

COURSE DESCRIPTION – ACADEMIC YEAR 2019/2020

Course title	Advanced Topics in Machine Learning
Course code	73021
Scientific sector	ING-INF/05
Degree	Master in Computational Data Science (LM-18)
Semester	1
Year	2
Credits	6
Modular	No
Total lecturing hours	40
Total lab hours	20
Attendance	It is highly recommended to attend the Lab sessions.
Prerequisites	
Course page	https://ole.unibz.it/
Specific educational objectives	<p>The course belongs to the type "caratterizzanti – discipline informatiche" in the curricula "Data Analytics" and "Data Management".</p> <p>In this course, students will learn the fundamentals of deep learning with a special focus on image-related applications. Moreover, students will learn how to implement, train, and validate a Convolutional Neural Network, and they will improve their understanding of the on-going research in the field of image processing and computer vision.</p>
Lecturer	Tammam TILLO
Contact	POS 1.17, ttillo@unibz.it , +39 0471 016026
Scientific sector of lecturer	ING-INF/05
Teaching language	English
Office hours	<ul style="list-style-type: none"> • Tuesday 15:00-17:00, faculty of computer science, Piazza Domenicani 3, Office 1.17. • It is recommended to make an appointment beforehand by email.
Lecturing Assistant (if any)	--
Contact LA	--
Office hours LA	--
List of topics	<ul style="list-style-type: none"> • Computer vision • Image classification • Convolutional Neural Networks (CNN) • Training Neural Networks • Understanding and visualizing Convolutional Neural Networks • Deep Reinforcement Learning
Teaching format	This course will be delivered through a combination of formal lectures and lab sessions.
Learning outcomes	<p>Knowledge and understanding:</p> <ul style="list-style-type: none"> • D1.1 - Knowledge of the key concepts and technologies of data science disciplines

	<ul style="list-style-type: none"> • D1.7 - Knowledge of artificial intelligence techniques and methods for the implementation of intelligent systems <p>Applying knowledge and understanding:</p> <ul style="list-style-type: none"> • D2.1 - Practical application and evaluation of tools and techniques in the field of data science • D2.2 - Ability to address and solve a problem using scientific methods • D2.6 - Ability to apply innovative techniques of data mining and machine learning to extract knowledge from complex and heterogeneous data <p>Making judgments</p> <ul style="list-style-type: none"> • D3.2 - Ability to autonomously select the documentation (in the form of books, web, magazines, etc.) needed to keep up to date in a given sector <p>Communication skills</p> <ul style="list-style-type: none"> • D4.1 - Ability to use English at an advanced level with particular reference to disciplinary terminology • D4.3 - Ability to structure and draft scientific and technical documentation <p>Learning skills</p> <ul style="list-style-type: none"> • D5.2 - Ability to autonomously keep oneself up to date with the developments of the most important areas of data science
<p>Assessment</p>	<ul style="list-style-type: none"> • Lab exercises • Final exam (written) <p>The written exam will consist of a set of verification questions, transfer of knowledge questions and exercises.</p>
<p>Assessment language</p>	<p>English</p>
<p>Assessment Typology</p>	<p>Monocratic</p>
<p>Evaluation criteria and criteria for awarding marks</p>	<p>Marks are distributed as follows :</p> <ol style="list-style-type: none"> 1) 30% for lab exercises 2) 70% for final exam <p>The aim of the written exam is to assess to which degree students have achieved the following learning outcomes: 1) knowledge and understanding, 2) applying knowledge and understanding, 3) making judgment.</p> <p>The laboratory exercises are designed to assess students' ability to design solutions for practical problems.</p>
<p>Required readings</p>	<p>--</p> <p>Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it</p>
<p>Supplementary readings</p>	<p>Suggested book :</p> <ul style="list-style-type: none"> • Title : Pattern Recognition and Machine Learning ; • Author : Chris Bishop;

	<ul style="list-style-type: none">Title : Deep Learning ; Authors : Ian Goodfellow, Yoshua Bengio and Aaron Courville ;
Software used	The lab experiments will be performed using MATLAB or PYTHON or other software tools.