

# NICHOLAS CARMINE HAYEK

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## EDUCATION

<b>McGill University</b> <u>B.A. Honours Mathematics and Computer Science</u>	Montreal, QC 08/2022 - 05/2026
<ul style="list-style-type: none"><li>• GPA: <b>3.81/4.0</b></li><li>• Coursework: Propositional Proof Complexity, Homological Algebra, Representation Theory, Galois Theory.</li><li>• Honours: D. Lorne Gales Scholarship; Tomlinson Engagement Award for Mentoring; Dean's Honour List.</li></ul>	

## WORK EXPERIENCE

<b>Department of Mathematics &amp; Statistics, McGill</b> <i>Course Assistant</i>	Montreal, QC (In Person) 08/2025 - present
<ul style="list-style-type: none"><li>• Run a weekly problem seminar for 330 students in Advanced Calculus for Engineers.</li><li>• Review and grade homework assignments for 80 students in Honours Algebra I.</li></ul>	
<b>Indiana University Indianapolis (IUI) REU Program</b> <i>Biomath Modelling Research Intern</i>	Indianapolis, IN (In Person) 06/2024 - 08/2024
<ul style="list-style-type: none"><li>• Modeled corticostriatal brain networks involved in binge alcohol drinking in rodents using a continuous-time neural network.</li><li>• Verified results from literature and analyzed model dynamics to gain insights into the biological mechanisms of addiction.</li><li>• 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.</li></ul>	

## ACADEMIC PROJECTS

<b>Course Transcription</b>	01/2023 - present
<ul style="list-style-type: none"><li>• Typeset guides in algebra, probability, discrete math, group theory, among others, in LaTeX.</li><li>• ~150 downloads per month by students. Example <a href="#">here<sup>4</sup></a>.</li></ul>	
<b>Honours Research Project</b>	
<ul style="list-style-type: none"><li>• Studied supersingular elliptic curve isogeny graphs (SIGs) over finite fields and their applications to cryptography.</li><li>• Implemented SIGs and supersingular <math>j</math>-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 <a href="#">here<sup>5</sup></a>. Mentored by Prof. Henri Darmon.</li></ul>	
<b>Director of the <i>McGill Undergraduate Mathematics Research Journal</i></b>	
<ul style="list-style-type: none"><li>• Initiated and oversaw the re-establishment of McGill's peer-reviewed, undergraduate mathematics research journal, which has been defunct since 2014.</li><li>• Recruited and managed editorial and grad student review teams, fundraised, and assisted in curating and editing articles.</li></ul>	
<b>Migraine Calendar</b>	
<ul style="list-style-type: none"><li>• Developed a <a href="#">web application<sup>6</sup></a> 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.</li></ul>	
<b>Virtual Musical Instrument Development</b>	
<ul style="list-style-type: none"><li>• Developed a VST/AU virtual musical instrument in C++, based on 350 self-recorded clips of a Steinway Model B.</li><li>• 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 <a href="#">here<sup>7</sup></a>.</li></ul>	

## 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

CKUT Radio Station, The McGill Tribune, Book Club

**Languages** ..... English (native)

**Interests** ..... Jazz piano, reading, web development

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<sup>1</sup> <https://nicholashayek.com/>

<sup>2</sup> <https://github.com/hayekn>

<sup>3</sup> <https://www.linkedin.com/in/nicholas-hayek-b24b1a243/>

<sup>4</sup> <https://sumsmcgill.ca/wp-content/uploads/2025/10/Algebra-4-Notes.pdf>

<sup>5</sup> <https://nicholashayek.com/tex/MATH/470/470report.pdf>

<sup>6</sup> <https://nicholashayek.com/goodcalendar/>

<sup>7</sup> <https://nicholashayek.com/proj.html>