

Florent DUFOUR

Graduate student from tri-national program in life science, data science, and bioinformatics
With experience in medical research, digital health, and data privacy

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PROFILE

I have spent eight years of study in the field of life science and developed a particular interest in new technology during my superior education. I graduated from a unique tri-national program where I studied biotechnology and data science, in parallel with which, I enrolled in a master's degree in bioinformatics to deepen my knowledge in computational biology. I stand at the crossroad between biological and digital sciences. I have contributed to European research projects and participated in the redaction of published articles. I am eager to progress as a researcher by doing a Ph.D.

EDUCATION

M.Sc., Bioinformatics **2016 – 2018**
Faculty of health and life science, Strasbourg *With honours*
Multi-disciplinary program that provides transversal knowledge in the field of computational biology. *Topics: High throughput data processing, digital imaging, machine learning, data base management, system biology, structural biology...*

Engineering degree, Biotechnology and data science **2015 – 2018**
École Supérieure de Biotechnologie de Strasbourg *With honours*
Lectures in Strasbourg (France), Freiburg (Germany), and Basel (Switzerland) taught in English and German. International students. *Topics: Life science, biotechnology, data analytics, machine learning, biophysics, statistics, mathematics, cell/molecular biology...*

- Students representative at the university board
- Chief communication officer at the student organization NGB
- Member of the media club, video maker for student events

Preparatory class for French superior schools **2013 – 2015**
Lycée Jean Rostand, Technology and biology, Strasbourg *2nd national rank*
Highly selective syllabus to prepare and select students before accessing French superior schools. *Topics: Life science, mathematics, algorithmic (python), physics, chemistry, biochemistry, microbiology...*

- Students representative
- Member of the organization team for the Christmas gala

RESEARCH EXPERIENCE

Research engineer: Big Data and AI, medical informatics **Since 2020**
Leibniz Supercomputing Centre, Big Data and AI research group, Munich
Develop an ethical and legally compliant, highly secure, and sustainable cloud workbench for critical biomedical data storage and processing.

- Build an end-to-end encrypted high performance cloud platform from the ground up
- Fine tune storage and compute resources for machine learning tasks with heterogeneous biomedical datasets (images, multi-omic assets, graph databases etc.)
- Coordinate with the legal team to develop a framework that meets regulatory requirements
- Coordinate with partner clinics and research institutes on data migration, processing, and scaling

- Migrate and develop new biomedical pipelines and workflows

Research engineer: data privacy and blockchain technology . 2019 – 2020
Université de Lorraine, Digital division, DUNE/éole, Nancy

Complete my experience in data science with real world problematic of data privacy and self sovereignty on a large scale ($\approx 60,000$ persons).

- Full-stack development of a cloud based solution for storing GDPR compliant data with Spring Boot & Docker
- Building a blockchain infrastructure to certify their authenticity and integrity with Python & Hyperledger
- Communication about the project during meetings, conferences, and workshops to both knowledgeable and novice audiences
- Communication with 5 partner universities to promote and deploy the solution

Master internship: high throughput computing 2018
National Centre for Scientific Research, LSMBO, Strasbourg

Complete my experience in data science with software engineering and high throughput computing.

- Development of a PoC software in Java, capable of automating the data interpretation of large MS³ spectra data sets
- Development of a fully-fledged human facing interface with spectral representation and interaction
- Mediator between the 3 participating institutes
- Development of a statistic validation method with ECE Illinois collaborators

Intern: medical research, artificial organs Summer 2017
National Institute for Health and Medical Research, PROTiP, Strasbourg

Opportunity to further explore the field of medical research and image processing for the European project Immodgel.

- Confocal microscopy and automated image processing of large data sets with ImageJ
- High throughput data analysis of cellular parameters with python
- Successful design of a novel poly(dopamine) nanoparticle exhibiting angiogenic and anti-microbial capabilities for implants coating
- Participated in the redaction of an article on poly(arginine) particles

Intern: medical research, chronic pain Summer 2016
Freie Universität Berlin, Dendropharm GmbH, Berlin

First experience with medical and pharmaceutical research in an highly active spin-off of the university in the field of drug delivery.

- Data processing and risk assessment for chronic pain and illness
- Organic synthesis, purification, and quality control of polymeric nano-carriers
- Formalization and translation of Standard Operating Procedures
- Communication and lab meeting in English and German
- All in ISO 9001 & GMP controlled environments

CONTRIBUTIONS

Scientific publications

- [1] Launay, K., Amalian, J.-A., Laurent, E., Oswald, L., Ouahabi, A.A., Burel, A., Dufour, F., Carapito, C., Clément, J.-L., Lutz, J.-F., et al. (2020). **Precise alkoxyamine-design enables automated tandem mass spectrometry sequencing of digital poly(phosphodiester)s.** *Angewandte Chemie International Edition.*
- [2] Laurent, E., Amalian, J.-A., Parmentier, M., Oswald, L., Al Ouahabi, A., Dufour, F., Launay, K., Clément, J.-L., Gignes, D., Delsuc, M.-A., et al. (2020).

High-Capacity Digital Polymers: Storing Images in Single Molecules.
Macromolecules.

- [3] Knopf-Marques, H., Barthes, J., Lachaal, S., Mutschler, A., Muller, C., Dufour, F., Rabineau, M., Courtial, E.-J., Bystroňová, J., Marquette, C., et al. (2019). **Multifunctional polymeric implant coatings based on gelatin, hyaluronic acid derivative and chain length-controlled poly(arginine).** Materials Science and Engineering: C 104, 109898.
- [4] Cavallo, G., Poyer, S., Amalian, J.-A., Dufour, F., Burel, A., Carapito, C., Charles, L., and Lutz, J.-F. (2018). **Cleavable binary dyads: simplifying data extraction and increasing storage density in digital polymers.** Angewandte Chemie.

Patents

- (To come): *Development of a novel algorithm and statistic validation approach for the automation of MS³ data interpretation*

Talks

- May 2020 (cancelled, covid-19), Nancy: Pint of Science - Cryptocurrencies, dark-web and data privacy
- June 2019 (700 seats), Nancy: Digital day - Blockchain, education, and ecological concerns

Associations

- Chief Communication Officer: New Generation of Biotechnologists
- Mediator between France and Germany: Young European Biotech Network
- Event manager: Pint of Science 2020

TEACHING

- **Advanced Cloud Computing Class for Medical Researchers:** Theory and practice on building a virtual infrastructure for reproducible and AI powered workflows in the cloud at the Leibniz Supercomputing Centre (Munich, Germany)
- **Introduction to Container Technology & Application to AI:** Theory and practice on containers, High Performance Computing, Artificial Intelligence and Reproducible Science at the Leibniz Supercomputing Centre (Munich, Germany), (lecture notes: du4.link/containers)
- **Facilitator in bioethics:** Supervising think tanks and workshops related to ethics and engineering. *e.g. New concerns raised by artificial intelligence and automated learning, Data acquisition: Whose property?, Open Access and the current model of scientific publishing, Individual right to death...*
- **Tutoring:** Preparing students for scientific Baccalauréat graduation: principally mathematics, statistics, and physics
- **Scientific workshops:** During summer camps with teenagers: raft crafting, volcano modelling, skyrocket designing, molecular gastronomy...

HONOURS &
AWARDS

- **2017: Top 100 talented students of Europe (Salzburg):** Organized by Roche Continents; science, art and innovation. It takes place in Austria and celebrates the Salzburg music festival.
- **2015: Second national rank Polytech challenge (Paris):** Competitive national challenge for preparatory class students. Two phases of examination to access superior schools.
- **2013: Top 5 high school students of France in biology, Concours Général des Lycées (Nancy):** Created in 1744, the Concours Général is the most prestigious academic competition for French high school students.

COMPUTER
SKILLS

- **Languages:** Java, Python, R, bash, JavaScript, Groovy, Swift, SQL.
- **Technologies:** Tensorflow, Numpy, Pandas, Matplotlib, Processing, Docker, Hyperledger, SpringBoot, JavaFX, Maven, JUnit.
- **Platforms:** GNU/UN*X, macOS, OpenStack, slurm, aws ec2 & S3.
- **Graphics:** L^AT_EX, marpit.js, Lightroom, Photoshop, Illustrator, Final Cut Pro X, HTML/CSS

LINGUISTIC
SKILLS

- **French:** Mother tongue
- **English:** Fluent
- **German:** Conversational
- **Portuguese:** Notions

REFERENCES

Available upon request

PICTURE

Available upon request

HOBBIES

Audio Visual:

- Generative art: Processing, p5.js, vectorial drawing and interpolation, typography. Experiments with neural networks. See dufour.xyz/LAB
- Photography: Digital but mostly film (including medium format and polaroids). Oldest camera in collection: Agfa Box 44 from the 30's
- Short film making: With a group of friends. We have a web series and participate in amateur festivals with original productions, fantastic and humorist

Well being:

- Nutrition and slow food: With friends & family, green enthusiast
- Sport: Jogging & swimming (earn multiple medals from local competitions)

Adventure:

- Hitch hiking, road tripping, and motor bike touring: Canada, Australia, Iceland, and Eastern Europe among others
- Hiking and mountain climbing