

NICHOLAS C. HAYEK

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EDUCATION

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

- **GPA: 3.8/4.0**
 - Selected Coursework: Homological Algebra, Representation Theory, Algorithmic Game Theory, Machine Learning.
 - 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

Course Transcription 01/2023 - present

- Publish typeset transcriptions for courses in linear algebra, probability, discrete math, ordinary differential equations, group theory, and Galois theory, among others, in LaTeX (300+ pages). ~150 downloads per month by students. Example [here](#).

Migraine Tracker Web App 11/2025

- Developed a [web application](#) to track migraines using Firebase, Svelte, and JavaScript. Secured with client-side encryption.
 - Allows users to make accounts, create and customize calendars, and submit daily logs.

Honours Research Project 05/2025 - 08/2025

- Studied 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 128-bit messages. Report [here](#). Mentored by Prof. Henri Darmon.

Gale-Shapley Visualizer 07/2025

- Developed an [interactive visualizer](#) 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 only peer-reviewed, undergraduate math research journal, which has been defunct since 2014.
 - Recruited editorial and grad student review teams, fundraised, and assisted in curating and editing articles.

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.
 - Built 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](#).

SKILLS AND ADDITIONAL INFORMATION

Computer Python, Java, C, C++, OCaml, Linux, Assembly, JavaScript (Svelte), Data Science (Matplotlib, Pandas, NumPy, SciPy), LaTeX

Extracurricular Activities Vice President, External of the Society of Undergraduate Mathematics Students
Student Researcher at the McGill AI Lab

Lapwings CKUT Radio St English (native)

Languages..... English (native) **Language skills** Basic production, web development, reading, writing, listening, speaking.