

# École doctorale de Physique en Île de France

ED564, PSL – UPMC – USPC – UPSaclay

<https://www.edpif.org>

## DEEP LEARNING DO-IT-YOURSELF

Florent Krzakala (LPS, ENS)

Andrei Bursuc (Inria)

Marc Lelarge (Safran)

Recent developments in neural network approaches (more known now as "deep learning") have dramatically changed the landscape of several research fields such as image classification, object detection, speech recognition, machine translation, self-driving cars and many more. Due its promise of leveraging large (sometimes even small) amounts of data in an end-to-end manner, i.e. train a model to extract features by itself and to learn from them, deep learning is increasingly appealing to other fields as well: medicine, time series analysis, biology, simulation.

This course is a deep dive into practical details of deep learning architectures, in which we attempt to demystify deep learning and kick start you into using it in your own field of research. During this course, you will gain a better understanding of the basis of deep learning and get familiar with its applications. We will show how to set up, train, debug and visualize your own neural network. Along the way, we will be providing practical engineering tricks for training or adapting neural networks to new tasks.

By the end of this class, you will have an overview on the deep learning landscape and its applications to traditional fields, but also some ideas for applying it to new ones. You should also be able to train a multi-million parameter deep neural network by yourself.

For the implementations we will be using the Keras library in Python.

### EDPIF – PSL

Dépt de physique de l'ENS  
24, rue Lhomond – 75005 Paris  
Secrétariat : L. LEDEZ  
+33 1 4432 2559  
[edpif.ens@edpif.org](mailto:edpif.ens@edpif.org)

### EDPIF – UPMC

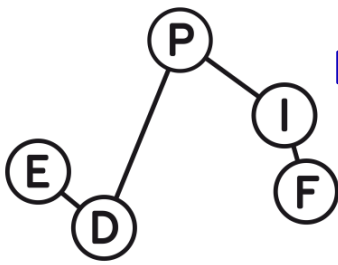
4, place Jussieu - 75005 Paris  
Secrétariat : N. YASSINE  
CC 921. Barre 56/66. Bur 218  
+33 1 4427 8039  
[edpif.upmc@edpif.org](mailto:edpif.upmc@edpif.org)

### EDPIF – USPC

Bâtiment Condorcet, Bur 376A  
10 r A.Domon et L. Duquet - Paris 13<sup>e</sup>  
Secrétariat: J. TAÏEB  
+33 1 5727 6110  
[edpif.upd@edpif.org](mailto:edpif.upd@edpif.org)

### EDPIF – UPSaclay

LPS Orsay, Bât 510, porte 145  
Univ Paris Sud - 91405 Orsay  
Secrétariat: S. HOARAU  
+33 1 6915 5356  
[edpif.u-psud@edpif.org](mailto:edpif.u-psud@edpif.org)



# École doctorale de Physique en Île de France

ED564, PSL – UPMC – USPC – UPSaclay

<https://www.edpif.org>

The topics covered in this course include:

- Neural network approaches: feedforward networks, convolutional networks (CNNs), recurrent networks (RNNs)
- Modern practices: backpropagation, regularization, optimization, fine-tuning
- deep learning research: autoencoders, deep generative models, long short-term memory (LSTM) modules
- CNN architectures: VGG, ResNet, fully convolutional net, multi input and multi output nets
- RNN architectures: bidirectional RNNs, encoder-decoder sequence-to-sequence, LSTMs, GRUs

-- 8 cours (2h) --

*les jeudis : 5, 19 octobre – 9, 16, 23, 30 novembre – 7, 14 décembre 2017 | de 14h à 16h*

*salle Conf IV*

*Département de Physique de l'ENS - 24 rue Lhomond 75005 Paris*

## EDPIF – PSL

Dépt de physique de l'ENS  
24, rue Lhomond – 75005 Paris  
Secrétariat : L. LEDEZ  
+33 1 4432 2559  
[edpif.ens@edpif.org](mailto:edpif.ens@edpif.org)

## EDPIF – UPMC

4, place Jussieu - 75005 Paris  
Secrétariat : N. YASSINE  
CC 921. Barre 56/66. Bur 218  
+33 1 4427 8039  
[edpif.upmc@edpif.org](mailto:edpif.upmc@edpif.org)

## EDPIF – USPC

Bâtiment Condorcet, Bur 376A  
10 r A.Domon et L. Duquet - Paris 13<sup>e</sup>  
Secrétariat: J. TAÏEB  
+33 1 5727 6110  
[edpif.upd@edpif.org](mailto:edpif.upd@edpif.org)

## EDPIF – UPSaclay

LPS Orsay, Bât 510, porte 145  
Univ Paris Sud - 91405 Orsay  
Secrétariat: S. HOARAU  
+33 1 6915 5356  
[edpif.u-psud@edpif.org](mailto:edpif.u-psud@edpif.org)