Machine Learning
FIB, Master in Innovation and Research in Informatics

Marta Arias, Computer Science @ UPC

Course information
Instructors

Mario Martin (temporally substituting Marta Arias) (theory)
► mmartin@cs.upc.edu
► no office hours; if you want to talk, email me and we’ll set a time

Raquel Pérez
► raquel.perez@bsc.es

Bernat Coma
► bcoma@cs.upc.edu
Class logistics

- Course material (lecture slides, lab notebooks, project info) placed at [www.cs.upc.edu/~mmartin/ml-mds.html](http://www.cs.upc.edu/~mmartin/ml-mds.html)
- Announcements and submissions through the racó
- Theory lectures (Wednesdays 18-20pm)
  - face to face [A6001]
  - materials in
- Lab sessions (Tuesdays 2-4pm and 4-6pm)
  - in person
  - will use notebooks in python
  - notebooks will implement and illustrate concepts from theory and introduce libraries as well
  - maybe use labs to do some examples in depth
  - may propose exercises and examples to solve *in your own time*, not graded
Final grade = 35% exam + 50% project + 15% poster

The project includes the skill “Reasoning” – *competencia transversal* – graded on the basis on how well your project is presented in the poster.

*Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.*
Project

- Done in **pairs** (singles not allowed)
- Topic of your choice (with some limits)
- Intended to start early and grow mature over time
- A final **written report** (along with the code) and an accompanying **poster** should be carefully prepared
- All posters will be put online for everyone to see

Delivery of project report, code and poster towards the **end of June**; exact date will be announced in the coming weeks
The aim of this course is to introduce you to important concepts in machine learning and some key machine learning methods; it is not intended to cover the latest developments in the area (which come every second) but rather to give you a solid basis that will allow you to understand new developments in the field.
Contents

▶ Linear methods:
  ▶ Linear methods for regression
  ▶ Linear methods for classification

▶ Clustering

▶ Non-linear methods:
  ▶ Kernel methods (support vector machines)
  ▶ Artificial Neural Networks
  ▶ Random Forests and other ensemble methods

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Disclaimer: the topics and/or their order may change (slightly)
Main bibliography

- **Pattern Recognition and Machine Learning**
  Christopher M. Bishop, Springer, 2006

- **The Elements of Statistical Learning**

- **Machine Learning: a Probabilistic Perspective**
  Kevin P. Murphy, MIT Press 2012; new edition drafts here

- **Introduction to Machine Learning**
  Ethem Alpaydin (3rd Ed.), The MIT Press, 2015

- ...There’s a whole web out there