

- Faculté des sciences
- [www.unine.ch/sciences](http://www.unine.ch/sciences)

### Reinforcement Learning and Decision Making Under Uncertainty (3IN2064)

Filières concernées	Nombre d'heures	Validation	Crédits ECTS
<b>Master en finance</b>	<b>Cours: 2 ph Exercice: 2 ph</b>	Voir ci-dessous	5
<b>Master en informatique</b>	<b>Cours: 2 ph Exercice: 2 ph</b>	Voir ci-dessous	5

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

#### Période d'enseignement:

- Semestre Printemps

#### Equipe enseignante

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#### Contenu

Statistical decision problems  
 Introduction to Bayesian inference  
 Markov decision processes  
 Dynamic programming:  
 - Backwards Induction  
 - Value Iteration  
 - Policy Iteration  
 - Temporal Differences  
 Stochastic Dynamic Programming:  
 - Q-Learning  
 - Sarsa  
 - Actor Critic Methods  
 - Monte Carlo Methods  
 Model Based Reinforcement Learning:  
 - Direct Model-Predictive Control  
 - Bayesian Reinforcement Learning  
 Upper confidence bounds:  
 - Bandit problems  
 - Reinforcement Learning  
 Inverse Reinforcement Learning  
 Multi-agent Reinforcement Learning

#### Forme de l'évaluation

Mandatory assignments (ungraded)  
 Group project (60% of the grade)  
 Written exam (40% of the grade)

#### Pré-requis

Linear Algebra  
 Calculus  
 Probability Theory  
 Basic competence in a programming language (C, Python, Octave/Matlab, etc)

#### Forme de l'enseignement

Lectures and exercises

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## **Reinforcement Learning and Decision Making Under Uncertainty (3IN2064)**

### **Objectifs d'apprentissage**

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

- Formulate Decision Problems
- Develop Algorithms
- Apply Algorithms
- Compute Probabilities and expectations
- Explain Algorithms and Theory
- Develop Project
- Integrate Theory and Practice

### **Compétences transférables**

- Explore Scientific literature
- Develop state-of-the-art methods