Robert Wickham has an opening for an M.Sc. student in theoretical soft condensed matter physics. The main focus of my group is the formation of complex supra-molecular structures through self-assembly. The goal is to understand macromolecular self-assembly at a fundamental level, including the conditions necessary to form a given structure, and also the principles governing the dynamics of self-assembly. Potential applications of this research include: self-assembled biological structures, nanolithography, optical devices, and nano-scale drug-delivery vehicles. This is a challenging field of research, involving many-body physics, multiscale modelling, competing interactions, and intrinsically non-equilibrium phenomena. My group tackles these problems using both sophisticated field-theoretical methods and high-performance computation on my 280-core cluster. Thus, students working in my group will not only deepen their understanding of statistical mechanics, soft materials, and field theory, but will also have the opportunity to develop their scientific computing skills using a supercomputer. Guelph has an excellent interdisciplinary research effort in soft materials and biophysics, and our group has strong collaborations with other experimental and theoretical soft matter/biophysics groups on campus and at neighbouring universities.

For this opening, the student should have a strong interest in high-performance computing and can choose a project in one of two areas. 1) Biophysics: field-theoretical modelling and simulation of antimicrobial peptides interacting with lipid bilayers, including the development of methods to treat complex and specific intermolecular interactions. 2) Non-equilibrium physics: simulations of interfacial motion, nucleation, and structural dynamics in block copolymer microphases.

If you are a highly-motivated graduate student who wants to perform leading-edge theoretical work in soft condensed matter physics, please contact me directly (rwickham@physics.uoguelph.ca) and please also visit my webpage: http://www.physics.uoguelph.ca/~rwickham/research/.