

PhD position: Quantifying process-structure-function relationships to develop novel high-value grain-based ingredients – An innovative data-driven approach

The University of Guelph resides on the treaty lands and territory of the Mississaugas of the Credit. We recognize this gathering place where we work and learn is home to many past, present, and future First Nations, Inuit, and Métis peoples. Our acknowledgement of the land is our declaration of our collective responsibility to this place and its peoples' history, rights, and presence.

The [Dairy Science](#), [Food Processing, Structure and Quality](#) and the [Grain Science and Technology](#) Research Groups in the Department of Food Science at the University of Guelph are seeking a highly motivated PhD student to join a dynamic, multidisciplinary, and multi-university research initiative '[The Future is Gree\(ai\)n](#)' (NSERC CREATE Program), with a focus on understanding how grain structural architecture governs food quality and how this knowledge can be leveraged to develop novel, high-value grain-based ingredients.

The structural organization of grains plays a fundamental role in determining nutritional quality, flavour perception, and techno-functional performance. However, the mechanisms through which grain structural architecture influences these quality attributes remain poorly understood. This PhD project will investigate and quantify the multi-scale structural organization of grain-based materials and determine how these structures are transformed during food preparation and processing. Particular emphasis will be placed on understanding how structural changes influence nutrient digestion behaviour, flavour release, and ingredient functionality.

A key component of the project involves developing innovative **data-driven platforms**, employing machine learning models, to integrate quantitative insights in process-structure-function relationships to promote rational ingredient design. The successful candidate will engage in hands-on research spanning sustainable processing, multi-scale structural analysis, techno-functional characterization, flavour mapping, *in vitro* digestion, and advanced data analytics. This is a unique opportunity to work at the intersection of food processing, food physics, food chemistry, and data science.

The student will be immersed in a [comprehensive professional development program](#) designed to support their academic growth and ensure a strong foundation for a successful career post-graduation. Through the NSERC CREATE-Gree(ai)n program, the candidate will participate in industry internships, academic exchanges, interdisciplinary training, and tailored professional development activities designed to support long-term career success in academia, government, and industry.

Research environment

The successful candidate will join dynamic, ambitious, and collaborative research teams dedicated to high-quality scientific research, intensive student training, and meaningful partnerships with other universities, industry, and society. These teams actively implement Indigenization, and equity, diversity and inclusion (EDI) principles throughout the training process and maintain a well-balanced research portfolio that spans both applied and fundamental scientific topics.

As a PhD student in our teams, you can expect:

- Mentorship and guidance tailored to support your research, outreach, and career development
- Comprehensive training through a variety of career-readiness activities, workshops, and courses

- Access to mobility opportunities for research exchanges with collaborators at other Canadian universities and internships with industry partners
- A collaborative and inclusive environment that fosters innovation and values Indigenization and EDI principles
- Opportunities to build a strong professional network and develop long-term collaborations with academic and industry stakeholders

Job responsibilities

The successful candidate will be creating an innovative data-driven platform to produce novel grain-based ingredients, and to evaluate the multi-scale structural and (bio)chemical changes influenced by processing and how these changes influence ingredient techno-functionality, digestion kinetics and flavour properties. The project will involve the use of various techniques, including spectral and imaging methods, GC-MS, LC-MS, *in vitro* digestion assays, kinetic modelling, and machine learning and AI. Key responsibilities include conducting a comprehensive review of the relevant literature, being involved in industry internships and academic exchanges, developing and documenting standard operating procedures, and regularly communicating progress to project stakeholders through meetings and annual reports. Additional tasks include ensuring adherence to lab safety protocols, participating in Indigenization and EDI training and activities, supporting knowledge translation and transfer initiatives, and completing a range of career-readiness and professional development training. The candidate will receive ongoing mentorship and support from a collaborative team, including postdoctoral researchers and fellow PhD students.

Candidate profile

The ideal candidate has a demonstrated educational background (M.Sc. degree) in food science or related field, and a keen interest in further sharpening their skills in research. Due to the collaborative nature of the project (spanning different research groups within the University of Guelph and at other Canadian Universities), the candidate should be an enthusiastic team player who is able to work both independently and as part of a team, and demonstrate excellent organization, time-management and communication skills, and be eager to take full advantage of the professional development and mobility opportunities that will be offered as part of the graduate program.

Required qualifications

We are looking for an ambitious, enthusiastic, motivated and responsible addition to our research teams with the following qualifications:

- Holding a M.Sc. degree in a relevant field (*e.g.*, Food Science, Food Engineering, or related disciplines)
- Demonstrating excellent organizational, time and project management skills
- Demonstrating strong background in food chemistry, food processing and chemical wet lab techniques; experience with vibrational spectroscopy, chromatography, and/or mass spectrometry is considered an asset
- Demonstrating skills and experience in advanced data analysis techniques such as chemometrics, machine learning, and kinetic modelling
- Eager to participate in professional development and research mobility opportunities at partner institutions across Canada
- Interested in close collaboration with government and industry
- Capable to work as an independent, critical, responsible and flexible researcher
- Open to think and work in an interdisciplinary environment
- Committed to publishing research in peer-reviewed journals and delivering timely project reports in English
- Capable of presenting research results at project meetings and conferences in English
- Keen to integrate in an international research team and be an active participant in and an advocate for Indigenization and EDI initiatives and training

The work requires on-campus presence and travel to the project partners.

To apply, please complete [this online form](#) by July 1, 2026 and include details about your qualifications. **Please do not send individual emails with your CV, as only applicants applying through this link will be evaluated.**

The position has an anticipated start date of **September 1, 2026** (although other timelines can be accommodated). Questions about the position can be directed to ijoye@uoguelph.ca with subject line 'PhD position in Grain Science - information request'.