

Alexander Turco

Graduate Student, MSc in Medical Biophysics, University of Toronto

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Education

University of Toronto: MSc in Medical Biophysics

Sep 2024 - Present

Thesis Supervisor: Dr. Sushant Kumar

- MSc Thesis Title: Decoding the Cancer Repeatome: Nanopore-Based Discovery of Non-B DNA Structures and Mechanistic Insights into Tandem Repeat Expansions in Cancer

McMaster University: Honours BSc in Biology, Research Specialization

Sep 2019 - Dec 2023

Thesis Supervisors: Dr. G. Brian Golding, Dr. Rosa da Silva

- Honours Thesis Title (Dr. Golding): Estimating Evolutionary Parameters for Protein Low Complexity Regions using an Approximate Bayesian Computation
- Honours Thesis Title (Dr. da Silva): Cells at War: The Playfulness of Game-Based Learning

Specialized Skills

Programming Languages and High Performance Computing: R, Python, C++, Git/GitHub, Unix/Linux, Bio-Conductor, bash, ComputeCanada, L^AT_EX

Genomic Tools & Methods: SPAdes, Kraken2, BLAST, FastP, sam/bamtools, GSEA, DESeq2, PCA, BWA, tidyverse, ggplot, dplyr, Dorado (Nanopore), Remora (Nanopore), minimap2, Verkko, hifiasm, IGV, PyTorch, Scanpy, AnnData

Soft Skills: Collaboration, communication, detail-oriented, highly organized, creative problem solver, highly adaptive

Research Experience

Research Technician I - Kumar Lab, Computational Cancer Genomics

Jan 2024 - August 2024

Princess Margaret Cancer Research Centre, University Health Network

Toronto, ON, Canada

- Explored alternative (non-B) DNA structures using long-read sequencing data.
- Built a workflow to process (basecall + align) raw long read sequencing data from the Human Genomic Structural Variation Consortium (HGSVC) and extract translocation time metrics (time it takes for a DNA base to pass through sequencing nanopore).
- Developed a machine learning model to detect the presence of alternative (non-B) DNA structures based on extracted translocation times.
- Examined the landscape of potential non-B DNA structures across the genome using high quality, phased, telomere-to-telomere genome assemblies.

Research Student - Kumar Lab, Computational Cancer Genomics

May 2023 - August 2023

Princess Margaret Cancer Research Centre, University Health Network

Toronto, ON, Canada

- Explored sex differences in gene expression across twelve human cancers to elucidate genetic interactions that selectively kill cancerous cells (synthetic lethal interaction).
- Developed a bioinformatic pipeline to analyze gene expression (RNA-seq) data from The Cancer Genome Atlas (TCGA), specifically focusing on determining differentially expressed genes that interact in a synthetic lethal manner.

- Created detailed documentation on operating procedures for computational pipeline.
- Concisely communicated scientific research to field specific and public audiences.

Research Student - Golding Lab, Bioinformatics and Molecular Evolution May 2022 - April 2023

Department of Biology, McMaster University

Hamilton, ON, Canada

- Explored the microbial composition of freshwater algal bloom sites across Ontario (summer project), as well as the evolution of protein low complexity regions (undergraduate thesis).
- Utilized bioinformatic tools and experimental design related to data visualization, genomic data analysis, phylogenetics, and molecular evolution.
- Analyzed and manipulated 16s rRNA amplicon sequence data collected by the Ministry of Environment and Climate Change (MOECC) to understand the toxicity of algal blooms.
- Developed a C++ program to simulate the evolution of protein low complexity regions as part of a step in an Approximate Bayesian Computation, in order to predict parameters that accurately describe the evolution of these regions.
- Comprehensive training in bioinformatic software and high performance computing such as R, Python, and Unix.
- Created detailed documentation describing background information, methods, and results.
- Concisely communicated scientific research through oral and poster presentations at two conferences.

Research Student - da Silva Lab, Pedagogy and Science Education

May 2022 - April 2023

Department of Biology, McMaster University

Hamilton, ON, Canada

- Explored the impacts of bringing game-based learning into university classrooms, through the development of a biological video game called "Cells at War".
- Collaborated with artists, designers, programmers, musicians, and scientists across the globe to conceptualize, design, and build an educational tool to teach first year students core cellular and molecular biology concepts.
- Provided biological expertise, and applied critical thinking strategies to synchronize scientific facts with the creative game design process.
- Created student feedback survey and analyzed results to better understand how video games improve student engagement and motivation.
- Communicated scientific research through oral presentations at two conferences as well as a full research paper highlighting student perceptions on game-based learning.

Presentations and Conferences

Poster Presentation

May 2025

Medical Biophysics Graduate Student Symposium, University of Toronto

Toronto, ON, Canada

- The Medical Biophysics Graduate Symposium brings together graduate students and faculty in the department of Medical Biophysics for a day to showcase research.

Poster Presentation

April 2025

Toronto DNA Replication and Repair Symposium, University of Toronto

Toronto, ON, Canada

- The [Toronto DNA Replication and Repair Symposium](#) aims to connect researchers in the field of genome integrity, DNA replication and repair across departments and institutes.

Conference Attendee

September 2024

Telomere-to-Telomere Face-to-Face Conference, University of California Santa Cruz

Santa Cruz, CA, USA

- The [Telomere-to-Telomere \(T2T\) consortium](#) is an open, community-based effort to generate the first complete assembly of a human genome.

Oral Presentation*University Health Network Summer Training and Research Program*

- 3 minute thesis virtual presentation.

August 2023
Toronto, ON, Canada

Oral Presentation*The Western Conference on Science Education*

- A STEAM game-based learning framework: Maximizing integrated and immersive learning in the classroom.
- Presented by supervising professor Dr. Rosa da Silva
- Conference publication available in [The Western Conference on Science Education Journal, 2023](#)

July 2023
London, ON, Canada

Oral Presentation*Biology Undergraduate Symposium, McMaster University*

- Undergraduate thesis presentation in computational biology.

April 2023
Hamilton, ON, Canada

Oral Presentation*Biology Undergraduate Symposium, McMaster University*

- Undergraduate thesis presentation in science education.

April 2023
Hamilton, ON, Canada

Poster Presentation*MacWater Challenges in Water Monitoring Conference*

- Poster presentation on 16s rRNA sequencing analysis of harmful algal blooms in Ontario.

October 2022
Hamilton, ON, Canada

*Awards & Honors***MBP Excellence OSOTF PMH Award***Ontario Cancer Institute & Princess Margaret Cancer Centre \$5,000.00**Aug 2025***Canada Graduate Scholarship Masters (CGS-M)***Canadian Institutes of Health Research \$30,000.00**May 2025***Best Poster Award***Toronto DNA Replication and Repair Symposium, University of Toronto, \$100.00**April 2025***Oral Presentation Award in Computational Biology***Biology Undergraduate Symposium, McMaster University**April 2023***Oral Presentation Award in Science Education***Biology Undergraduate Symposium, McMaster University**April 2023***3rd Place Abstract Award***MacWater Challenges in Water Monitoring Conference, McMaster University**October 2022***Research stipend for the creation of Cells at War: A Biological Video Game***Co-operative Education and Work-Integrated Learning Canada (CEWIL), \$6000.00 Sept 2021 - Dec 2023*