4 MODULE TITLE: Introduction to Deep Learning		CODE: EE5C16
LEVEL: MSc	CREDITS: 10 ECTS	PREREQUISITES:
MODULE COORDINATOR: Asst Prof. François Pitié		
TERMS: Semester 1		
DURATION (WEEKS): 11		

AIMS/OBJECTIVES

This module is an introduction to Machine Learning (ML), with a focus on Deep Learning. Deep learning is another name for artificial neural networks, which are a loosely inspired by the structure of the neurons in the cerebral cortex. Although Deep Learning has been around for quite a while, it has recently become a disruptive technology that has been unexpectedly taking over operations of technology companies around the world and disrupting all aspects of society. When you read or hear about AI or machine Learning successes in the news, it really means Deep Learning successes. The course starts with an introduction to some essential aspects of Machine Learning, including Least Squares, Logistic Regression and a quick overview of some popular classification techniques. Then the course will dive into the fundamentals of Neural Nets, including Feed Forward Neural Nets, Convolution Neural Nets, autoencoders and Recurrent Neural Nets. The material is constructed in collaboration with leading industrial practitioners including Google, YouTube and Movidius, and students will have guest lectures from these companies. Hands on labs will give you experience with the field and allow you to develop your own Deep Learning applications.

SYLLABUS

We have developed a fantastic lab environment specially for this module, so that you can learn best industry practices:

- Programming will be done in python 3 using Keras and TensorFlow. Everything will be running on the Google Cloud Platform, which gives ondemand scalable computing resources.
- The coding environment will be a combination of shell/terminal, editor, and Jupyter notebook.
- Git will be used to checkpoint lab progress and give continuous feed-back on lab assignments. We have developed a platform that will smooth out all the painful installation and configuration parts so that you can focus on the essential.

INDICATIVE READING AND RESOURCES

Assessment Textbooks

- Deep Learning, Ian Goodfellow et al., (MIT press), [https://www.deeplearningbook.org]
- Machine Learning on Cousera, Andrew Ng [https://www.coursera.org/learn/machine-learning]
- Neural Networks and Deep Learning, Michael Nielsen [http://neuralnetworksanddeeplearning.com/]

MODULE 4 LEARNING OUTCOMES

On successful completion of this module, student sshould be able to:

1. Describe the main neural network architectures and parameters used in popular Deep Learning software libraries such as Keras.
2. Implement neural network applications using python 3 and keras.
3. Evaluate the performance of Machine Learning algorithms and analyse the potential pit falls.

TEACHING STRATEGIES

Teaching strategy The teaching strategy for this module is a mixture of lectures, problem-solving tutorials and laboratories dedicated to implement and solve machine learning problems. Most of the theoretical elements of Machine Learnings and Deep Learning will be covered in the first half of the term. The rest of the term is dedicated to exposure to more advanced labs and exposure to industry related problems.

ASSESSMENT MODE

The final written end-of-year examination counts for 60% of overall mark, the lab submissions for 35% and a mid-term quiz in week 8 for the remaining 5%.

ASSESSMENT COMPONENTS IN SITS: 40% COURSEWORK, 60% FINAL EXAM