

Discrete Choice Analysis: micro-econometrics and machine learning approaches

Date:	6 – 9 February 2024
Time:	10:00 – 16:00 h.
Location	TU Delft, faculty TPM
Course leaders:	Prof. dr. Stephane Hess and Dr. Sander van Cranenburgh (DUT)
Days:	4
ECTS:	2 ECTS (attendance, including assignments)
Course fee:	Free for TRAIL/Beta/OML members, others please contact the TRAIL office
Registration:	www.rstrail.nl

General aim

Discrete choice analysis (DCA) has become one of the most important frameworks for transportation modelling. Using DCA, the researcher or analyst is able to estimate the influence of all sorts of factors on travel behaviour and demand, and to predict mobility patterns and market shares for transport-related services. Most importantly, this is all done in a quantitative, statistically rigorous way with deep roots in economics and the behavioural sciences. As such, DCA is indispensable for the underpinning of many transport policies and plans.

In this course, we will cover two different perspectives on DCA: the conventional, generally econometrics-based perspective, and a more novel perspective which is gaining ground rapidly, based on recent advances in Machine learning. This combination makes this course unique, compared to other choice modelling courses taught in the Transport community.

This course will contain a mix of theory, implementation guidelines, and hands-on exercises to be completed during the course and under supervision of the lecturers.

This course covers:

Day 1 – Basics of Discrete choice theory (Hess)

- Introduction to choice modelling and data requirements
- Random utility and the logit model
- Model specification, estimation and interpretation of results
- Exercise 1 (Apollo)

Day 2 – Advances in Discrete choice theory (Hess)

- Allowing for heterogeneity in preferences
- Random heterogeneity and the mixed logit model
- Making predictions from choice models
- Exercises 2 and 3 (Apollo)

Day 3 – Introduction to Machine learning for choice behaviour analysis (Van Cranenburgh)

- Introduction into Machine learning for choice behaviour analysis
- Data and training
- Artificial Neural networks
- Exercise 4 (Jupyter notebook)

Day 4 – Advances in Machine learning for choice behaviour analysis (Van Cranenburgh)

- Hybrid models
- Explainable AI techniques: SHAP values
- Exercise 5 (Jupyter notebook)

ECTS:

Participants of this course will be awarded with 2 ECTS when attending the full course (one for each part).