Sophia Yazzourh | CV

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French & Moroccan

Postdoctoral researcher in biostatistics, specializing in machine learning for medical data.

I am currently a postdoctoral fellow in the Department of Biostatistics at McGill University, supervised by Erica Moodie. My research focuses on the development of statistical and machine learning methods for precision medicine, with an emphasis on dynamic treatment regimes, causal inference, and applications in depression, dermatomyositis, and oncology.

Research interests: Reinforcement Learning, Precision Medicine, Dynamic Treatment Regimes, Bayesian Support Vector Machine, Preference Learning.

Academic Experience & Education

- **PhD in Applied Mathematics** — **IMT (FR)**
  Decision Algorithms in Medical Research — *October 2021 - October 2024*
  "Reinforcement Learning and Bayesian Outcome-Weighted Learning for Precision Medicine. Integration of medical knowledge into decision algorithms."
  Supervised by Nicolas Savy (IMT) and Philippe Saint Pierre (IMT) in collaboration with the *University of North Carolina* (UNC) at Chapel Hill, USA, including work with Michael Kosorok and Nikki L.B. Freeman.

- **Engineering Degree, Master's Level** — **INSA Toulouse (FR)**
  Specialization in Applied Mathematics & Statistics — *September 2014 - June 2021*
  - Machine Learning, High-Dimensional and Deep Learning, Artificial Intelligence Frameworks (NLP, Reinforcement Learning).
  - Innovation and Research Project on modeling a quantitative variable in the context of logistic regression using interpolation splines.

- **Erasmus** — **NTUA (GR)**
  Hosted by the Departments of Mathematics and Computer Science — *September 2016 - January 2017*
  European exchange program undertaken during the first semester of my third year in the Bachelor's program at the *National Technical University of Athens* (NTUA).

Professional Experience

- **Apprenticeship in Big Data & AI for Space Activities** — **Thales Alenia Space**
  Research and Development in Artificial Intelligence — *January 2020 - June 2021*
  - Development of a Python library of algorithms for anomaly detection, applied to the space domain.
  - Implementation and adaptation of Active Anomalies Discovery methods on time-series signals: anomaly detection within the framework of Active Learning, particularly the integration of user feedback into algorithms such as Isolation Forest or SVM.

  Technical expertise: Python, PCA, Isolation Forest (IF), SVM, Autoencoders, ROC Curves, GIT, Docker, Flask API.

- **Apprenticeship in management and industrial processes** — **Thales Alenia Space**
  Project Management — *October 2019 - January 2020*
  Focus on information transmission and tool coherence through to the maintenance phase.
  Technical expertise: Life cycle of space ground segment projects and associated tools.

- **Master's Internship, GALILEO Mission Segment** — **SOGETI HIGH TECH, Capgemini Group**
  Integration and Validation — *July 2019 - September 2019*
  - Integration of a prototype element.
  - Data and flow analysis of connected components within the Mission and Uplink Control Facility (MUCF).
  - Analysis of the European Space Agency's specifications, preparation, and implementation of test scenarios within the assembly team.

  Technical expertise: Knowledge of the GALILEO Ground Segment and its Global Operation.

Grants

- **Doctoral Grant from the French Ministry of Higher Education, Research, and Innovation**
  Three-year doctoral grant awarded through a competitive selection process.

Publications

- **Publications:**
  - Sophia Yazzourh (IMT), Nicolas Savy (IMT), Philippe Saint Pierre (IMT), and Michael Kosorok (UNC). *Medical Knowledge Integration into Reinforcement Learning Algorithms for Dynamic Treatment Regimes*, International Statistical Review, 2024. DOI: 10.1111/insr.12617.
- **On-going publications:**
  - Sophia Yazzourh (IMT) and Nikki L. B. Freeman (Duke). *Bayesian Outcome Weighted Learning.* In preparation for Biostatistics. arXiv preprint arXiv:2406.11573.
  - Sophia Yazzourh (IMT), Nicolas Savy (IMT), Philippe Saint Pierre (IMT), and Michael Kosorok (UNC). *Rewards Construction Based on Preference Learning for Dynamic Treatment Regimes.*
  - Sophia Yazzourh (McGill), Erica E.M. Moodie (McGill). *Near-Equivalent Q-learning Policies for Dynamic Treatment Regimes.*
- **Manuscript:**
  Sophia Yazzourh, *"Reinforcement Learning and Bayesian Outcome-Weighted Learning for Precision Medicine. Integration of Medical Knowledge into Decision Algorithms."*, Doctoral Manuscript, University of Toulouse, prepared at the University of Toulouse III - Paul Sabatier, 2024.

Talks

Invited Talks – Upcoming

- **Statistics Seminar – University of Glasgow** *(Glasgow, January 7, 2026) "Title to be confirmed."* Invited research seminar.
- **SSC Annual Meeting 2026** *(Hamilton, June 2026) "Invited presentation in the session Recent Advances in Dynamic Treatment Regime Inference."* Invited speaker in a thematic session.

Invited Talks

- **CSEB Annual Conference 2025** *(Montreal, August 13, 2025) "Construction of Multiple ϵ-Equivalent Recommendations for Dynamic Treatment Regimes."*
- **CRM Seminar – Université de Montréal** *(Montreal, April 25, 2024) "Reinforcement Learning for Precision Medicine: Integrating Medical Knowledge into Decision Algorithms."*
- **Statistics Seminar – UQAM** *(Montreal, April 3, 2024) "Integrating Medical Knowledge into Reinforcement Learning for Dynamic Treatment Regimes."*
- **Presentation to the PhairLab (Michael Kosorok)** *(UNC Chapel Hill, April 21, 2023) "Integration of Medical Knowledge into Reinforcement Learning for Dynamic Treatment Regimes."*

Contributions

- **CFIRB Graduate Research Symposium in Mathematics and Statistics** *(CHUM, Université de Montréal, Montreal, August 10, 2025) "Construction of Multiple ϵ-Equivalent Recommendations for Dynamic Treatment Regimes."* **Award: Best Presentation.**
- **SSC Annual Meeting 2025** *(Saskatoon, May 27–30, 2025) "Rewards Construction Based on Preference*

Learning for Dynamic Treatment Regimes."

- **8th Annual Biostatistics Research Day** *(McGill University, Montreal, May 9, 2025) "Bayesian Outcome-Weighted Learning."* **Award: Best Presentation.**
- **10th Southern Statistics Days** *(Université Toulouse III – Paul Sabatier, Toulouse, June 18, 2024) "Bayesian Outcome-Weighted Learning."*
- **IMT Student Seminar** *(Université Toulouse III – Paul Sabatier, Toulouse, June 6, 2024) "Introduction to Reinforcement Learning."*
- **55th French Statistical Days (SFdS)** *(Université de Bordeaux, Bordeaux, May 27, 2024) "Reward Construction via Preference Learning for Reinforcement Learning Models Applied to Adaptive Treatment Strategies."*
- **Toulouse Seminar "Statistics for Biology" – INRAE** *(INRAE, Toulouse, November 15, 2022) "Reinforcement Learning: Application to Adaptive Treatment Strategies."*

Posters

- **Statistics and Optimization Seminar – IMT** *(IMT, Toulouse, December 6, 2022) "Incorporating Medical Expertise into Reinforcement Learning Models Applied to Adaptive Treatment Strategies."*

Teaching & Pedagogical Projects

- **Teaching Assistant in Mathematics – Mechanical Engineering Technology Department (IUT GMP)** *(2021–2024)*
  - Led tutorials and practical sessions for undergraduate students (Years 1–3, IUT GMP).
  - Courses covered the following topics:
    - Calculus and differential/integral analysis;
    - Applied linear algebra (matrices, linear systems);
    - Probability and statistics applied to mechanical engineering;
    - Numerical methods and optimization;
    - Introduction to algorithmics and numerical modelling.
  - Delivered courses and tutorial sessions in English for the English-track program.
  - Designed and translated teaching materials (lectures, tutorials, and practical exercises) from French to English.
- **Volunteer at the Ouverture Rencontres Évolution Association (ORE)** *(2014-2021)*
  - Provided tutoring in mathematics, science, and French for students from 6th grade to senior high school.
  - Developed and delivered a beginner's course in Python programming and algorithms.

Academic Commitment

- **Member of the African Women in Science Association (AFSA), McGill Representative** (2025–): Co-organizing seminars and community-building activities promoting the visibility and advancement of African women in science within the Montreal academic community.
- **Organizer of the Student Seminar at IMT** (2022–2024): Bi-monthly organization of seminars for PhD and postdoctoral researchers, coordination of social events, and design of communication posters.
- **Member of the Organizing and Scientific Committee of the 10th Journées Statistiques du Sud** (2024): Contribution to scientific planning, speaker selection, and coordination of mini-courses and research presentations.
- **Scientific Outreach in High Schools – DECLICS Program** (2022–): Engagement in scientific mediation through discussions with high school students across the Occitanie region, introducing careers in statistics, data science, and applied mathematics.
- **Member of Scientific Societies**: French Statistical Society (SFdS), Statistical Society of Canada (SSC).
- **President of the Student Association of the Mathematics Department, INSA Toulouse** (2019–2020): Coordination of student initiatives, academic events, and departmental representation.

Interests

- **Handball Player** :
  - **Current (Canada)** — Player for the Celtiques de Montréal in Division 1.
  - **Career in France** — National 3 level club player, trained 3–4 times per week and competed in weekly matches.
  - **University** — Participation in the French University Championships (2015, 2016, 2017, 2018, 2019).
- **Head of the Handball Section and Captain of the Women's Team at INSA Toulouse** (2016–2019).
- **Treasurer of the INSA Sports Association** (2016–2017).

Additional Skills

- **Programming Languages:** Python, LaTeX, R, Matlab, Java, C, C++.
- **Development Tools:** Git, Docker, Google Cloud.
- **Foreign Languages:** English, German (limited professional proficiency), Chinese (limited professional proficiency), and Greek (basics).