DATA SCIENCE & AI

| TRAINING FOR ACADEMICS 2024/26 |

Basic courses - from 5 to 8 pm, Estrapade

— IA/ML Overview (12h) with Frédéric Lechenault

4 lectures: from 14/10/2024 to 4/11/2024

All these lectures correspond to a “beginner” level.

- o Training for academics, overview *14/10/2024*
- o History of AI *21/10/2025*
- o Data science basics *28/10/2024 & 4/11/2024*

— Statistics, probability, linear algebra (21h) with Alexandre Verine

7 lectures: from 12/11/2024 and 13/01/2025

- o Linear Algebra1 *(Beginner) 12/11/2024*
- o Linear Algebra2 *(Advanced) 18/11/2024*
- o Calculus 1 *(Beginner) 25/11/2024*
- o Calculus 2 *(Beginner) 2/12/2024*
- o Probability and statistics 1 *(Beginner) 16/12/2024*
- o Probability and statistics 2 *(Advanced) 6/01/2025*
- o Probability and statistics 3 *(Advanced) 13/01/2025*

— Data structures and algorithms Python (21h) with Muni Sreenivas Pydi

7 lectures: from 20/01/2025 to 3/03/2025

- o Introduction to Python Programming *(Beginner) 20/01/2025*
- o Introduction to Data Structures *(Beginner) 27/01/2025*
- o Algorithm Analysis and Complexity *(Advanced) 3/02/2025*
- o Sorting Algorithms *(Advanced) 10/02/2025*
- o Searching Algorithms *(Advanced) 17/02/2025*
- o Advanced Data Structures and Algorithms *(Advanced) 24/02/2025*
- o Applications of Data Structures and Algorithms *(Beginner) 3/03/2025*

— Foundations of supervised and unsupervised learning (30h) with Muni Sreenivas Pydi

10 lectures:from 10/03/2025 to19/05/2025

- o Introduction *(Beginner) 10/03/2025*
- o Linear regression *(Beginner) 17/03/2025*
- o Binary classification *(Advanced) 24/03/2025*
- o Linear methods in high dimension 1 (*Beginner*) *31/03/2025*
- o Linear methods in high dimension 2 (*Advanced*) *07/04/2025*
- o Beyond linear methods 1 (*Beginner*) *14/04/5025*
- o Beyond Linear methods 2 *(Advanced) 28/04/2025*
- o Beyond Linear methods 3 (*Expert*) *07/05/2025*
- o Unsupervised learning 1 (*Basic*) *12/05/2025*
- o Unsupervised learning 2 (*Advanced*) *19/05/2025*

— Math and IA Overview (12h) with Frédéric Lechenault

4 lectures : from 16/05/2025 to 23/06/2025

All these lectures correspond to a “beginner” level.

- o Introduction to Machine Learning and Neural Networks *16/05/2025*
- o artificial intelligence for vision *6/06/2025*
- o artificial intelligence for time series and natural language processing *16/06/2025*
- o Introduction to Reinforcement Learning and Advanced ML Techniques *23/06/2025*

— Data management and SQL (18h) with Muni Sreenivas Pydi

6 lectures: 22/09/2025 to 27/10/2025

- o Introduction to Databases *(Beginner) 22/09/2025*
- o Introduction to SQL *(Beginner) 29/09/2025*
- o Joins and Relationships *(Beginner) 6/10/2025*
- o Creating a SQL database *(Beginner) 13/10/2025*
- o Advanced Queries *(Advanced) 20/10/2025*
- o Data Manipulation and Control *(Advanced) 27/10/2025*

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— Deep Learning (30h) with Nicolas Schreuder

10 lectures: from 3/11/2025 to 26/01/2026

- o Machine learning reminder *(Beginner) 3/11/2025*
- o Multi-Layer Perceptron : *(Beginner) 17/11/2025*
- o Introduction to Pytorch *(Beginner) 24/11/2025*
- o Convolutional neural networks *(Beginner) 1/12/2025*
- o Deep learning tricks *(Beginner) 8/12/2025*
- o Deep learning tricks *(Advanced) 15/12/2025*
- o Residual Networks *(Advanced) 5/01/2026*
- o The transformer model 1 (*Advanced) 12/01/2026*
- o The transformer model 2 (*Advanced*) *19/01/2026*
- o Generative models (Advanced) *26/01/2026*

— Optimization & machine learning (18h) with Kimia Nadjahi

6 lectures: from 2/02/2026 to 9/03/2026

- o Convexity *(Beginner) 2/02/2026 & 9/02/2026*
- o Standard algorithms for constrained or unconstrained problems *(Advanced)16/02/2026 & 23/02/2026*
- o Large scale optimization *(Advanced) 2/03/2026 & 9/03/2026*

Advanced courses - from 5 to 8 pm, Estrapade

— Web scraping (12h) with Bruno Chaves

4 lectures: from 12/02/2025 and 2/04/2025

This lecture only requires basic knowledge of Python & SQL.

- o The basics 1 *12/02/2025*
- o The basics 2 *19/03/2025*
- o Advanced Topics and legal aspects 1 *26/03/2025*
- o Advanced Topics and legal aspects 2 *2/04/2025*

— SQL in practice, NoSQL and Vector (9h) with Bruno Chaves

3 lectures: from 21/05/2026 to 4/06/2026

This lecture only requires basic knowledge of Python & SQL.

- o SQL in practice *21/05/2026*
- o NoSQL databases *28/05/2026*
- o Vector databases *4/06/2026*

— Natural Language Processing (21h) to be announced

7 lectures: from 4/05/2026 to 22/06/2026

- o Background (refresh): basic concepts from Machine Lear- ning and Neural Networks *4/05/2026*
- o Word vectors: Latent Semantic Analysis (LSA), word2vec and GloVe *11/05/2026*
- o Language Models:from N-gram models to RecurrentNeural Networks *18/05/2026*
- o Sequence-to-sequence modelling and Machine Translation (MT) *1/06/2026*
- o Attention, self-attention and Transformer-based language models *8/06/2026*
- o Pretraining and Finetuning large language models *15/06/2026*
- o Understanding ChatGPT *22/06/2026*

— Reinforcement learning (18h) with Ana Busic

6 lectures: from 16/03/2026 to 27/04/2026

- o Introduction to reinforcement learning *16/03/2026*
- o Markov decision processes and dynamic programming *23/03/2026*
- o Bandit algorithms *30/03/2026*
- o Reinforcement learning: stochastic approximation, algorithms, actor-critic, model-based *13/04/2026 & 20/04/2026*
- o Reinforcement with approximation *27/04/2026*