

Econ 609 Discrete Choice Models 2022-2023

COURSE AIMS & OBJECTIVES, KEY SKILLS AND LEARNING OUTCOMES

Course Aims & Objectives: The course covers the estimation and usage of discrete choice models that are increasingly estimated using simulation methods. Discrete choice models are used to examine the choices of individual consumers, households, firms and other agents. The course will cover the main discrete choice models and a variety of specifications that build on these models, as well as standard maximum likelihood and simulation-based estimation techniques. Discrete choice models are applicable in many fields, including energy, environmental studies, health, labour, marketing, urban economics and transportation.

Completion of Foundations of Econometrics (Core 1) is a prerequisite for taking this module.

Key Skills: By the end of this course, students should know and understand:

- The main types of discrete choice models in the literature
- The specification of these models
- The methods used to estimate and test the models
- The interpretation of the model estimates
- The advantages and disadvantages of different models

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

- Specify appropriate discrete models for a range of applications (paying appropriate attention to the issues of identification and scaling, correlated choices and unobserved heterogeneity, and endogeneity)
- Estimate the models using Stata and/or Python
- Present, interpret and analyse the estimation results

Note: Discrete choice models may be estimated using a range of commercial (e.g., Matlab, NLogit, SAS, Stata) and free (e.g., Python and R) software packages. The lectures and tutorials will use Stata and the Biogeme (Python) package. Students are welcome to use other software for tutorials and course work.

COURSE STRUCTURE

Econ 609 is a 10 credits course and therefore students are expected to input approximately 100 hours of study into the course. The total number of contact hours on Econ 609 is 15 hours. This leaves 85 hours for private study.

The course will be delivered in the form of 10 hours of lectures and 5 hours of tutorials in weeks 2 to 4 weeks of the term. There will be optional clinics on the last day of the course.

During your private study you should strike a balance between reading the course material (which is the primary source of information) and the recommended textbooks, thinking critically about how these fit in to the body of knowledge on the subject and about how our level of knowledge can be improved, performing exercises, completing coursework and revising for examinations. You can expect to perform well on this course only if you work consistently through the year.

COURSE CONVENOR

Dr Anthony Murphy.

LECTURERS CONTACT INFORMATION (Including Office Hours)

Email: anthony.murpy@dal.frb.org. Office hours are available by appointment (please email to arrange a convenient time).

COURSEWORK ASSESSMENT

The assessment is 100% coursework based. The coursework will be assigned in Week 5, and students will have four weeks to complete it. Coursework must be submitted electronically through the Moodle site for this course: <https://mle.lancs.ac.uk/course>. Login using your regular Lancaster University access details. This opens a page headed MLE: My home.

The format of the submission is as follows.

- The submitted file must be in pdf format with using the naming convention **stud#_studname_cw_cw#.pdf** where stud# is your student number, studname is your name in the format surname_name, cw# is cw1, cw2 etc. according to the piece of coursework submitted.
- For example, a student named Alpha Bravo with student number 111 would submit a first coursework file named 111_bravo_alpha_cw1.pdf.
- The maximum file size is 2Mb, so figures resolution should be adjusted accordingly.

Note: Your work will be screened using software designed to detect plagiarism. You should not rely upon someone else to submit your coursework.

FEEDBACK ON COURSEWORK:

The coursework will be marked and returned to students within 4 weeks of the submission deadline. Feedback will consist of marker's notes appended to the pdf of your coursework.

MARKING CRITERIA AND PENALTIES

Marking criteria can be found in the Economics Undergraduate Handbook and the general course information paper. An electronic copy of this can be found via the Current Student page of the university website then follow the Academic Regulations link:

<https://gap.lancs.ac.uk/ASQ/QAE/MARP/Documents/UG-Assess-Regs.pdf>

FINAL MARK INFORMATION

This course is assessed 100% by means of coursework. The final mark is the average of the coursework marks.

COURSE TEXT AND RECOMMENDED READING

The main textbook is Train (2009), *Discrete Choice Models with Simulation* (below). A complete on-line course with textbook, videotaped lectures for web-viewing, problem sets, and links to relevant articles is available here: <https://eml.berkeley.edu/~train/distant.html>.

- Hensher, David A., Rose, John M., Greene, William H. (2015), **Applied Choice Analysis**, 2nd Edition, Cambridge University Press. A useful textbook with many examples using NLogit, especially if you have to design stated preference discrete choice experiments.
- Train, Kenneth E. (2009), **Discrete Choice Models with Simulation**, 2nd Edition, Cambridge University Press.

Additional readings will be provided during the lectures.

COURSE OUTLINE/LECTURE SCHEDULE

- Lecture 1: Properties of Discrete Choice Models (Train, Chap. 2), Conditional Logit Models (Chap. 3), Stated vs Revealed Preferences (Chap 7), Estimation (Chap 8)
- Lecture 2: Generalized Extreme Value / Nested Logit Models (Chap 4)
- Lecture 3: Probit Models (Chap. 5), Drawing from Densities (Chap 9), Simulation Assisted Estimation (Chap 10)
- Lecture 4: Mixed Logit Models (Chap 6), Bayesian Estimation (Chap 12), EM Algorithm (Chap 14)

- Lecture 5: A selection of the following topics: Ranked Data, Ordered Responses, Contingent Valuation, Dynamic Optimization (Chap 7), Endogeneity (Chap 13), Machine Learning (time permitting).