

# Human-centered Machine Learning

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Polito Prof. Luca Vassio  
UPC Prof. Cecilo Angulo  
Program Manager: Marcela Acosta in collab  
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# Teaching Model – short term course

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- Focuses on **recent research and development** in the field
- **Has a duration of 2 weeks (10 teaching days)**, beginning the second week of August
- **Awards 3 ECTS**. Awarded ECTS may be recognised within the degree programme at the home institution.
- Has a focus on **interactive lessons** and **project-based learning**.
- Courses take place **in-campus** (whenever possible) but allows for **some virtual guest lectures** from other universities.
- Encourages **international networking** and the development of **multicultural skills**. Encourages learning of the **local culture** by including short cultural introductions, visits, and social events as part of the official program
- Includes a view on **ethical** issues and ethical handling of data

Human-Centered Machine Learning is an innovative and hands-on bachelor's level course on the main components and combinations of current machine learning systems. This two-week course will teach you some of the most widely used machine learning (ML) techniques.

The focus will be on human-centered applications of ML methods that require high levels of privacy protection and transparency. The course includes lectures that teach basic principles of human-centered ML and its applications (such as elderly care). You will learn to implement privacy-preserving and transparent ML methods by using a few lines of Python during exercise sessions.

## Must know

- \* Basic Workflow of Model Training, Validation and Selection
- \* Basic Techniques for Privacy Preservation
- \* Apply methods in Python (scikit-learn)

## Need to know

- Basic probabilistic models for data (“i.i.d.”)
- Basic Clustering Methods (k-means, GMM)
- Basic Feature Learning Methods (PCA)

## Nice to know

- Regularization techniques
- Basic Idea of Gradient-Based Methods
- Computational/Statistical Tradeoffs (SGD)



# Detailed application schedule 2022

- Application period: 1<sup>st</sup> March – 15<sup>th</sup> May 2022
- Application form: will be uploaded 1<sup>st</sup> March 2022
- Student pre-selection: 23<sup>rd</sup> May 2022
- Student selection: latest 30<sup>th</sup> May 2022



# Information about the course

[Human-Centered Machine Learning | Aalto University](#)

Disciplines: Engineering – computer science

Language: English

Level: 2nd and 3rd year Bachelor's

When: 8<sup>th</sup> - 19<sup>th</sup> August 2022 + independent online work

Where: Aalto University, Espoo, Finland

Mode of instruction: blended

Credits: 3 ECTS total 99 hours

15 hours ML bootcamp lectures

15 hours in-class work

9 hours specialised lectures

9 hours study visits/expert guest

10 hours independent work for specialized project

50 hours independent work

Prerequisites: „Hello world“ in python and Matrices.

Fees: none

## Basic schedule template 1.5 hours lecture + 1.5 hour work/slot

Week 1					
	Monday	Tuesday	Wednesday	Thursday	Friday
<b>Morning slot 9-12</b>	Welcome to Aalto	Regression Prof. Alex Jung	Classification Prof. Alex Jung	Model Validation and Selection Prof. Alex Jung	Generalization Prof. Alex Jung
<b>Noon</b>	Lunch break				
<b>Afternoon slot 13-16</b>	Three Components of ML Prof. Alex Jung	Multicultural teamwork/intro to Finnish culture	GDPR/Ethics	Support vector machines (SVM) – UPC – online project with Cecilio Angulo	Sauna evening
<b>Evening</b>	Social programme organised by Summer School				

## Basic schedule template

Week 2					
	Monday	Tuesday	Wednesday	Thursday	Friday
<b>Morning slot 9-12</b>	Regularization Prof. Alex Jung	Deep Learning Prof. Alex Jung	Clustering Prof. Alex Jung	Feature Learning Prof. Alex Jung	Trustworthy ML Prof. Alex Jung
<b>Noon</b>	Lunch break				
<b>Afternoon slot 13-16</b>	Privacy preserving data processing Polito – Luca Vassio		Company visit/visiting lecture/cultural program	Company visit/visiting lecture/cultural program	Farewell evening
<b>Evening</b>	Social programme organised by Summer School				

## UPC

- Support vector machines (SVM)
  - Introduce ideas for generalization
  - How to get solutions

## Polito

- Privacy preserving data processing
  - Techniques for making data (differential privacy)
  - How to use ML together with privacy-preserving techniques
  - Library in python – privacy-preserving framework
  - Project



# Future iterations

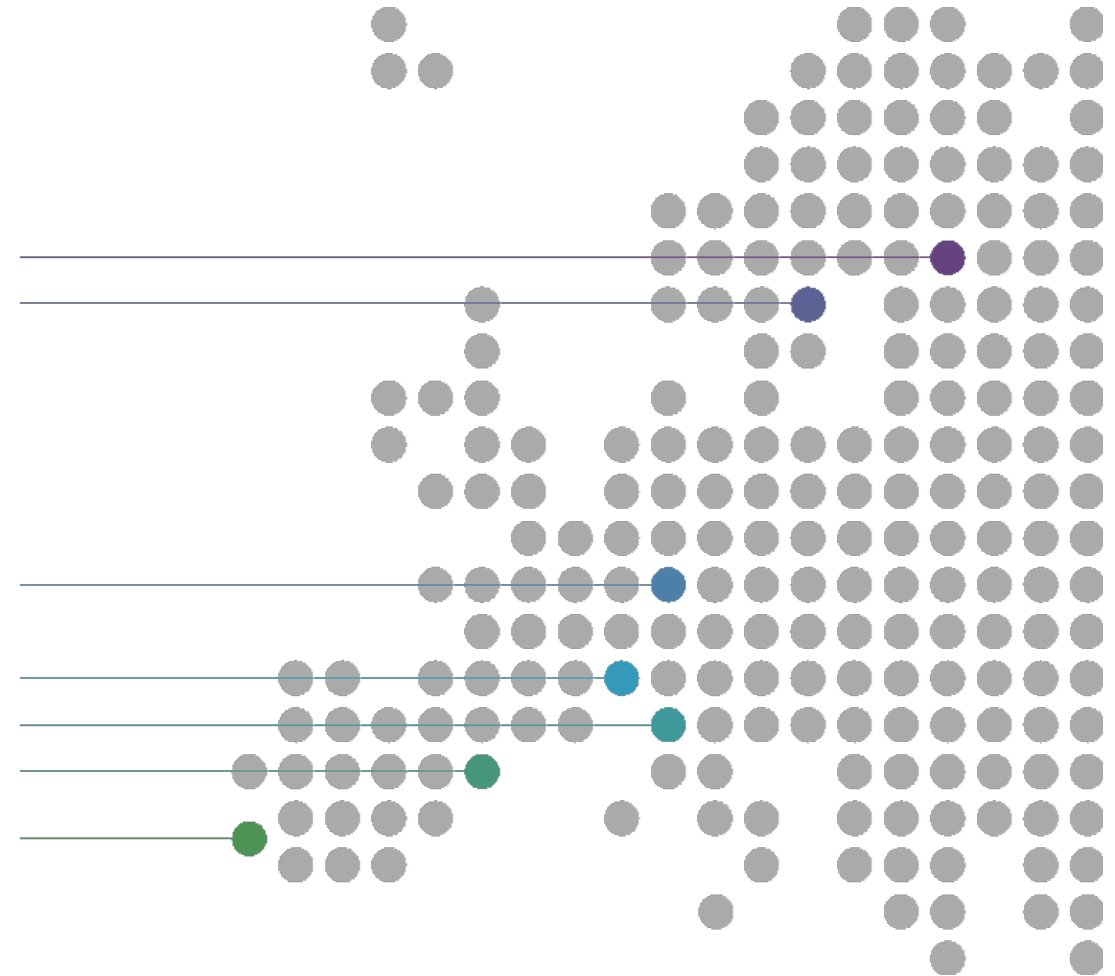
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- Course feedback for improvement
- More universities involved

Aalto University, Espoo/Helsinki  
KTH Royal Institute of Technology, Stockholm

Technical University of Darmstadt

Grenoble INP-UGA  
Politecnico di Torino  
Universitat Politècnica de Catalunya · BarcelonaTech  
Universidade de Lisboa





**A”**  
Aalto University







 TECHNISCHE  
UNIVERSITÄT  
DARMSTADT



 UGA



 POLITECNICO  
DI TORINO

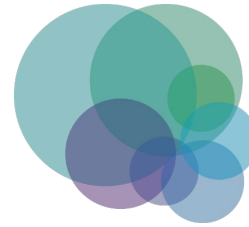


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DE GATALUNYA  
BARCELONATECH



 LISBOA  
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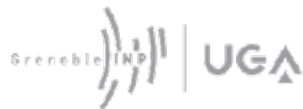
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