

NANOinBIO 2022 Spring School Program

May 30	
08.15 am	Welcome Reception & Registration
Spring School : Machine learning approaches for data analyses	
9.30 am – 12.30 pm	<p>Lead: Prof Adam Foster, Aalto University</p> <p>Aim: Theoretical introduction to machine learning for data analysis. Basic keys for getting started as a non-specialist. Worked examples.</p> <p>Program:</p> <ul style="list-style-type: none">• Introduction<ul style="list-style-type: none">○ Python, Jupyter notebooks, GitHub• Tutorials<ul style="list-style-type: none">○ Reading data - parsing files○ Image processing in Jupyter e.g. FFT○ <i>Advanced</i> - "OpenCV tutorial" - images and movies
12.30 pm	Lunch Break
2.00 pm – 5.30 pm	<p>Lead: Prof Adam Foster, Aalto University</p> <p>Aim: Choice of a suitable strategy for a given question, and main steps to enact a given strategy. Guided 'hands on' approach to extracting a given feature from a real data set. Hints from experience and discussion of possible variations</p> <p>Program:</p> <ul style="list-style-type: none">• Introduction<ul style="list-style-type: none">○ Machine learning (CNN), reinforcement learning, when and why?• Tutorials<ul style="list-style-type: none">○ Sci-kit learning classification on images○ CNN Good tip vs. bad AFM tip○ <i>Advanced</i> - Deep reinforcement learning toy model (linked to AFM autonomous operation)

May 31

09.00 am - 09.15 am

Welcome & Registration

Spring School : Machine learning approaches for data analyses

9.30 am - 12.30 am

Lead: Prof Nuria Gavara, University of Barcelona

Aim: Focus on Atomic Force Microscopy: extracting quantitative information from datasets. Worked example from topographic images to mechanical data.

Program:

- Calibrations
- Mechanical models
- Data fitting and feature extraction
- Looking at data distribution and outliers

12.30 pm

Lunch Break

2.00 pm - 4.00 pm

Lead: Prof Nuria Gavara, University of Barcelona

Aim: Worked example highlighting the 'dos' and 'don't' when implementing and a machine learning approach. Machine learning for disease diagnostic

Program:

- Classification versus regression, supervised vs unsupervised learning, training vs test datasets
- Assessing "success", ROC, statistical descriptors and the issue of generalization
- Supervised machine learning algorithms (kNN, SVM, Random Forest, Decision Trees)
- Feature selection vs dimensionality reduction

4.15 pm

Group photos at the University "Campus of Fouillole"