

MATH-463

**Mathematical modelling of behavior**

Bierlaire Michel

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
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**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**

1. Introduction and examples
2. Choice theory
3. Data
4. Binary choice
5. Multinomial choice
6. Nested Logit model
7. Multivariate extreme Value models
8. Tests
9. Prediction
10. Sampling
11. Large scale problems
12. Mixed models.

**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**

Flipped classroom: the students will be provided with various material to be introduced to the concepts. The ex cathedra lectures will provide deeper descriptions, and involve discussions and clarifications.

**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

- 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 Methods with Simulation / Train](#)
- [Discrete Choice Analysis / Ben-Akiva](#)