Nemo Fournier

Curriculum vitæ

✉ *nemo.fournier@ens-lyon.org*
perso.ens-lyon.fr/nemo.fournier/
little-nem

Education

2017 – Present **Élève de l'École Normale Supérieure de Lyon**.

2018 – 2020 **Master Degree in Computer Science**, *ENS de Lyon*, *with highest honours*.

2017 – 2018 **Bachelor Degree in Computer Science**, *ENS de Lyon*.

2015 – 2017 **Classe Préparatoire Scientifique (C.P.G.E)**, Toulouse.
MPSI and MP, major in Mathematics and Physics, minor in Computer Science

2015 **Baccalauréat Scientifique**.

Internships

September 2020 – February 2021 **5 Months Research Internship**, *IMAGES team*, Telecom Paris, supervised by Pietro Gori, joint work with Jean Feydy and Pierre Roussillon.
Tractogram segmentation using geometry induced metrics and optimal transport

January – June 2020 **5 Months Research Internship**, *Empenn*, Rennes, co-supervised by Pierre Maurel and Julie Coloigner.
Graph-based Methods for Brain Structural Connectivity Analysis

May – July 2019 **3 Months Research Internship**, *University of Edinburgh*, supervised by Kartic Subr, joint work with Tatiana Lopez-Guevara.
Reinforcement Learning of Parameters in Complex Physical Systems

June – July 2018 **6 Weeks Research Internship**, *IXXI*, Lyon, co-supervised by Paulo Gonçalves and Patrick Flandrin.
Geometry and Statistics of the Time-Frequency Signature of *High-Frequency Oscillations* in EEG

Responsabilities

Winter 2017-2018 **Organiser of a *sport-study* conference week**.
Logistic and scientific organisation of a week of conferences about current research topics in computer science, aimed at computer science students of the ENS de Lyon

2018 - Present **Leader of the Hardware team of the Symbolibre project**.
Working on the conception of the first prototypes of the Symbolibre graphic calculator, from hardware selection and design to building the actual physical prototype.

Languages

French Fluent (*Mother Tongue*)
English C1 (*CAE, 2018)*)
Spanish B2 (*School*)
Deutsch A1 (*School*)

Computer skills

Programming C, C++, MATLAB / OCTAVE, PYTHON, TENSORFLOW, OCAML, MPI
Tools LaTeX, GIT, UNIX systems

Courses Attended

September 2017 **First Semester of Bachelor**.

January 2018
- **Algorithms 1.** Algorithm design, complexity, NP-completness, approximations
- **Architecture and System.** Computer architecture from ISA to VHDL
- **Computability.** Computation models, language theory, (in)decidability
- **Programming theory.** Semantics of languages, typing, lambda calculus
- **Project 1.** Programming class, with focus on good programming practices
- **Algebra.** Duality, bilinear algebra, quadratic forms, groups and representations

January 2018 **Second Semester of Bachelor**.

June 2018
- **Algorithms 2.** Emphasis on data structures, graph theory, algorithms on words
- **System and Networks.** Operating system design, communication networks
- **Logic.** Set theory, first-order logic, model theory, Peano's axioms, Gödel's theorems
- **Probability.** Probability theory, Markov chains, randomized algorithms, statistics
- **Preparation for ACM.** Training in the effective resolution of algorithmic problems
- **Signal Processing.** Processes, spectral estimation, sampling, filtering, transforms
- **Physics, Information and Computation.** Feyman's rules, quantum computations and algorithms and information theoretic approach, IBM Q

September 2018 **First Semester of Master**.

January 2019
- **Performance Evaluation and Networks.** Random processes, queuing theory
- **Compilers and Program Analysis.** Writing a compiler, static analysis of programs
- **Information Theory.** Entropy, compression, Shannon's theorems, correcting codes
- **Parallel and Distributed Algorithms.** PRAMs, ring and grids, MPI
- **Optimisation, Approximation.** Linear programs, SDP, non-linear optimization

January 2019 **Second Semester of Master**.

May 2019
- **Computational Geometry and Digital Images.** Image and shape representation and processing, computational geometry, data structures for geometry, rendering
- **Computer Algebra.** Arithmetic of polynomials, structured and fast linear algebra
- **Cryptography and Security.** Symmetric and asymmetric crypto, security proofs
- **Machine Learning.** Standard methods, bounds and guaranties, boosting theory, non-parametric methods, metric learning, optimal transport
- **Data Bases and Data Mining.** Relational model, functional relations, Armstrong's system, normalisation, data mining, clustering

September 2019 **Third Semester of Master**.

January 2020
- **Machine Learning.** Theoretic machine learning, project on anomaly detection.
- **Numerical Methods for Computer Graphics.** Tools for image processing (Poisson processing, Monte-Carlo Methods, Optimal Transport)
- **Numerical Mechanics.** Theoretical and practical tools for simulation (Lagrangian mechanics, elasticity, inverse problems, slender structures, frictionnal contacts)
- **Hidden Markov models for time series classification and filtering.** Markov models for the analysis of time series data, focus on Bayesian decision and filtering.
- **Selected Topics in Information Theory.** Information theory, concentration inequalities, detection and estimation, hypothesis testing, decision-making processes, data compression, transmission and analysis.
- **Quantum Information and Computation.** Quantum information (quantum circuits, Shor's algorithm, Grover's algorithm) to geometry of entangled states
- **Modern Algorithms for Symbolic Summation and Integration.** Solving the problem "*[50] Develop computer programs for simplifying sums that involve binomial coefficients.*" from Knuth's Art of Computer Programming Book