONVENOR

NAME Dr Jurgen A. Doornik

OFFICE By appointment — please email to arrange a convenient time

COURSE STRUCTURE

Econ 7915 is a 10-credit course and students are expected to input approximately 100 hours of study. The total number of contact hours is 15 hours, leaving 85 hours for private study. Delivery is by lectures — 15 hours across the first three weeks of term, comprising 10 hours of lectures and 5 hours of tutorials. Optional clinics run on the last day of the course.

During private study, balance the course material (the primary source) against the recommended textbooks: think critically about how these fit into the body of knowledge, perform the exercises, complete coursework and revise. You can expect to perform well only by working consistently through the year.

MODULE PROGRAMME

LECT.	TOPIC	SESSION CONTENT
02	Introduction to Monte Carlo	— Introduction to Monte Carlo experiments in econometrics; PcNaive
03	Implementing Monte Carlo	— Designing and implementing Monte Carlo experiments in PcNaive and Ox; parallel computation
04	Replicating and extending Monte Carlo experiments	— Extending the scope of experiments, replication of some published experiments
05	Advanced topics and conclusions	— Further uses of Monte Carlo methods, including the bootstrap

KEY SKILLS

By the end of this course, students should have some knowledge and understanding of:

- Basic pseudo random number generation, sampling from statistical distributions
- Basic principles of numerical computation
- Uses and limitations of Monte Carlo experiments
- Statistical properties of Monte Carlo experiments
- Using PcNaive to design experiments for econometrics
- Understand the output from PcNaive
- Bootstrapping

DESIRED OUTCOMES

By the end of this course, students should be able to:

- Interpret Monte Carlo results
- Implement advanced experiments using PcNaive
- Implement basic experiments in the Ox language, and use parallelization effectively
- Understand basic principles and limitations of the bootstrap
- Present, interpret and analyse information in numerical form
- Understand some of the basic principles of Monte Carlo estimation

ASSESSMENT

WEIGHTING	100% coursework
ISSUED	End of week 6
DUE	End of week 10 — four weeks for completion
SUBMISSION	Electronically via the Moodle site for this course
FEEDBACK	Returned within 4 weeks of the deadline, as marker's notes appended to the PDF of your coursework

Marking criteria and penalties are set out in the Economics Undergraduate Handbook and the general course information paper, available via the Current Student page of the university website under Academic Regulations.

COURSE TEXT & RECOMMENDED READING

Book chapters and online material. For the tutorials you will also need access to the OxMetrics system for PcNaive and the Ox statistical programming language; the course also takes a brief look at aspects of R, Python and GNU Octave. Copies of the lecture slides are made available on the course web pages, together with additional material and course announcements.

- Doornik, J. A. (2006). The Role of Simulation in Econometrics. Chapter 22 in Palgrave Handbooks of Econometrics: Vol. 1 Econometric Theory
- Doornik, J. A. and Hendry, D. F. (2001). Interactive Monte Carlo Experimentation in Econometrics Using PcNaive. Timberlake Consultants Press
- Hendry, D. F. (1984). Monte Carlo Experimentation in Econometrics. Handbook of Econometrics, Volume II