# RESL 1500 Undergraduate Research certificate E-Portfolio – Reflective Essay

Over the course of my degree, 'Honours Bachelor of Science in Cellular, Molecular, and Microbial Biology with a minor in Chemistry' at Thompson Rivers University (TRU), research has become the foundation of how I understand science, learning, and my goals for the future. While my academic record has been consistent with Dean's List standing and a GPA above 4.0 in multiple terms reflects my discipline and love of learning, it does not fully capture what I spend the majority of my time at university on. Through independent research, teaching, and science communication, I have gained technical expertise, confidence, and a deeper appreciation for the responsibility scientists hold within society.

When I first entered university, I viewed science primarily as the acquisition of knowledge: learning mechanisms, memorizing pathways, and mastering laboratory techniques. Research changed that perspective. My first major project, 'Developmental and environmental variation in the microbial communities of the newly hatched juvenile marine snail, *Nucella ostrina,*' required me to move beyond structured laboratory exercises and into experimental design, troubleshooting, and data interpretation. I learned that research rarely follows a linear path. Fieldwork conditions vary, extractions fail, sequencing data requires cleaning, and statistical analyses that I'm still working on over a year later. Research is attempting to do something no one has ever done before, and unexpected results aren't rare their consistent. Through this project, I stopped seeing unexpected results as failure and began to see them as opportunities for discovery and new questions.

Through this work, I developed a vast amount of different field and lab skills but more importantly, I developed intellectual skills, the ability to critically evaluate literature, identify

bias and the ability to contextualize findings within broader ecological and evolutionary frameworks. Preparing this work for publication required an additional level of rigour. Writing for a scientific audience has been a huge learning curve, learning to construct logical arguments, justify methodological decisions, and anticipate reviewer critique. Research taught me not just how to generate data, but how to defend and communicate it, and lastly, take a lot of criticism.

Presenting my research at conferences including national and regional venues further transformed how I understand communication. I have learnt that simple is always best people even in your field get lost in complex methodology. Competing in the “In a Nutshell” Three-Minute Thesis Competition in March 2025 fundamentally shifted that mindset. Winning both First Place and Audience Choice demonstrated that clarity, not complexity, defines effective communication. I learned to how to communicate microbial ecology and marine ecology into narratives that non-specialists could grasp. This experience reshaped how I write, speak, and teach. I now prioritize clarity and audience awareness, understanding how a presentation need to change based on whether addressing researchers, undergraduate students, or community members.

My current honours thesis, ‘The determination of triglyceride levels in *Nucella ostrina* using quantitative nuclear magnetic resonance (NMR) spectroscopy’, has deepened my quantitative and interdisciplinary skills. Integrating chemistry-based analytical techniques with ecological questions required me to bridge disciplines intentionally. As a microbiologist doing a project in two fields I know nothing about (analytical chemistry and ecology) has been a challenge to say the least. But I have gained experience in analytical method development, making calibration curves, interpreting spectroscopic data and praying the NMR works, all with

relating this to the animal's physiology and ecology. This work strengthened my confidence in navigating complex instrumentation and reinforced the importance of precision, reproducibility, and method development. I have also come to appreciate how biochemical measurements connect directly to ecological resilience, energetic trade-offs, and environmental stress responses. Research is no longer abstract; it is a tool for understanding how organisms survive in changing environments.

Beyond technical competencies, research has cultivated resilience and independence. Managing long-term projects demanded time management, adaptability, and sustained motivation. There were moments of equipment malfunction, inconclusive data, and competing deadlines. My directed studies project has lasted 2.5 years, with the last 1.5 years just being writing, and I'm still not done. Learning to persist through uncertainty strengthened my problem-solving skills and my tolerance for disappointment and lost funding, an attribute essential for any scientist. My current honours project has been a non-stop disaster with samples being left out, ruining half of my project, the instrument being down for a month, delaying me, but all this, although unfortunate, is just how research goes sometimes.

Community outreach through organizations such as the Microbiology Outreach Foundation, Let's Talk Science, and Geneskool further broadened my perspective. Engaging elementary and secondary school students reminded me that scientific literacy begins long before university. Communicating marine biology and microbiology to younger audiences required creativity and enthusiasm. It also reinforced the societal importance of accessible science. These experiences shifted my thinking from focusing solely on academic achievement to recognizing science as a

shared, public endeavour. Scientists rely on public interest and taxpayer money for funding public adherences and interest is essential to destigmatize science and continue funding.

The importance of my research extends beyond personal development. Investigating microbial communities and energetic reserves in marine snails contributes to broader questions about organismal resilience under environmental stress. Intertidal ecosystems are dynamic and increasingly affected by climate change. Understanding how developmental stage, microbiome composition, and energy reserves interact provides insight into survival strategies in fluctuating environments. Contributing to this knowledge base reinforces my commitment to research that is ecologically relevant and methodologically rigorous.

Looking forward, these experiences have clarified my aspirations. I intend to pursue graduate studies at Dalhousie University this coming May, examining essential fatty acids in phytoplankton. The interdisciplinary nature of my honours work has shown me the value of crossing traditional boundaries between chemistry, microbiology, and ecology. I am particularly motivated to continue research that examines organismal responses to environmental stressors at multiple biological scales from macromolecules to ecosystems.

In reflecting on my research journey, the most significant change has been in how I define my achievements. Early in my degree, getting high grades and mastery of content was everything, and although this is still important, having intellectual curiosity, resilience, and meaningful communication is equally important. Research transformed my way of thinking from memorizing established knowledge to generating and evaluating new knowledge. It reshaped my behaviour from passive learner to active contributor, and it has refined my communication to purposeful storytelling.