MATH-463

Mathematical modelling of behavior

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Cursus	Sem.	Type
Computational science and Engineering	MA1, MA3	Opt.
Energy Management and Sustainability	MA1, MA3	Opt.
Financial engineering	MA1, MA3	Opt.
Ing.-math	MA1, MA3	Opt.
Mathematics for teaching	MA1, MA3	Opt.
Mathématicien	MA1, MA3	Opt.

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	Written
Workload	150h
Weeks	14
Hours	**4 weekly**
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Summary

Discrete choice models allow for the analysis and prediction of individuals' choice behavior. The objective of the course is to introduce both methodological and applied aspects, in the field of marketing, transportation, and finance.

Content

MOOC
1. Introduction and examples
2. Choice theory
3. Binary choice
4. Multinomial choice
5. Specification testing
6. Prediction

Ex cathedra lectures
7. Nested Logit model
8. Multivariate extreme Value models
9. Sampling
10. Mixed models.
11. Choice models with latent variables.

Learning Outcomes

By the end of the course, the student must be able to:

- Model discrete choice

Transversal skills

- Use a work methodology appropriate to the task.
- Assess one's own level of skill acquisition, and plan their on-going learning goals.
- Use both general and domain specific IT resources and tools

Teaching methods

Lectures:
The first half of the semester is based on the online MOOC "Introduction to discrete choice models". There is no lecture in class.
The second half of the semester is based on ex-cathedra lectures in class.
Exercices and laboratories:
They are organized every week during the semester. The students will estimate the parameters of behavioral models

based on real data.

Expected student activities

Every week, the students are supposed to

1. read the appropriate material, according to the schedule (the material for a given week is supposed to be read **before** the lecture of that week);
2. work on the assignments for the laboratories.

Assessment methods

Written
Dans le cas de l'art. 3 al. 5 du Règlement de section, l'enseignant décide de la forme de l'examen qu'il communique aux étudiants concernés.

Resources

Bibliography

Ben-Akiva and Lerman (1985) Discrete Choice Analysis, MIT Press.Train (2003) Discrete Choice Methods with Simulation, Cambridge University Press.

Ressources en bibliothèque

- Discrete Choice Analysis / Ben-Akiva
- Discrete Choice Methods with Simulation / Train

Websites

- https://courses.edx.org/courses/course-v1:EPFLx+DiscreteChoiceX+3T2017/course/