

Two Graduate Student Positions investigating RNA Modification

Dr. Ute Kothe, Professor & Head, Department of Chemistry



University
of Manitoba

Overview

The Kothe group (<https://kothegroup.ca/>) investigates how functional RNAs are generated in the cell. Specifically, we decipher the interplay of RNA modification with transcription, RNA folding, and RNA processing and how the integration of these processes enhances the functionality of RNAs in translation. As such, we identify as an RNA Biochemistry Lab, but we have equally strong interest in protein biochemistry and RNA-protein interactions. Our research uncovers fundamental biological processes and identifies disease mechanisms and potential therapeutic targets.

Project 1: Mechanism and function of tRNA modification and folding

tRNAs are the most highly modified RNAs in all cells. It is now evident that tRNA modifications are critical determinants of protein synthesis and that tRNA functionality and modifications status are influenced by environmental conditions and disease states. Based on our strong track record in investigating tRNA modifying enzymes using biochemistry and molecular biology, you will study the mechanism and function of selected tRNA modifying enzymes in order to gain mechanistic insight how tRNA modifications influence each other, tRNA folding and tRNA functionality in particular aminoacylation and protein synthesis.

Project 2: Modification and folding of ribosomal RNA by H/ACA small nucleolar Ribonucleoproteins (H/ACA snoRNPs)

H/ACA snoRNPs introduce pseudouridine modifications into ribosomal RNA (rRNA) during the early phases of ribosome synthesis. We want to gain deeper insight into these processes because ribosome synthesis is up-regulated in all cancers and dys-regulated in a number of inherited diseases including Dyskeratosis congenita. Building on our unique expertise in biochemically investigating H/ACA snoRNPs, you will integrate biochemical and biophysical techniques including fluorescence together with other experimental approaches to characterize how the interaction of H/ACA snoRNPs with rRNA affects the folding of rRNA.

Learning Opportunities

Molecular Lifesciences: you will gain a well-rounded education in the molecular life sciences including techniques from biochemistry, molecular biology, biophysics, structural biology, and genetics with a special focus on RNA. We have access to many state-of-the-art instruments on campus providing you with hands-on training. This expertise enables you to pursue research careers in academia or in industry – the ability to produce and characterize biomolecules is critical for the growing biomanufacturing sector.

Collaboration & Networking: you will interact with the Kothe team as well as local and international collaborators gaining experience in teamwork. We are well connected locally through the Manitoba RNA Salon and the Manitoba Protein Structure & Function Group, and we are a founding member of the RNA Canada community including the RiboClub providing us with strong connections to a vibrant RNA research community across the country.

Communication & Leadership: we place a special emphasis in our training on supporting everybody in developing strong communication skills for diverse audiences and leadership skills. Starting with a graduate course focussed on scientific communication, we provide ample opportunities for presentations, participation in scientific meetings, outreach, and scientific writing. All group members are encouraged to pursue volunteer and leadership opportunities.

Expected Qualifications

Applicants must have completed at least a B.Sc. or equivalent studies in biochemistry with outstanding academic achievements; an M.Sc. degree in biochemistry is required to directly enter the Ph.D. program. You should have an excellent understanding of biomolecular structure and function, in particular regarding proteins, RNA and DNA. It is expected that applicants have prior research experience in biochemistry. Expertise in protein purification and characterization is considered an asset. To be accepted for graduate studies and to succeed, you must have very strong English language skills (writing, reading, speaking, listening). In addition, applicants should demonstrate experience in teamwork, outstanding interpersonal and communication skills, a strong interest in RNA research, perseverance, and curiosity to learn.

About the University of Manitoba and the City of Winnipeg

The University of Manitoba is a driving force of innovation, discovery and advancement and is the main research institution in the province of Manitoba. It is also one of the 15 leading Universities in Canada (U15) offering a high-profile research environment with ample opportunities for advanced education and research collaboration. Our momentum is propelled by our campus community – UM faculty, staff, and students whose determination and curiosity shape our world for the better. Our research, teaching, learning, and work environment is uniquely strengthened and enriched by Indigenous perspectives. With two main campuses in Winnipeg, satellite campuses throughout Manitoba, and world-wide research, UM's impact is global.

The City of Winnipeg (www.tourismwinnipeg.com), located where the Red and Assiniboine Rivers meet, is recognized for its vibrant, multicultural community and diverse culture. The city, with a growing population of more than 766,000, is home to internationally renowned festivals, galleries and museums, the historic Exchange District and The Forks, and ever-expanding research, education, and business sectors. From the Hudson Bay waters, across the farmland fields, to the pulse of the cities and towns, The Province of Manitoba's (www.travelmanitoba.com) people and places – its 100,000 lakes, 92 provincial parks, winding river valleys and storied prairie skies – inspire.

Application

Applications are invited for either Ph.D. studies or M.Sc. studies with the option of transferring into the Ph.D. program depending on prior experience. Potential start dates are January 1, 2024, or May 1, 2024.

Interested students should send a complete application package to ute.kothe@umanitoba.ca including:

1. A 2-page motivation letter outlining your qualifications and research experience, fit to our research program, and goals in conducting M.Sc. or Ph.D. studies
2. A curriculum vitae
3. All relevant transcripts (unofficial versions are accepted at this stage)
4. Contact information for three references

Only complete applications will be considered. Please know that you will only be contacted if you are invited for a virtual interview; please refrain from sending multiple applications or inquiries.

Stipend

All graduate students will receive a guaranteed stipend according to the departmental agreements.

Further information about Graduate Studies at the University of Manitoba

[Graduate student admissions](#) | [Faculty of Graduate Studies](#) | [University of Manitoba \(umanitoba.ca\)](http://University of Manitoba (umanitoba.ca))