

Statement of Purpose – MSc in Scientific Computing at Memorial University of Newfoundland

“The more I know, the more I realize I know nothing.” – Socrates. This sentiment has guided my academic journey, from my first encounter with programming to my current pursuit of integrating advanced computational techniques with scientific applications. My academic path began with a pivotal moment in my sophomore year when programming was introduced in my university curriculum. The ability to transform abstract concepts into executable code that solved real-world problems ignited an intellectual passion that continues to drive me today.

A pivotal moment in my academic journey came during my undergraduate research project, “Machine Learning-based fault detection system in Induction motors.” This project allowed me to apply deep learning models to a practical engineering problem, where I implemented neural networks to identify anomalies in motor performance without extensive feature engineering. This experience demonstrated the transformative potential of combining domain-specific knowledge with advanced computational techniques – a synergy that lies at the heart of scientific computing.

My professional experience at Newmont Corporation further exposed me to large-scale data systems and computational infrastructure in an industrial setting. Currently, I am enrolled in a Master of Data Science program where I’ve developed strong foundations in statistical analysis and machine learning while significantly advancing my programming capabilities in Python and R. This program has equipped me with valuable skills in algorithm development, data structures, and computational thinking that I’m eager to apply to scientific computing challenges, particularly those requiring high-performance computing solutions for complex simulations.

My decision to pursue an MSc in Scientific Computing at Memorial University stems from my desire to bridge the gap between data science techniques and scientific applications. I am particularly drawn to MUN’s interdisciplinary approach, which would allow me to apply advanced computational methods to substantive scientific problems. The program’s emphasis on high-performance computing architectures and software development tools for parallel and vector computers aligns perfectly with my research interests.

I am especially interested in working with Dr. Elsa Cardoso-Bihlo in the Mathematics and Statistics department. Her research in physics-informed neural networks (PINNs) and deep operator networks represents an exciting frontier where traditional numerical analysis meets modern machine learning techniques. The application of symmetry methods to reduce computational complexity in solving differential equations and the development of invariant numerical schemes for high-performance simulations particularly resonate with my interests. I am eager to explore how deep learning techniques can be applied to scientific computing problems, particularly in designing efficient numerical methods for large-scale simulations. Having developed a foundation in machine learning through my current data science program, I am now motivated to understand how these techniques can be optimized and scaled using high-performance computing resources for solving complex scientific and engineering problems.

The MSc in Scientific Computing at Memorial University, with its focus on state-of-the-art numerical methods, high-performance computer architectures, and software development tools for parallel computing, offers the ideal environment for me to develop these skills. The program’s connection with ACEnet would provide invaluable access to high-performance computing resources that are essential for the research I hope to pursue. Additionally, the interdisciplinary nature of the program would expose me to a broader range of scientific applications than traditional discipline-based programs, enhancing my versatility as a researcher.

My long-term goal is to work in research roles in applied fields, where I can contribute to pushing the boundaries of what is computationally possible in scientific domains. I believe that the MSc in Scientific Computing at MUN, particularly the thesis-based path, would provide me with the advanced computational skills and research experience necessary to achieve this goal.

I am committed to this intellectual journey and to contributing to Memorial University’s tradition of excellence in scientific computing. Given the opportunity, I will work assiduously to advance our understanding of how computational methods can address complex scientific challenges. I have made my decision to pursue this path, and I eagerly await yours.