

Module Guide

6006CEM – Machine Learning and Related Applications

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Module team



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Aims and Summary

The module will:

- represent an **introduction** to the wide field of machine learning.
- present **fundamental** concepts related to *supervised and unsupervised* learning methods.

The students will:

- **understand** the basics behind these methods
- be able to **apply** techniques of processing a set of data
- be able to **apply** various machine learning algorithms on such data
- be able to **analyse** the outcomes

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Learning outcomes

At the end of this module you should be able to:

1. **Apply** the knowledge behind the principles, techniques and applications of machine learning
2. **Critically evaluate** existing machine learning methods and select the most appropriate ones for a certain task
3. **Analyse** information, **compare** different machine learning techniques and produce an academic written report as a result
4. **Conceptualise** the role of modern machine learning approaches and their impact on society.

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Assessment

Coursework [100%] – LOs 1, 2, 3, 4

- Portfolio including:
 - **Implementation:** 2+ learning algorithms for a chosen problem
 - **Report:** maximum 2000 words in total (penalty for exceeding the limit)
 - what – how – why did you do it?
- Assessment will be based on:
 - the clarity and quality content of the report
 - AND the application and implementation of different techniques
- Minimum to pass: 40%
- Resit is in form of a new coursework

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Indicative content ^{** subject to change}

Weeks	Lectures	Labs
1	Introduction to Machine Learning	Techniques related to: <ul style="list-style-type: none"> - Pre-processing data - Choosing which attributes to include - Choosing which model to use - Building an instance of the selected model - Optimising the model - Ensuring the model is generalise - Estimating model performance
2	Linear Regression	
3	Logistic Regression	
4	Artificial Neuron Networks	
5	Model evaluation	
6	Model tuning	
7	Other general issues	
8	SVM, Naïve Bayes	
9	K-means clustering	
10	Hierarchical clustering	
11	Summary	

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Module structure

Each week of the module will include the following:

- **Lecture:** delivered by pre-recorded videos.
It's important to watch the videos to do the asynchronous activity.
- **Asynchronous activity:** provides tasks based on the week content with solutions released a week later.
It's important to attempt the tasks well before attending the tutorial.
- **Tutorial:** for discussion and demonstration around the given tasks.

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Support

- Please refer to the **Getting Help** page on [Aula/6006CEM/Journey](#) about:
 - Special needs support
 - Module support
 - Support with Maths
 - General Help and Support
 - Support with Aula
- **Recommendation:**
The module leader will be offering recommendations, aimed for the ones of you that are very passionate about this module and its contents. If you have any questions related to this, please ask the module leader.

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Getting started

Make sure that you follow all the instructions in the
Getting Started page on **Aula/6006CEM**

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Reading list

- Müller, Andreas C., and Guido, Sarah, Author. *Introduction to Machine Learning with Python : A Guide for Data Scientists*. 2017.
- Flach, Peter A. *Machine Learning : The Art and Science of Algorithms That Make Sense of Data*. Cambridge: Cambridge UP, 2012.
- Alpaydin, Ethem. *Introduction to Machine Learning*. Third ed. 2014.
- Garreta, Raul., and Moncecchi, Guillermo. *Learning Scikit-learn : Machine Learning in Python*. 1st ed. 2013.
- Hackelning, Gavin. *Mastering Machine Learning with Scikit-learn : Apply Effective Learning Algorithms to Real-world Problems Using Scikit-learn*. 1st ed. 2014.

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