UCLouvain

linma2472

2023

Algorithms in data science

5.00 credits	30.0 h + 22.5 h	Q1

Teacher(s)	Blondel Vincent ;Delvenne Jean-Charles (coordinator) ;Krings Gautier (compensates Blondel Vincent) ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Prerequisites	Familiarity with mathematics and algorithmics of the common core of the Bachelor of Engineering or Computer Science (SINF) is required. More particularly in linear algebra and analysis (e.g. LEPL1101 and 1102), probability (e.g. LEPL1108), discrete mathematics (e.g. LINMA1691), algorithmics and basic programming (e.g. LEPL1104 and LEPL1401).
Main themes	The course explores questions, mainly of an algorithmic nature, regarding the challenges offered by the emergence of Big Data.
Learning outcomes	**At the end of this learning unit, the student is able to :** Learning outcomes : • AA1 : 1,2,3 • AA3 : 1,3 • AA4 : 1 • AA5 : 1,2,3, 5,6 More specifically, at the end of the course the student will be able to : 1 • read a general or specialized literature on a specific cutting-edge theme of discrete mathematics, and summarize the key messages and results • explain those messages to their peers in a clear and precise way • solve mathematical problems in application to those results • identify the possible caveats of those results and criticize the exposition chosen by the references • relate the concepts encountered in the literature to concepts covered in other course, despite different notations or viewpoints The mathematical objectives can change from year to year.
Evaluation methods	The projects made during the semester are evaluated based on the written reports and the oral presentations. They amount to 8/20 of the final grade (in Jan and in Aug). The projects are not re-organised outside the semester. The (written or oral, depending on the circumstances) exam in the Jan or Aug session amounts to 12/20 of the final grade.
Teaching methods	In part ex cathedra lectures that introduce the concepts and algorithms along with their theoretical foundations, and in part projects with written and/or oral reports.These projects contain a large part of implementation (in Python) and data analysis. It is thus required to learn this language (thanks in part to the proposed tutorials) if not already mastered.
Content	The course contents may vary from one year to another and can tackle various algorithmic questions related to analysis, storage, or broadcast of large datasets. E.g., social network analysis, kernel methods, GANs (generative adversial networks), etc. Some transversal topics are also explored by external lecturers, e.g. (depending on the year): ethics in data science, environmental cost of data science, etc.
Inline resources	The Moodle page of the course.
Bibliography	Variable.
Faculty or entity in charge	MAP

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Data Science : Statistic	DATS2M	5		
Master [120] in Environmental Bioengineering	BIRE2M	5		
Master [120] in Mathematics	MATH2M	5		
Master [120] in Chemistry and Bioindustries	BIRC2M	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 Agricultural Bioengineering	BIRA2M	5		
Master [120] in Data Science: Information Technology	DATI2M	5		