NICHOLAS C. HAYEK

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EDUCATION

McGill University   Montreal, QC
Honours Mathematics and Computer Science   08/2022 - 05/2026

- **GPA: 3.81/4.0**
- Coursework: Algorithmic Game Theory, Quantitative Risk Management, Machine Learning, Stochastic Processes, Galois Theory.
- Awards: D. Lorne Gales Scholarship, Tomlinson Engagement Award for Mentoring, Dean's Honour List.

WORK EXPERIENCE

Department of Mathematics & Statistics, McGill   Montreal, QC (In Person)
Course Assistant   08/2025 - present

- Run a weekly problem seminar for 330 students in Advanced Calculus for Engineers.
- Review and grade homework assignments for 80 students in Honours Algebra I.

Indiana University, Indianapolis (IUI) REU Program   Indianapolis, IN (In Person)
Biomath Modelling Research Intern   06/2024 - 08/2024

- Modeled corticostriatal brain networks involved in binge alcohol drinking in rodents using a continuous-time neural network.
- Verified results from literature and analyzed model dynamics to gain insights into the biological mechanisms of addiction.
- Presented findings at the Indiana Undergraduate Math Research Conference and at the IUI Summer Research Symposium. Mentored by Prof. Alexey Kuznetsov with help from the Indiana Alcohol Research Center.

ACADEMIC PROJECTS

Math Transcriptions   01/2023 - present

- Typeset guides in linear algebra, probability, discrete math, group theory, and representation theory, among others, in LaTeX.
- ~150 downloads per month by students. Example here[4].

Migraine Calendar   09/2025

- Developed a web application[5] to track migraines securely, using a client-side, key wrapping encryption scheme. The app allows users to make accounts, create and customize calendars, and submit daily logs. Built with Firebase and JavaScript.

Honours Thesis in Algebraic Number Theory   05/2025 - 08/2025

- Researched supersingular elliptic curve isogeny graphs (SIGs) over finite fields and their applications to cryptography.
- Implemented SIGs and supersingular j-invariant finders in Python, as well as a hash function based on traversals along SIGs, which may be used to encrypt messages. Report here[6]. Mentored by Prof. Henri Darmon.

Stable Matching Visualizer   07/2025

- Developed an interactive simulator[7] of the Gale-Shapley deferred acceptance algorithm, in JavaScript.

Director of the *McGill Undergraduate Mathematics Research Journal*   08/2024 - 05/2025

- Initiated and oversaw the re-establishment of McGill's peer-reviewed, undergraduate math research journal.
- Recruited editorial and grad student review teams, fundraised, and assisted in editing and publishing.

Virtual Musical Instrument Development   12/2024 - 01/2025

- Developed a VST/AU virtual musical instrument based on over 350 self-recorded clips of a Steinway Model B.
- Build in C++ with 4 channels of audio. Implemented adjustable attack, decay, sustain, and release parameters and velocity-based sample selection. Users can play live or recorded music using a piano keyboard controller. Link here[8].

SKILLS AND ADDITIONAL INFORMATION   .

Computer	Python, Java, C, C++, OCaml, Linux, Assembly, JavaScript (Svelte), Data Science (Matplotlib, Pandas, NumPy, SciPy), LaTeX
Extracurricular Activities	Student Researcher at the McGill AI Lab (2025) Vice President at the Society of Undergraduate Mathematics Students (2024-26) Member at the CKUT Radio Station, *The McGill Tribune*, and Book Club
GRE	170/165 Quant/Verbal
Languages	English (native)
Interests	Jazz piano, web development, reading

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[2] https://github.com/hayekn

[3] https://www.linkedin.com/in/nicholas-hayek-b24b1a243/

[4] https://sumsmcgill.ca/wp-content/uploads/2025/10/Algebra-4-Notes.pdf

[5] https://nicholashayek.com/goodcalendar/

[6] https://nicholashayek.com/tex/MATH/470/470report.pdf

[7] https://nicholashayek.com/matchmaker/

[8] https://nicholashayek.com/proj.html