

Alexander Turco

Research Student, BSc in Biology, Research Specialization

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Education

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, Remora, minimap2, IGV,

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 - Present

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 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.

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 DNA 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

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

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 - Present