

In view of the health context linked to the spread of the coronavirus, the methods of organisation and evaluation of the learning units could be adapted in different situations; these possible new methods have been - or will be - communicated by the teachers to the students.

5 credits	30.0 h + 30.0 h	Q1
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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	<b>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</b> Closed book oral examination, or written examination (depending on the number of students). The project is part of the evaluation.
Teaching methods	<b>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</b> 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 (MLP)</li> <li>• Deep learning (convolutional CNN and adversarial GAN)</li> <li>• Clustering and vector quantization</li> <li>• Nonlinear regression with radial-basis function networks (RBFN)</li> <li>• Model selection</li> <li>• Feature selection</li> <li>• Principal Component Analysis (PCA)</li> <li>• Nonlinear dimensionality reduction and data visualization</li> <li>• Independent Component Analysis (ICA)</li> <li>• Kernel methods (SVM)</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
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Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Chemistry and Bioindustries	<a href="#">BIRC2M</a>	5		
Master [120] in Forests and Natural Areas Engineering	<a href="#">BIRF2M</a>	5		
Master [120] in Biomedical Engineering	<a href="#">GBIO2M</a>	5		
Master [120] in Agricultural Bioengineering	<a href="#">BIRA2M</a>	5		
Master [120] in Data Science : Statistic	<a href="#">DATS2M</a>	5		
Master [120] in Mathematical Engineering	<a href="#">MAP2M</a>	5		
Master [120] in Computer Science and Engineering	<a href="#">INFO2M</a>	5		
Master [120] in Electrical Engineering	<a href="#">ELEC2M</a>	5		
Master [120] in Computer Science	<a href="#">SINF2M</a>	5		
Master [120] in Data Science Engineering	<a href="#">DATE2M</a>	5		
Certificat d'université : Statistique et sciences des données (15/30 crédits)	<a href="#">STAT2FC</a>	5		
Master [120] in Data Science: Information Technology	<a href="#">DATI2M</a>	5		
Master [120] in Statistic: General	<a href="#">STAT2M</a>	5		
Master [120] in Environmental Bioengineering	<a href="#">BIRE2M</a>	5		