



MSc/PhD Research in Bioinorganic Chemistry

2018 ACADEMIC YEAR INTAKE
SCHOOL OF CHEMISTRY

November 11, 2017

Advertisement: Higher Degree Positions in Bioinorganic Chemistry

Bioinorganic Chemistry is a multidisciplinary science spanning chemistry, biochemistry, chemical physics, cell biology, and microbiology. At WITS, the SARChI Chair in Bioinorganic Chemistry focuses on three core areas at the interface of chemistry and biology: [1] metallodrugs for cancer and mycobacteria chemotherapy, [2] proteins for metallodrug transport, and [3] bespoke metalloenzyme catalysts. A fourth focus to be introduced in 2018 involves vitamin B₁₂ chemistry. High performance computational chemistry (DFT, MM/QM, and molecular dynamics) underpins all research projects in the group.

The SARChI Chair is likely to have two NRF grant-holder linked MSc bursaries and two PhD bursaries for South African graduate students in 2018 who hold an Honours/Master's degree and who are interested in pursuing research toward an MSc/PhD degree in Bioinorganic Chemistry.

All students interested in carrying out dynamic, challenging research in the field of Bioinorganic Chemistry are invited to apply for the available bursaries. Students who already have funding for their higher degree aspirations in 2018 and who meet the following minimum requirements are also invited to apply for a higher degree position in the group.

Minimum Requirements - MSc Degree Candidates:

1. Applicants must have an aggregate grade of $\geq 65\%$ for Chemistry Honours or Biochemistry Honours.¹
2. Applicants must have majored in Chemistry and/or Biochemistry at the undergraduate level and hold a BSc degree reflecting these majors. Applicants with majors in Chemistry and Genetics or Chemistry and Microbiology are equally eligible to apply.
3. Applicants must have either completed the Bioinorganic Chemistry Honours Elective Module at WITS, with an aggregate grade of not less than 65%, or (if from another university or School) must commit to take this module as part of their higher degree training.

Minimum Requirements - PhD Degree Candidates:

1. Applicants must preferentially have majored in both Chemistry and Biochemistry at the undergraduate level and would typically hold an Honours degree in Chemistry or Biochemistry.

¹ This is a Senate Standing Order of the University of the Witwatersrand.

2. Applicants must hold an MSc degree (research dissertations only) in experimental Chemistry (organic/bioinorganic/materials/physical) or Biochemistry. Applicants holding an MSc degree in theoretical Chemistry or Biochemistry/Biology will naturally also be considered.

Advantages and Skills (General Requirements):

Biochemistry Skills. In order to be successful in the research program, applicants will need to be competent in one or more basic biochemical methods such as gel electrophoresis (e.g. PAGE and standard agarose GE), purification of proteins and or DNA by column chromatography, dialysis, and ultracentrifugation. Facilities to grow protein crystals are available and exceptional candidates can expect to learn how to collect X-ray data and solve and refine protein and/or DNA macromolecular structures during their project work. Candidates wanting to pursue a PhD in the group who hold an MSc degree in Chemistry will be trained on key biochemical methods used in the group.

Chemistry Skills. In order to be successful in the research program, applicants need to be skilled at organic/inorganic compound synthesis and compound purification. The ability to characterize compounds by NMR, FTIR, UV-vis, and mass spectrometry is essential. Successful applicants will learn to grow metal-organic compound crystals and solve and refine single crystal X-ray data to publishable models in their research program, so this is not a prerequisite skill. Candidates wanting to pursue a PhD in the group who hold an MSc degree in Biochemistry will be trained in key chemical methods and will pursue projects in the category of metalloprotein or metallodrug-DNA biochemistry.

Computer Skills. All applicants must be competent using spreadsheets, office software, and scientific graphing or graphics packages. You will learn the art of creating high-impact scientific graphics in your project work. We have licenses for Origin and advanced computational chemistry software (Schrodinger and Gaussian) as well as open source crystallography packages (Olex-2 and Phenix). Candidates wishing to use high performance computing to augment and delineate experimental data will have the opportunity to do so during their research in the Chair's program.

Advantages. [1] A BSc with Chemistry and Biochemistry as co-majors, [2] competence in scripting/programming languages such as C++ or Python, and [3] a strong research record in the case of PhD applicants (e.g., a publication in a respected international journal or an MSc *cum laude*).

Application Process:

The Faculty of Science closing date for MSc applicants planning to commence in Semester 1 of 2018 is 30 November 2017. If you meet the minimum requirements and wish to apply to WITS for an MSc degree in Bioinorganic Chemistry, please pursue this online before 30/11/2017:

<https://www.wits.ac.za/science/academic-programmes/postgraduate-programmes/>

Please also e-mail your application documents and your expression of interest to Professor Orde Munro (Orde.Munro@wits.ac.za). Note that because space is limited, not all qualifying applicants can be accommodated. Selection will thus be based on academic merit and on a first-come-first-served basis. (PhD applicants should be aware that they may apply during the course of 2018, but that the positions may be filled before April 2018.) At least two positions are reserved for African students (RSA citizens only) in order for the Chair to meet Department of Science and Technology (DST) mandated diversity targets.