

Joseph Katz

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Research Interests: Molecular Genetics, immunogenetics, statistical genomics, computational biology.

Education

May 2026 – *University of Toronto and SickKids*, MSc Applied Immunology by Advanced Standing, Division of Gastroenterology Hepatology and Nutrition, Cell and Systems Biology
Supervisor: [Dr. Eytan Wine](#)

Sept 2022 – Apr. 2026 *University of Toronto*, BSc (Honours) Life Science Program.
Physiology and Immunology double major

Overall GPA: 3.86 (Sept. 2022 – May 2026)
Immunology (IMM250): 89 (A) (class average 77)
Biochemistry (BCH210): 86 (A) (class average 70)
Physiology II (PSL301): 87 (A) (class average 70)
Cell Biology II (BIO230): 90 (A+) (class average 73)
Developmental Immunology (IMM429): 95 (A+)
Immunology Honour's Thesis (IMM450): 95 (A+)

Sept 2014 – May 2022 *Upper Canada College*, International Baccalaureate Program
IB advanced specialization: Physics, Math, Economics

Research Experience

May 2026 – Supervisor: [Dr. Eytan Wine](#), Division of Gastroenterology Hepatology and Nutrition, Cell and Systems Biology - Causal and Mechanistic Dissection of Ultra-Processed Food: Driven Gastrointestinal Inflammation Using Patient-Derived Organoids, Microbiome Platforms, Advanced Barrier Physiology, Immune Profiling, and Integrative In Vivo Models

Sept 2025 – Supervisor: [Dr. Mamatha Bhat](#), Multi Organ Transplant Program, *University Health Network* – Using Image Mass Cytometry to Describe the Liver Allograft Fibrosis Immune Environment

- Independently developed a Python workflow for human liver Image Mass Cytometry preprocessing, single-cell segmentation, immune-cell phenotyping, and dimensional analysis (UMAP, t-SNE)
- Analyzing pre- and post-fibrosis liver allograft biopsies to identify immune population shifts and cell-cell interactions

Jan 2025 –

Supervisor: [Dr. Mamatha Bhat](#), Multi Organ Transplant Program, *University Health Network* – Multi-Agent AI Evaluation of Donor Suitability in Liver Transplantation

- Designed a Python-based multi-agent system simulating a liver-transplant selection committee to optimize donation and mitigate liver discard
- Implemented current donor guidelines with Retrieval Augmented Generation in the processing of clinical data of over 40,000 donors to support realistic decision-making

May 2025 – Aug 2025

United Health Network ORT Summer Student Research Program

- Created and presented a poster of the Donor Agent project at the Summer Student Research Conference as first author
- Answered questions, presented findings, and translated complex computational and clinical concepts into a visual and written digestible format
- Participated in seminars covering research design, ethics, data interpretation, and scientific communication

Jan 2024 – Sept 2024

Mount Sinai Research Student: Silverberg Gastroenterology Lab

- Topic: Identification of genetic molecular risk factors for development of inflammatory bowel disease
- Performed blood DNA extraction, DNA quantification, and ELISA assays (fecal calprotectin) on hundreds of samples independently
- Created data analysis tables, data visualization tools, and performed comparative and regression statistical analyses across cohorts of inflammatory markers using Excel and R programming

Formal Research Skills Training

PSL372 – Mammalian Physiology Laboratory – Pharmacological Testing, Dissection skills, Force Transducer Setup, Electrophysiological Measurements, EMG, Blood Type Testing, Blood Pressure Testing, Basic skills and laboratory techniques in physiology

BIO230 – Cell Biology: Genes to Organisms – PCR, Pipette skills, DNA extraction, Gel Electrophoresis, Microscope Skills, Slide Prep

STA288 – Stats for Life Sci – Proficiency in R and R studio, Data Cleaning and Data Management, Data Visualization, Statistical Analysis

Skills and Certifications

Computational and Data Analysis: R, R Studio, Python, Microsoft Excel, PowerPoint, data cleaning, data visualization, regression analysis, statistical modeling, CrewAI, Mesmer, Retrieval Augmented Generation, Cell Segmentation, t-SNE and UMAP plotting, numpy, pandas.

University Level Biostatistics and Study Design I, Calculus I and II, R coding, Introductory Python, Cell Biology Lab, Physiology Lab Methods, Organic and Biochemical lab purification techniques.

Clinical Certifications: CPR-C, Standard First Aid, National Lifeguard, Israeli First Responder National Certification

Wet-Lab Techniques: DNA extraction, PCR, gel electrophoresis, ELISA, microscopy, dissection, electrophysiology, spirometry, blood typing, force transduction, biospecimen processing, organic chemistry purification techniques.

Awards and Accomplishments

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| Jun 2023, 2024, 2025, 2026 | University of Toronto Dean's List Scholar U of T
Recognized for achieving a cumulative GPA of 3.50 or higher, awarded after completing 5 and 10 credits. |
| Apr 2022 | General Proficiency Award Upper Canada College
Honored for academic achievement during the 2021–2022 school year. |
| Apr 2021 | Maurice Clarkson Prize of Academic Honours with Distinction
Awarded to students in the top 10% of academic standing. |
| Mar 2018 | University of Toronto Science Fair Provincial Gold Recipient
Recognized for research comparing the efficacy of naturopathic remedies and antibiotics in inhibiting <i>E. coli</i> and <i>Staphylococcus aureus</i> growth. |

Work and Volunteer Experience

Jun 2023 – Aug 2023

Magen David Adom: Paramedic First Responder Volunteer

- Delivered emergency care in high-pressure environments, transporting patients to hospitals in Haifa, Israel.
- Administered life-saving interventions, including CPR and first aid, for stroke, heart attack, trauma, and respiratory patients.
- Collaborated with a multidisciplinary team to provide emotional and medical support to patients, communicating in Hebrew.

May 2023 – Jul 2023

Lifeguard: Superior Pool Spa and Leisure

- Supervised the safety of patrons, performing regular inspections of pool equipment and ensuring adherence to safety protocols.
- Conducted routine repairs on pool systems and actively engaged with patrons to build positive relationships and maintain a safe environment.

May 2022 – Aug 2022

Canoe Lifeguard and Staff: Camp Kadimah

- Independently managed groups of 15–20 children, teaching canoeing and ensuring their safety during water sports activities.
- Provided immediate responses to minor injuries and worked collaboratively with co-workers to ensure a secure and enjoyable environment.
- Taught children the basics of canoeing and boat safety.

Jun 2022 – Aug 2022

Video Producer and Editor: Canadian Glomerulonephritis Registry

- Produced and edited a promotional video used to support a research grant application for the Canadian Glomerulonephritis Registry.
- Awarded Best Visual Effects by the Can-Solve CKD organization for innovative and engaging video content.

Nov 2021 – Mar 2022

Musician and Manager: Baycrest Senior Service Society

- Founded and managed a band that performed for Alzheimer's patients at Baycrest Hospital, organizing regular performances and recording an album to raise funds for the hospital.
- Led the group's practices, played piano and saxophone, and coordinated logistics to ensure seamless performances.

Dec 2020 – Jan 2021

Covid Lab Volunteer: Shared Hospital Laboratory

- Supported Ontario's COVID-19 case surge in PCR test processing and sample organization.
- Coordinated patient sample flow and logged patient data, ensuring proper test management.
- Contributed to organizing storage and organization systems for patient samples based on variant identification.

Sept 2020 – Dec 2021

Musician and Head of Publicity: *Skyky SickKids Concert*

- Led the organization and promotion of fundraising concerts, utilizing emails, posters, and announcements across schools and local neighbourhoods.
- Performed in a Jazz Quartet and collaborated with team members to plan, practice, and execute the performances.
- Successfully raised over \$5,000 for pediatric research at SickKids Hospital through strategic event promotion and community outreach.

Co-Curricular Activities

Sept 2024 –

Weekly Jewish Torah Studies: Forest Hill Jewish Center

Sept 2022 –

Member & Instructor: *Harthouse* Athletics Weightlifting Club

Sept 2011 –

Recreational and RCM Piano

Jun 2024 – Aug 2024

Fralick Lab Epidemiology and Statistics Crash Course

Sept 2021 – Jan 2024

Volleyball Player: *University of Toronto* Intramurals League

Sept 2017 – Apr 2022

Saxophonist & Clarinetist: *Upper Canada College* Jazz Band

Sept 2017 – Apr 2022

Clarinetist: *Upper Canada College* Symphonic Band