

In Conversation with Indigenous Professor Ryland Giebelhaus

Can you introduce yourself, and tell us a little bit about where you are from?

I'm Ryland Giebelhaus, I'm Métis. I grew up in Kelowna, British Columbia. I am Métis, and my Metis family originates from modern day Portage La Prairie, Manitoba. My family moved to the Okanagan in the 60s and has been there ever since. I was fortunate to have been born and raised in beautiful Kelowna, British Columbia. Now I am currently living in Edmonton, Alberta, as a PhD candidate, and just finishing up my PhD before I start my professorship at the University of Victoria, in July 2025.

Can you share your path to becoming a professor in chemistry, and what inspired you to begin this journey?

I have always enjoyed chemistry ever since I was very, very young. I was always interested in chemistry and the chemical sciences, and enjoyed how it overlapped with so many other fields of science. I think I was always sort of a science geek.

I studied an undergraduate degree in chemistry at the University of British Columbia, Okanagan in Kelowna. I had a wonderful opportunity through the Aboriginal Centre at UBCO to participate in their Aboriginal Undergraduate Research Mentorship (AURM) program during my second year, where I worked with a professor on a small research project, and the Aboriginal Centre provided a stipend for the semester. I worked with a great professor in the Department of Chemistry, Dr. Susan Murch, who introduced me to research, and that connected everything together. I'm a first-generation student, no one in my family ever went to university, while my family was incredibly supportive, I had to guidance with respect to how the university system functioned or what opportunities outside of regular classes was available to me. Then I found this great mentorship through this program, which showed me that there are numerous career opportunities in research.

I have enjoyed coaching, teaching, and mentoring, so I always knew I enjoyed those roles. Watching professors interact, looking at their lifestyle and what they did day to day, it seemed very fun, fulfilling, and impactful. So, I finished my undergrad degree, where I did four years of research throughout my undergrad, wrote and defended an honors thesis, and then I moved to the University of Alberta for graduate studies.

Both my undergrad research and my PhD are in analytical chemistry, specifically in the field of metabolomics, performing chemical analysis on really complex samples. I really love these areas of research as they're widely applied to so many different fields. Analytical chemistry truly lets chemistry present as the central science, interfacing with all aspects of science. Then this position opened up at UVic, and I applied this winter, and I was offered an interview, and then I was offered a position.

That was my journey all the way from undergrad. Beginning by having really no idea what careers in research looked like or what a professor did in their day-to-day life.

How has your Indigenous identity influenced your approach to teaching and research?

I think it makes me acutely aware of Indigenous Ways of Knowing, which I find to be very valuable. Sometimes in science, we are focused on just one way of understanding, but there is valuable information from other ways of knowing as well. That doesn't make it more or less correct, it's just a different perspective. So, for me, as a researcher, having my identity, I acknowledge these different ways of knowing, generating knowledge, and understanding the natural world. In my research, as well as teaching, it's important to inform students that there are different ways of knowing. They are not inherently worse or better than Western Science, but they are different. I think it's partially a stigma as well, that we have to get over as a society, encouraging different viewpoints and perspectives. Especially in a place like Canada, where we have such a rich history with Indigenous groups that have their perspectives on many different natural phenomena and things that are well studied in Western Science. We look at things that have been observed for thousands of years, and things that science has characterized and understands, and we see there is quite a bit of overlap. So, I think that influences my approach to teaching and research.

I went through an Aboriginal undergrad research mentorship program, and that, especially as an Indigenous first-generation student, imparted me with the importance of having a strong mentor. I carry that with me every day. The impact that these mentors had and continue to have on my day-to-day professional life. I strive to make sure that I'm being a strong mentor for the students around me.

What teaching strategies do you plan to use to make chemistry more relatable for Indigenous students?

It's a challenge because I think that Indigenous perspectives are all so unique, and I think that it is important not to use a pan-Indigenous perspective across education. I think bringing in examples from phenomena that have been observed, Traditional Knowledge, or antidotes from Indigenous stories into places like chemistry. More so in applied science fields, like ethnobotany as an example, that looks at Traditional Medicine and their uses. How science uses Traditional Knowledge to guide research in fields that look at natural products, or the development of life saving pharmaceuticals from Traditional Ways of Knowing. As an analytical chemist as well, I think having lots of examples that maybe don't necessarily make chemistry easier to digest but make it more personal, and relatable, which can improve student engagement. Analytical chemistry sometimes is seen as a very sterile, boring field, in a white laboratory, and everyone is wearing lab coats. It is very precise and accurate, you have to get exact measurements, but analytical chemistry can also be messy, with plenty of field work opportunities.

Analytical chemistry is used to help Indigenous groups in remote communities. Drinking water safety is a massive concern in remote communities and analytical chemists are at the forefront of this. It's not just people in a lab doing analysis, but people are in the field, and citizen scientists collecting samples. People are passing on knowledge from the community level, saying "hey, the government says that my water is safe to drink, but it smells like gasoline". I think that providing these examples makes, especially analytical chemistry, perhaps more interesting and more engaging to students with diverse backgrounds.

As an Indigenous person in academia, what challenges have you encountered, and how have you navigated these challenges?

I grew up in Kelowna, so I was fortunate I went to my undergrad where I grew up so I could have my family as a support network. However, as an Indigenous person who is a first-generation student, and a lot of Indigenous students are first-generation. Being a first-generation student was the most significant barrier that I felt that I had to overcome. UBC had a lot of great support for Indigenous students, and they helped overcome that, but things were uncomfortable at times. I wasn't even aware of how to sign up for classes my first year. I had no idea how to sign up for classes, I didn't know what classes to take. No one around me had ever gone through the university process. I didn't know what a tutorial or lab or a seminar was. These things were more challenging. I watched people around me, whose parents had gone to university, some of them had masters, PhDs or professional degrees. They were able to get these research positions after their first year. I didn't have anyone in my corner to support me until I found a mentorship network my second year. So, I think that the biggest challenges were a lack of mentorship and experience within my own family. I think that would be one of the biggest challenges I faced, but again, the mentorship really helped me overcome this. I think my advice to Indigenous students and first-generation students in general is find great mentorship. There are programs on campus, they're there to help, and they work to advocate for students.

Considering the significant impact it has had on you; how important would you say mentorship is in the field of chemistry?

I think mentorship is really the most important aspect of my field, and I think it is the most important part of a professor's job. It's how we train people on new techniques, to work with very complex instrumentation and perform analysis with it you have to be successfully mentored in it. We rely on mentorship in my field especially, really heavily, due to all the techniques, instrumentation, and need for precision. This mentorship role is very important both professionally, for the hard laboratory skills and also for soft skills, such as going to conferences, presenting results, applying for funding, and writing papers. I think in all fields of science, probably in all fields of inquiry, mentorship is really important and sometimes overlooked, but a good mentor can make or break your research experience. I've been fortunate to have a number of great mentors which have really helped me along the way. Having great mentors really allows a student to learn and make mistakes in a comfortable environment without being judged and explore their own interests in a way where they know they will always be supported. So, mentorship is incredibly important for a number of different trajectories, learning how to do stuff in the lab, the soft skills, and also just growing as a student and as a person.

Can you tell us a bit about your current area of research, and what you plan to research while instructing at UVic?

I'm an analytical chemist, and my whole professional research career has been centered around analytical chemistry. My particular field of research in analytical chemistry is called metabolomics. Metabolomics is the study of considerable small molecule metabolites in a biological sample. Small molecules are typically under 1000 Daltons in mass, such as amino acids, fatty acids, and some sugars. There are other secondary metabolites as well, alkaloids, terpenes, and these are all small molecule metabolites. The goal of metabolomics is to try and detect as many of these as we can in a

single analysis, to allow those tools to probe the small molecule metabolism in different biological samples. This provides insight into things such as environmental contaminants and exposure, some small molecule spills, things like oil spills. For instance, you can see trace amounts of oil in biological samples and how they are metabolized. Certain biomarkers for disease as well are often small molecules. Many active ingredients in plants or traditional foods that might be used to treat diseases or ailments, are also small molecules.

The goal of metabolomics is to study small molecules, particularly my research field uses a technique called multidimensional chromatography. We use an extension of traditional one-dimensional chromatography, so either gas or liquid chromatography. We have two dimensions of separation of a single analysis, which provides very comprehensive, really high-resolution analysis, and allows us to separate and identify thousands of small molecule metabolites in a single analysis in under two hours.

My research at UVic will focus largely on developing techniques and data tools for two-dimensional liquid chromatography, liquid chromatography-based metabolomics. Then applying these tools and techniques to hopefully study phenomena affecting the environment in British Columbia, studying some Indigenous food crops in British Columbia and in Canada as well. I would love to see the technical developments from my research applied solve problems that might be affecting certain Indigenous groups. Part of my research I really like doing is that coding, it's kind of different than what most chemists do. I spend a lot of my research writing code, processing data, and developing new ways to process and handle data. A big part of my research is focused on developing new data tools and techniques. There is really something for everyone in my future research group, applied analytical chemistry, and also this sort of basic research, studying chemical data, studying chromatography, and studying principles of analytical chemistry.

What advice would you give to future Indigenous chemistry students who are interested in getting involved with research, or are seeking mentorship in their field?

Don't be afraid to ask for help. Don't be afraid to ask for opportunities. Talk to your professors. Seek out opportunities on campus. The First Peoples House is a great resource for this, they have programs that help Indigenous students get into research. Talking to professors, talking to senior students. Most people, almost everyone at the university, they're there because they enjoy working with young students and young researchers. They enjoy that mentorship and teaching role. Professors tell me that they are sometimes surprised that students don't come to them. I think students don't recognize that is the role of the professors, to help and mentor. The professors genuinely enjoy that. Don't be afraid to talk to professors and seek out help and guidance. Everyone is there with good intentions, they want to help, and they want you to succeed. Find good mentors and rely on them for their expertise and for their advice. They've been through it before. They've seen it. They've seen lots of students through it.

What is your vision for future Indigenous students as they enter the field of chemistry, and what words of encouragement and advice would you like to share with them?

I hope that they feel free to study and explore their interests, regardless of what their interests are. I think that sometimes there is a bit of pressure on Indigenous students, that they have to study something that directly affects their community, or affects their identity, or is influenced by their identity. By no means should anyone lose their identity, but if an Indigenous student is really interested in data science or inorganic chemistry, or something that is really far removed from application at the community level, they should go for it. There shouldn't be this sort of fear that it will be perceived in a way that is perhaps a little bit removed from their Indigenous identity. I hope Indigenous students can study whatever they find interesting and cool and pursue their own research interests regardless of what they are, without the fear or pressure of "is it applied and am I helping people?". Science, usually, helps people. I am hoping that students feel comfortable studying whatever they want to study and have that freedom. Having great mentors and good support structures in a strong department allows students to do that.

The university is a really welcoming environment. Don't be afraid of coming to university. Almost everyone at the university is there to help and support, and they want to see students succeed. You have to do some work, because you have to find mentors, you have to seek them out. There are great resources for that. Don't be afraid to ask for advice, ask questions, and ask for guidance. It's okay not to know things. People will be there to support you. It's okay to make mistakes, we all make mistakes along the way. Seek out mentors and seek out opportunities through that. It's important to understand that professors, faculty, supporting staff, and older students, they almost all certainly want what's best for students. Having an understanding that they are there to support you, allows students to grow without fear and without hindrance. For me, that's the most important piece of advice and encouragement, that the university is a welcoming environment, and make sure you make the most of it by finding great mentors and great opportunity to grow and succeed as a young scientist.