

Crash course in deep learning

GIOVANNI VOLPE & CARLO MANZO

January 19, 2026 to September 15, 2026

10:00 to 17:00

Mir-Puig Seminar Room (MPSMR) (MP210)

The trainers will start by introducing basic dense neural networks and backpropagation?to progressively move toward deep learning using the standard neural network packages such as TensorFlow/Keras and PyTorch

They will describe several advanced deep-learning architectures for?different tasks, ith applications to real case studie

Dates: January 19, 20, 21 // April 27, 28 // June 1, 2 // September 14, 15

Hour: 10-13h to 15-17h

Place: Mir-Puig Seminar Room (MPSMR) (MP210)

Target Group: ICFO researchers?

Schedule:

- **Day 1:** Neural Networks?for Classification?
- **Day 2:** Neural Networks for Regression?
- **Day 3:** Convolutional Neural Networks?
- **Day 4:** Encoders-Decoders?
- **Day 5:** U-Net?

- **Day 6:** Recurrent Neural Networks, Attention and Transformers
- ? - **Day 7:** Graph Neural Networks?
- **Day 8:** Generative Adversarial Networks?
- **Day 9:** Diffusion Models?

Trainers: ?

Prof. Giovanni Volpe (University of Gothenburg):

Giovanni Volpe is a Full Professor at the Physics Department of the University of Gothenburg University, where he leads the Soft Matter Lab (<http://softmatterlab.org>) - and an ICFO alumnus. His research interests include soft matter, optical trapping and manipulation statistical mechanics, brain connectivity, and machine learning. He has authored more than 100 articles and reviews on soft matter, statistical physics, optics, physics of complex systems, brain network analysis, and machine learning. He co-authored the books "Optical Tweezers: Principles and Applications" (Cambridge University Press, 2015) and "Simulation of Complex Systems" (IOP Press, 2021). He has developed several software packages for optical tweezers (OTS - Optical Tweezers Software), brain connectivity (BRAPH-Brain Analysis Using Graph Theory), and microscopy enhanced by deep learning (DeepTra

Prof. Carlo Manzo (University of Vic):

Carlo Manzo is an Associate Professor at the Universitat de Vic (UVic-UCC), where he leads the Quantitative Biomedicine lab (<https://mon.uvic.cat/qubilab/>). His research aims at providing a quantitative view of biophysical processes through the combination of single-molecule microscopy, machine learning, and statistical mechanics. He has authored more than 50 articles in optics, biophysics, machine learning, and cell biology. He is the organizer of the Anomalous Diffusion challenge ([Andy.andi-challenge.org](http://andy.andi-challenge.org)).

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