UCLouvain

linma2470

2023

Stochastic modelling

5.00 credits	30.0 h + 22.5 h	Q2

Teacher(s)	Chevalier Philippe ;Madani Mehdi (compensates Chevalier Philippe) ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	A probability course and a background in mathematical modelling
Main themes	Introduction to stochastic models in operations research. Study of renewal processes, Markov chains, Markov Processes, Markov Decision Processes. Applications to inventory models, queuing models, branching processes, random walks, etc.
Learning outcomes	
Evaluation methods	Students will be evaluated through a written exam based on the objectives of the course. The exam consists in exercices applying the concepts viewed in the course. Many examples of questions of previous exams are solved during the exercice sessions. The students will make a class presentation of some theory chapter or an application of the theory. This presentation is done in groups and counts for 25% of the grade. This presentation cannot be done again for the session in September.
Teaching methods	The course consists in weekly lectures and 11 exercice sessions. Part of the lectures will be presented by student groups.
Content	• Poisson processes and their properties • Markov chains with a finite number of states • Renewal processes and stopping rules • Markov chains with an infinite number of states • The notion of reveribility • Markov processes • Birth and death processes • Queueing theory and networks of queues • Fluid models for queues • Various applications, such as inventory management, replacement, reliability and job shop modeling. • Markov decision processes and Reinforcement learning
Bibliography	Lecture recommandée : "Stochastic Processes: Theory for applications" de R. Gallagher, 2013, disponible en ligne : http://www.rle.mit.edu/rgallager/notes.htm "Reinforcement Learning: An Introduction" de R. Sutton et A. Barto, disponible en ligne : http://incompleteideas.net/book/RLbook2020.pdf
Faculty or entity in charge	MAP

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Mathematics	MATH2M	5		
Master [120] in Computer Science and Engineering	INFO2M	5		
Master [120] in Computer Science	SINF2M	5		
Master [120] in Mathematical Engineering	MAP2M	5		
Master [120] in Data Science Engineering	DATE2M	5		
Master [120] in Data Science: Information Technology	DATI2M	5		