

# NICHOLAS C. 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: 3.8/4.0</li><li>• Coursework: Algorithmic Game Theory, Quantitative Risk Management, Machine Learning, Representation 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>• 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). ~120 downloads per month by students. Example <a href="#">here<sup>4</sup></a>.</li></ul>	
<b>Migraine Tracker Web App</b>	
<ul style="list-style-type: none"><li>• Developed a <a href="#">web application<sup>5</sup></a> to track migraines using Firebase, Svelte, and JavaScript. Secured with client-side encryption.</li><li>• Allows users to make accounts, create and customize calendars, and submit daily logs.</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>6</sup></a>. Mentored by Prof. Henri Darmon.</li></ul>	
<b>Gale-Shapley Visualizer</b>	
<ul style="list-style-type: none"><li>• Developed an <a href="#">interactive visualizer<sup>7</sup></a> of the Gale-Shapley deferred acceptance algorithm in JavaScript.</li></ul>	
<b>Director of the McGill Undergraduate Mathematics Research Journal</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>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>8</sup></a>.</li></ul>	

## SKILLS AND ADDITIONAL INFORMATION

<b>Computer</b>	Python, Java, C, C++, OCaml, Linux, Assembly, JavaScript (Svelte), Data Science (Matplotlib, Pandas, NumPy, SciPy), LaTeX
<b>Extracurricular Activities</b>	
Vice President, External of the <a href="#">Society of Undergraduate Mathematics Students</a> Student Researcher at the <a href="#">McGill AI Lab</a> CKUT Radio Station, <a href="#">The McGill Tribune</a> , Book Club	
<b>Languages</b>	
English (native)	
<b>Interests</b>	
Jazz piano, music production, web development, reading	

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

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

<sup>5</sup> <https://nicholashayek.com/goodcalendar/>

<sup>6</sup> <https://nicholashayek.com/tex/MATH/470/470report.pdf>

<sup>7</sup> <https://nicholashayek.com/matchmaker/>

<sup>8</sup> <https://nicholashayek.com/proj.html>