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: Currently in rotation period

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, LaTeX
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*

- Exploring 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).
- Developing a machine learning model to detect the presence of alternative (non-B) DNA structures based on extracted translocation times.
- Examining 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 - Present
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

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 August 2023
University Health Network Summer Training and Research Program *Toronto, ON, Canada*

- 3 minute thesis virtual presentation

Oral Presentation July 2023
The Western Conference on Science Education *London, ON, Canada*

- 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

Oral Presentation April 2023
Biology Undergraduate Symposium, McMaster University *Hamilton, ON, Canada*

- Undergraduate thesis presentation in computational biology

Oral Presentation April 2023
Biology Undergraduate Symposium, McMaster University *Hamilton, ON, Canada*
- Undergraduate thesis presentation in science education

Poster Presentation October 2022
MacWater Challenges in Water Monitoring Conference *Hamilton, ON, Canada*
- Poster presentation on 16s rRNA sequencing analysis of harmful algal blooms in Ontario

Awards & Honors

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 Best 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*