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Université de Neuchâtel

- Faculté des sciences
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Machine Learning: Theory, Fairness and Privacy (3IN2078)

Filières concernées	Nombre d'heures	Validation	Crédits ECTS
Master en économie appliquée	**Cours: 2 ph** **Exercice: 2 ph**	**Voir ci-dessous**	5
Master en informatique	**Cours: 2 ph** **Exercice: 2 ph**	**Voir ci-dessous**	5

ph=période hebdomadaire, pg=période globale, j=jour, dj=demi-jour, h=heure, min=minute

Période d'enseignement:

- Semestre Automne

Equipe enseignante

- Christos Dimitrakakis
- Andreas Athanasopoulos (assistant)

Contenu

This course is a modified version of 2023 Autumn Machine Learning and Data Mining course. The main difference is that we reduce the number of models we talk about, and we add two important topics in modern machine learning: fairness and privacy. The theoretical part remains the same. Students are expected to explore different models on their own for their project work.

The topics are
- Learning and generalisation [6 weeks]
- Classification: Convergence of the perceptron algorithm
- Regression: The linear regressor
- Cost minimisation versus probabilistic Modelling
- Bayesian learning: conjugate priors, approximate inference
Fairness [3 weeks]
- Fairness as conditional independence
- Fairness as smoothness
- Causality.
Privacy [3 weeks]
- Anonymity and differential privacy
- Randomised response and the Laplace mechanism
- The exponential mechanism.

Forme de l'évaluation

- Assignments: 20%
- Project: 40%
- Exam: 40%

Modalités de rattrapage

- Assignments can be submitted late, but only with a good excuse

Pré-requis

- A previous or concurrent ML/AI course
- Probablity
- Calculus
- Linear Algebra
- Python (including numpy)

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Forme de l'enseignement

- Lectures, demonstrations, blackboard proofs
- Blackboard exercises
- Program demos
- Office hours: Fridays 14:00-15:00 (by appointment)

Objectifs d'apprentissage

Au terme de la formation l'étudiant-e doit être capable de :

- Formulate Learning Problems
- Recognise Social Problems
- Analyse Privacy Issues
- Apply Concentration Inequalities

Compétences transférables

- Apply Theory to Practical Problems
- Discuss Research Results
- Explain Your own Work