










5 credits	30.0 h + 30.0 h	Q1
-----------	-----------------	----

Teacher(s)	Lee John (compensates Verleysen Michel) ; Verleysen Michel ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	Linear and nonlinear data analysis methods, in particular for regression and dimensionality reduction, including visualization.
Aims	<p>With respect to the AA referring system defined for the Master in Electrical Engineering, the course contributes to the development, mastery and assessment of the following skills :</p> <ul style="list-style-type: none"> <li>• AA1.1, AA1.2, AA1.3</li> <li>• AA3.1, AA3.2, AA3.3</li> <li>• AA4.1, AA4.2, AA4.4</li> <li>• AA5.1, AA5.2, AA5.3, AA5.5</li> <li>• AA6.3</li> </ul> <p>1</p> <p>At the end of the course, students will be able to :</p> <ul style="list-style-type: none"> <li>- Understand and apply machine learning techniques for data and signal analysis, in particular for regression and prediction tasks.</li> <li>- Understand and apply linear and nonlinear data visualization techniques.</li> <li>- Evaluate the performances of these methods with appropriate techniques.</li> <li>- Choose between existing methods on the basis of the nature of data and signals to be analyzed.</li> </ul> <p>-----</p> <p><i>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".</i></p>
Evaluation methods	Closed book oral examination, or written examination (depending on the number of students)
Teaching methods	Lectures, exercises, practical sessions on computers, project to be carried out individually or by groups of 2 students
Content	<ul style="list-style-type: none"> <li>• Linear regression</li> <li>• Nonlinear regression with multi-layer perceptrons</li> <li>• Clustering and vector quantization</li> <li>• Nonlinear regression with radial-basis function networks</li> <li>• Probabilistic regression</li> <li>• Ensemble models</li> <li>• Model selection</li> <li>• Principal Component Analysis</li> <li>• Nonlinear dimensionality reduction and data visualization</li> <li>• Independent Component Analysis</li> <li>• Kernel methods</li> </ul>
Inline resources	<a href="http://moodleucl.uclouvain.be/course/view.php?id=84">http://moodleucl.uclouvain.be/course/view.php?id=84</a>
Bibliography	Divers livres de références (mais non obligatoires) mentionnés sur le site du cours
Faculty or entity in charge	ELEC

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Data Science Engineering	DATE2M	5		
Master [120] in Forests and Natural Areas Engineering	BIRF2M	5		
Master [120] in Electrical Engineering	ELEC2M	5		
Master [120] in Agricultural Bioengineering	BIRA2M	5		
Master [120] in Biomedical Engineering	GBIO2M	5		
Master [120] in Statistics: General	STAT2M	5		
Master [120] in Mathematical Engineering	MAP2M	5		
Master [120] in Computer Science and Engineering	INFO2M	5		
Master [120] in Chemistry and Bioindustries	BIRC2M	5		
Master [120] in Environmental Bioengineering	BIRE2M	5		
Master [120] in Computer Science	SINF2M	5		
Master [120] in data Science: Statistic	DATS2M	5		
Master [120] in data Science: Information technology	DATI2M	5		