

Nils Giordano

POSTDOCTORAL RESEARCHER · COMPUTATIONAL SYSTEMS BIOLOGIST

Nantes, France

🏠 www.normalesup.org/~giordano/ | 📧 nigiord | 🌐 [nils-giordano](https://nils-giordano.github.io) | 🎓 Nils Giordano

Microbial communities – Metabolic Modeling – Data Science – Metagenomics

Skills

Bioinformatics

Scripting (Python/Bash/Julia/R), Versioning (Git), Pipeline design (Snakemake/Nextflow), Metagenomics (Illumina), Genome binning, Genome annotation (EggNOG/KO), Metabolic reconstruction (CarveMe)

Biomathematics

Network analysis, Optimal control, Optimization, Metabolic modeling, Linear/non-linear dynamical systems, Time-series analysis (Kalman filtering/smoothing), Image analysis (segmentation/tracking), Sensitivity analysis

Microbiology

Cloning (molecular design, overlap PCR, Gibson assembly), Chromosomal modifications (electroporation, lambda-red recombineering), Microplate reader, Fluorescence microscope, Microfluidic

Languages

French (native), English (fluent), Italian (basic)

Experience

CNRS – Université de Nantes

Nantes, France

POSTDOCTORAL RESEARCHER

Jan. 2018 – Dec. 2019

Mentor: Dr. Samuel Chaffron (COMBI team, LS2N, CNRS).

- Constructed a global network of microbial interactions in the global ocean using Tara expeditions metagenomic and metatranscriptomic data.
- Identified communities of cultivated and non-cultivated microbes.
- Uncovered functional traits linked to mutualism, including putative metabolic cross-feeding interactions. and

Inria – Université Grenoble Alpes

Grenoble, France

RESEARCH AND TEACHING ASSISTANT, PHD STUDENT

Sep. 2012 – Mar. 2017

Supervisors: Dr. Hidde de Jong (Project-team Ibis, Inria) & Pr. Johannes Geiselmann (team BIOP, LIPhy).

- Constructed an abstract mathematical model of nutrient allocation in a microorganism.
- Applied Optimal Control to predict the optimal regulation of nutrient allocation during an environmental change.
- Showed that such a regulation is reminiscent of known regulatory processes in *E. coli* (published in *Plos Comp. Biol.*).
- Engineered bacteria with fluorescent ribosomes and monitored them during an environmental change using a microfluidic device.

INTERNSHIPS

Inria

Grenoble, France

RESEARCH ASSISTANT, INTERN

Feb.-Jun. 2012

Supervisors: Dr. Hidde de Jong & Dr. Delphine Ropers (Project-team Ibis, Inria).

- Reviewed and implemented state-of-the-art methods of sensitivity analysis on a complex model of the gene expression machinery in bacterium *E. coli*.
- Developed a brand-new dynamical method of global sensitivity analysis.
- Helped to identify the key parameters driving the model dynamics and to reduce its complexity.

University of Cambridge

Cambridge, United Kingdom

RESEARCH ASSISTANT, INTERN

Feb.-Jun. 2011

Supervisor: Pr. Raymond E. Goldstein, Department of Applied Mathematics and Theoretical Physics.

- Led a theoretical study about the evolution towards multicellularity in microalgae (Volvocales)
- Developed a general model of phosphate uptake and growth in microalgae
- Explored the role of the extracellular matrix for phosphate storage, especially in changing complexity.

École Normale Supérieure

Paris, France

RESEARCH ASSISTANT, INTERN

Jun.-Jul. 2010

Supervisor: Dr. Silvia de Monte (Eco-evolutionary Mathematics, IBENS).

- Analyzed time-series fluorescence data of oscillating yeast cells suspensions subject to periodic forcing.
- Modified an existing mathematical model based on Hopf bifurcation to recreate the observed dynamics.
- Showed that even when an irrational forcing is applied, the biological system does not exhibit any chaotic behavior (published in Journal of Computational Interdisciplinary Sciences).

Publications

A complete list of publications is available at <https://www.normalesup.org/~giordano-n>.

Mathematical Modelling of Microbes: Metabolism, Gene Expression and Growth

Hidde de Jong, Stefano Casagrande, Nils Giordano, Eugenio Ciniquemani, Delphine Ropers, Johannes Geiselmann, Jean-Luc Gouzé
Journal of The Royal Society Interface 14.136 (Nov. 2017) p. 20170502. 2017

Dynamical Allocation of Cellular Resources as an Optimal Control Problem: Novel Insights into Microbial Growth Strategies

Nils Giordano, Francis Mairé, Jean-Luc Gouzé, Johannes Geiselmann, Hidde de Jong
PLOS Computational Biology 12.3 (Mar. 2016) e1004802. 2016

Dynamical Responses of Oscillating Yeast Cell Suspensions to Periodic Forcing.

Nils Giordano, Francesco D'Ovidio, Sune Danø, Preben G. Sørensen, Silvia De Monte
Journal of Computational Interdisciplinary Sciences 3.2 (2012) pp. 77–86. 2012

Education

PhD, Systems Biology

Grenoble, France

UNIVERSITÉ GRENoble ALPES

2017

- Title – Microbial growth control in changing environments: Theoretical and experimental study of resource allocation in *Escherichia coli*
- Supervisors – Dr. Hidde de Jong & Pr. Johannes Geiselmann
- Labs – Project-team Ibis (Inria Grenoble – Rhône-Alpes) and team BIOP (Laboratoire Interdisciplinaire de Physique, Université Grenoble Alpes)

ENS Diploma

Paris, France

ÉCOLE NORMALE SUPÉRIEURE

2009–2013

- French leading research school, selected via a national competitive exam

MSc, Cell Systems Biology

Paris, France

ÉCOLE NORMALE SUPÉRIEURE & UNIVERSITÉ PIERRE ET MARIE CURIE

2012

- Gene regulatory networks, cell ecosystems, cell machinery, microscopy (quantification, image processing), graph theory, comparative genomics, population genetics, structural bioinformatics, modeling of biopolymers, *in silico* biology, genes and genomes, from gene to function, ecological systems biology, biophysics, biomathematics

BSc, Life sciences

Paris, France

ÉCOLE NORMALE SUPÉRIEURE & UNIVERSITÉ PIERRE ET MARIE CURIE

2010

- Experimental practice, ecology, physiology, molecular and cellular biology, genetics and epigenetics, bioinformatics, statistics, biomathematics, statistical and optical physics, weak-bond chemistry, modeling in biology

Teaching

Angers Bioinformatic Summer School

Angers, France

INVITED SPEAKER (1/2 DAY)

Jul. 2018

- Lecture and training on Environmental Genomics for PhD students and young scientists, in collaboration with Dr. Samuel Chaffron.

Ecole Normale Supérieure

Paris, France

INVITED SPEAKER (3 X 1 DAY)

Sept. 2013 – Aug. 2016

- Lecture and training on modeling and simulation of genetic regulatory networks for MSc students, in collaboration with Dr. Hidde de Jong.

Université Grenoble Alpes

Grenoble, France

TEACHING ASSISTANT (211 HOURS)

Sept. 2013 – Aug. 2016

- Bioinformatics: from genome analysis to modeling (BSc)
- Population genetics, conservation biology, biodiversity and evolution (BSc and MSc)
- Prokaryotic genetics and microbiology (BSc)

Presentations

2019

8 Oct. **Workshop on Environmental Genomics (GDR-GE, 5th edition)**, 15 min

La Rochelle, France

30 Sept. **Workshop Recent Computational Advances in Metagenomics (RCAM'19)**, 25 min

Paris, France

3 Jul. **Journées Ouvertes Biologie, Informatique & Mathématiques (Omics Dark Matter session)**, 15 min

Nantes, France

2018

23 Oct. **International Conference on Ecological Sciences (SFEcologie 2018)**, 15 min

Rennes, France

3 Jul. **Workshop on Systemic and Symbolic Biology (BIOSS, 4th edition)**, 15 min

Marseille, France

2016

1 Jul. **Workshop on Systemic and Symbolic Biology (BIOSS, 2nd edition)**, 15 min

Lyon, France

2015

21 Oct. **Seminar on the Modeling of Life (SeMoVi)**, 20 min

Grenoble, France

7 Apr. **Advanced Lecture Course on Computational System Biology (CompSysBio)**, 15 min

Aussois, France

Extracurricular Activity

- Sports** Outdoor/indoor climbing and bouldering (6A/B outdoor, 6B/C indoor, french quotations)
- Community** Former contributor on bioinfo-fr.net, a communautary French blog for bioinformaticians
- Misc** Advocate for the open-source and libre cultures