

MGT-302

**Introduction to data driven business analytics**

Acerbi Carlo

Cursus	Sem.	Type
Humanities and Social Sciences	BA6	Obl.

Language of teaching	English
Credits	2
Session	Summer
Semester	Spring
Exam	During the semester
Workload	60h
Weeks	14
<b>Hours</b>	<b>2 weekly</b>
Lecture	2 weekly
<b>Number of positions</b>	<b>80</b>

**Remark**

Une seule inscription à un cours SHS+MGT autorisée. En cas d'inscriptions multiples elles seront toutes supprimées sans notification

**Summary**

This course focuses on methods and algorithms needed to apply machine learning with an emphasis on applications in business analytics

**Content**

The following topics will be covered in the course:

1. Supervised learning
  - Linear Regression
  - Gradient Descent and Stochastic Gradient Descent
  - Multiclass Classification
  - K-NN
  - Support Vector Machines
  - Decision Tree and Random Forest
2. Unsupervised learning
  - Regularization and Model Selection
  - Cross Validation
  - PCA
3. Deep Learning
  - Deep Neural Networks
  - Back propagation
4. Graphical models
  - Bayesian networks
  - Inference and structure learning
5. Causal inference in time series
  - Granger causality
  - Directed information Graphs
6. Quantitative Risk Management
  - Risk Measures: Value at Risk and Expected Shortfall
  - Statistical Estimation and Risk Measurement
7. Statistical Learning for Finance
  - Shrinkage, Ridge Regression, LASSO and Dimension Reduction
  - Predicting Financial Returns

**Keywords**

machine learning, causal inference, time series, quantitative risk management

## Learning Prerequisites

### Required courses

A course in basic probability theory  
A course in basic linear algebra  
Calculus  
Familiarity with Python or Matlab

### Important concepts to start the course

Students should be familiar with basic concepts of probability theory, calculus, linear algebra, and programming.

## Learning Outcomes

By the end of the course, the student must be able to:

- Formulate supervised and unsupervised learning problems and apply it to data

## Transversal skills

- Assess one's own level of skill acquisition, and plan their on-going learning goals.

## Teaching methods

Formal teaching interlaced with practical exercises.

## Expected student activities

Attending lectures and working on homework and projects.

## Assessment methods

Three homeworks (33.33333333% each)

## Supervision

Office hours	Yes
Assistants	Yes
Forum	No

## Resources

### Moodle Link

- <https://go.epfl.ch/MGT-302>