SIMON DROCHMANS

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Applied Mathematics and ECE student focused on stochastic modeling, numerical methods, machine learning, and financial engineering.

EDUCATION

McGill University — M.Eng., Electrical & Computer Engineering (Intelligent Systems) 2026 - Expected Dec. 2027

Montréal, QC

Relevant coursework: Machine Learning, Deep Learning, Reinforcement Learning, Bayesian Theory and Methods, Advanced Probabilistic Machine Learning.

UCLouvain, École Polytechnique de Louvain (EPL) — BSc in Applied Math & Electrical Eng. 2023 – 2026

Louvain-la-Neuve, Belgium

Graduated with Distinction, GPA 15.48/20 | Coursework: Stochastic Processes, PDEs, Complex Analysis, Functional Analysis, Discrete Math & Probability, Statistics & Data Science, Numerical Analysis, Optimization, Graph Theory, Artificial Intelligence, Deep Learning project.

SELECTED QUANTITATIVE PROJECTS

Local Volatility Option Pricing Model with Finite Element Methods 2026

- Independently derived, calibrated, implemented, and defended a local-volatility option pricing model.
- Derived a state- and time-dependent volatility function from a second-order expansion of the Merton jump-diffusion model.
- Calibrated the local volatility surface from market option data by inverting Black-Scholes prices across maturities.
- Solved the resulting pricing PDE using the Finite Element Method and validated results against closed-form Black-Scholes benchmarks.
- Grade: 9/10, oral defense with Prof. Jean-François Remacle (co-creator of Gmsh).

Kalman & Particle Filtering for Ship Trajectory Tracking (Team of 2) 2026

- Derived joint MLE estimators (mean, scale) for Laplace-distributed acceleration noise; proved consistency and validated efficiency against the Cramér-Rao Lower Bound via Monte Carlo simulation.
- Implemented and compared a Kalman Filter against a Particle Filter for nonlinear ship trajectory estimation; diagnosed sample impoverishment in the PF and improved it via particle count and initial-variance tuning, ultimately outperforming the Kalman Filter (MSE 0.20 vs 0.22).
- Implemented adaptive resampling using Effective Sample Size thresholding to preserve particle diversity.

Adversarial Robustness of CNNs on EMNIST (Group Project), using PyTorch library 2026

- Built a CNN (PyTorch, 88.8% test accuracy) and benchmarked 6 adversarial attacks (FGSM, PGD, APGD, DeepFool, C&W, HopSkipJump); led the DeepConsensus defense strategy and implemented adversarial training (TRADES loss).

EXPERIENCE

Cybersecurity Awareness Content Developer (Student Job), Fluxys 2026

- Designed cybersecurity awareness training on phishing and AI-generated threats for employees; translated technical risks into concise learning content.

Private Tutor — Physics & Mathematics 2022 – 2023

- Tutored university-level Physics 1 & 2 and secondary-school physics and mathematics.

SKILLS

Programming: Python (NumPy, SciPy, PyTorch), C, Java, Git, Matlab

Quantitative: Probability & stochastic processes, PDEs, numerical methods, finite element methods, numerical analysis, optimization, statistics, Monte Carlo simulation, machine learning

Languages: French (native), English (IELTS C1, Band 7.5), Dutch (B1), Spanish (beginner)

HONORS & AWARDS

- Finalist, Belgian Mathematical Olympiad (OMB) (40 finalists from an initial competition of 15000 students)
- 7th place, Belgian Physics Olympiad
- Creativity Award & 2nd place Technical Award, First-Year Engineering Project — smart die using 6 inductive coils and a Raspberry Pi (original concept, team of 5).
- Graduated with Distinction — B.Eng., UCLouvain (top decile, GPA 15.48/20)