

# Florent DUFOUR

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

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📄 <https://dufour.xyz>

## 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* *2<sup>nd</sup> 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 ethically 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 MS<sup>3</sup> 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., Gigmes, 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  $MS^3$  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](https://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	<ul style="list-style-type: none"> <li>– <b>Languages:</b> Java, Python, R, bash, JavaScript, Groovy, Swift, SQL.</li> <li>– <b>Technologies:</b> Tensorflow, Numpy, Pandas, Matplotlib, Processing, Docker, Hyperledger, SpringBoot, JavaFX, Maven, JUnit.</li> <li>– <b>Platforms:</b> GNU/UN*X, macOS, OpenStack, slurm, aws ec2 &amp; S3.</li> <li>– <b>Graphics:</b> L<sup>A</sup>T<sub>E</sub>X, marpit.js, Lightroom, Photoshop, Illustrator, Final Cut Pro X, HTML/CSS</li> </ul>
LINGUISTIC SKILLS	<ul style="list-style-type: none"> <li>– <b>French:</b> Mother tongue</li> <li>– <b>English:</b> Fluent</li> <li>– <b>German:</b> Conversational</li> <li>– <b>Portuguese:</b> Notions</li> </ul>
REFERENCES	Available upon request
PICTURE	Available upon request
HOBBIES	<p><b>Audio Visual:</b></p> <ul style="list-style-type: none"> <li>– Generative art: Processing, p5.js, vectorial drawing and interpolation, typography. Experiments with neural networks. See <a href="http://dufour.xyz/LAB">dufour.xyz/LAB</a></li> <li>– Photography: Digital but mostly film (including medium format and polaroids). Oldest camera in collection: Agfa Box 44 from the 30's</li> <li>– Short film making: With a group of friends. We have a web series and participate in amateur festivals with original productions, fantastic and humorist</li> </ul> <p><b>Well being:</b></p> <ul style="list-style-type: none"> <li>– Nutrition and slow food: With friends &amp; family, green enthusiast</li> <li>– Sport: Jogging &amp; swimming (earn multiple medals from local competitions)</li> </ul> <p><b>Adventure:</b></p> <ul style="list-style-type: none"> <li>– Hitch hiking, road tripping, and motor bike touring: Canada, Australia, Iceland, and Eastern Europe among others</li> <li>– Hiking and mountain climbing</li> </ul>