Vasily Ilin

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Education

University of Washington │ **2020 - 2025**

PhD in Mathematics

Boston University │ **2019 - 2020**

Master of Science in Computer Science │ GPA: 4.0

Boston University │ **2015 - 2019**

Master of Arts in Mathematics │ GPA: 4.0

Bachelor of Arts in Mathematics with honors

Graduated with Magna Cum Laude and the Marvin Freedman Prize
Thesis: "Stochastic Simulation Algorithms and Benchmarks" supervised by Samuel Isaacson

Graduate Coursework

Analysis

MATH 525-527 (UW) – Measure theory, functional analysis, complex analysis.
MA 511, 512 – Metric spaces, convergence, Fourier theory, integrability.
MA 711 – Measure theory, L^p spaces, integration.
MA 713 – Analytic functions, contour integration, biholomorphic maps.
MA 776 (audited) – Partial Differential Equations.

Algebra and Number Theory

MATH 504-506 (UW) – groups, field and Galois theory, homological algebra, commutative algebra, representation theory.
MA 742 – Algebras, matrix canonical forms, intro to algebraic geometry.
MA 741 – Group extensions, domains (ED, PID, UFD, Noetherian), modules, tensor products, Hom, exactness.
MA 542 – Ring & Field theory, Galois theory.
MA 547/548 – Continued fractions, cyclic groups, PIDs, quadratic reciprocity.

Probability and Statistics

MA 581, 582 – Random variables, WLLN, CLT, generating functions, estimation theory.
MA 779, 780 (audited) – Probability with measure theory.

Topology & Geometry

MATH 545-547 (UW) – Topological manifolds and smooth manifolds.
MA 563 – Fundamental forms of surfaces, curvature, geodesics.
MA 564 – Topological spaces, fundamental group, covering spaces, homotopy theory.

Applied & Computational Mathematics

MA 565, 579 – Analytic and numerical methods for ODEs and PDEs in mathematical biology.
CS 535 – TM's, uncomputability, complexity, randomized algorithms, interactive proofs, PCP theorems.
CS 537 – Randomness in Computing.
CS 591 – Large scale graph algorithms, e.g. sparsifying.

Computer Science

CS 591 – Object Oriented Design in Java.
CS 565 – Data Mining.
CS 530 – Data Structures and Algorithms.

Projects

Google Summer of Code with NUMFOCUS │ **Summer, 2021**

Successfully passed GSoC 2021 – a competitive Google-run open-source program. Implemented, tested and benchmarked several novel algorithms to simulate jump processes in space, e.g. epidemics or chemical reactions. Contributed over 7000 lines of code to DiffEqJump and maintained a biweekly blog. The project description and final writeup available here.

DiffEqJump │ **Summer, 2020**

Extensively contributed to DiffEqJump, a Julia package for building and solving jump equations via SSAs (stochastic simulation algorithms), e.g. the Gillespie method. Wrote two SSAs, one of them novel, refactored old code, wrote code toward simulating spatially non-homogeneous systems.

Dense Low Rank Subgraph │ **Summer, 2020**

Researched a novel problem of finding a dense low-rank subgraph, supported by a grant of Evimaria Terzi. The problem description, write-up and code available on github.

Fully Dynamic Connectivity │ **Spring, 2020**

Implemented a Fully Dynamic Connectivity data structure described in Henzinger and King, 1995, and did benchmarking and experimentation. Worked in Python with a partner. Report and code available on github.

Rogue-like Object-Oriented game │ **Spring, 2020**

Wrote a rogue-like Quest game playable in the terminal, following object-oriented practices. Code available on github. Additionally, worked with a partner to make a MOBA-inspired game that extends the Quest.

Bank │ **Spring, 2020**

Implemented a bank in Java. Designed and implemented the class structure, used JSON files for data permanence and Java Swing for GUI. Followed best OOP practices. Report and code available on github.

Research in Stochastic Simulation Algorithms (Work for Distinction) │ **Fall, 2018 - Spring, 2019**

Implemented several numerical methods of simulating chemical stochastic systems in three dimensions with reactions and diffusion in Julia. Compared asymptotic complexity and the real run time of each algorithm in several implementations. Received the Marvin Freedman Prize for this work. The report is available at vasilyilin.com.

Data Mining Competition │ **Fall 2019**

Placed second out of a class of over 100 graduate students in BU's data mining competition. Code available on github. The leaderboard is available here.

Mini Language │ **Summer, 2019**

Wrote an imperative language in Haskell and solved five problems from project Euler. Worked with a team of three. Code is available on github.

Research in Theoretical Behavioral Economics │ **Summer, 2018**

Wrote a full grant proposal and won the funding, explored a novel theoretical model in behavioral economics inspired by neural networks in cognitive science, implemented the model in Python. Available on github.

Work Experience

Teaching Assistant for Calculus at UW │ **Fall, 2020 - present**

I teach two discussion section of 30 people each, hold office hours and grade exams in calculus.

Teaching Assistant for Data Science at BU │ **Spring, 2020**

Taught discussions, designed homework and held office hours for a data science class at Boston University.

Tutor & Grader │ **Fall, 2016 - Spring, 2020**

I tutored pre-calculus and calculus. Graded classes in abstract algebra, mathematical statistics, differential equations and calculus.

Data Science Intern at Orion Health │ **Fall, 2017**

Developed an anomaly classifier algorithm for an AWS server based on 250 features, used PCA, T-SNE and K-means to find patterns, self-studied data science and precision medicine. Worked in a team of 6 machine learning and data science specialists.

Skills

Technical Skills

Python, Julia, Java, Git, LaTeX, Data Structures & Algorithms, Complexity Analysis & Optimization

Languages & General Skills

Russian (native), German (A3 level), problem solving, quantitative thinking, patience, ability to learn quickly, teamwork