mlsmm2154 *2020*	**Machine Learning**

5 credits	30.0 h	Q2

Teacher(s)	Lebichot Bertrand ;
Language :	English
Place of the course	Mons
Main themes	The main themes for this course are the following: • Dimensionality reduction methods:Principal Component Analysis, Singular Value Decompositionand Multidimensional Scaling • Kernel methods for classification and regression • Bayesian networks and graphical models • Markov models and hidden Markov model • Reinforcement Learning Those themes are complementary to those presented in MLSMM2151 'Data Mining'.
Aims	With respect to the LSM competency framework. This course contribute to acquiring the following competencies: Knowledge and reasoning • Mastery of the core knowledge for each area of management. • Ability to communicate one's acquired knowledge from the various areas of management. • Ability to properly apply one's acquired knowledge in order to solve problems. A scientific and systematic approach 1 • Clear, structured, analytical reasoning based on applying, and if needed adapting, scientifically-based conceptual frameworks and models to define and analyse a problem. • Collecting, selecting and analysing relevant information using rigorous, advanced and appropriate methods. At the end of this course, the student will be able to: • Understand and describe the main methods used in Machine Learning. • Apply dimensionality reduction techniques, when required. • Determine the most relevant methods to use for a given learning problem. • Apply those methods on real-life learning problems. - - - - *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** The final mark takes two results into account: • The project evaluation • In session, an oral examination
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** • Lectures • Practical sessions integrated to those lectures • A project based on lectures and practical sessions
Content	Nowadays, the volume of data generated, for instance by internet and social networks, is constantly increasing. On the other hand, there is a great need for efficient ways to infer useful information from those data, which can take different forms. Numerous data mining, machine learning and pattern recognition algorithms were developed in order to predict information for different applications. This course is devoted to some of those techniques, emphasizing on dimensionality reduction, Kernel and Bayesian models and some graph related methods.

Inline resources	Course notes are available on https://moodleucl.uclouvain.be/
Bibliography	Recommended books : BISHOP C., Pattern Recognition and Machine Learning, Springer, 2006. DUDA R., Patter Classification (second edition), Wiley, 2001. ALPAYDIN E., Introduction to Machine Learning, 2nd Ed., The MIT Press, 2009. THEODORIDIS S., Machine Learning : A Bayesian and Optimization Perspective, Academic Press, 2015. SUTTON R., Reinforcement Learning : An introduction, The MIT Press, 1998.
Other infos	This course has strong technical requirements : - In mathematics : matrix computation, linear algebra, optimization - In statistics : multivariate statistics and statistical inference - In computer science : programmation (like R, Python, and Matlab), algorithmic
Faculty or entity in charge	CLSM

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] : Business Engineering	INGM2M	5		🔍
Master [120] : Business Engineering	INGE2M	5		🔍