Math

In the first of two math sessions, students got a chance to talk to math graduate students about (among other things) what mathematics research really looks like. The discussion emphasized math as its own discipline with active research rather than a tool for science. To emphasize these ideas students worked through several activities that involved formulating and proving mathematical statements. We spent some time colouring maps, with the goal of using as few colours as possible. Of course, with countries sharing a boarder being distinct colours. Students were able to colour all their maps using only four colours and conjectured that no matter the map four colours would suffice. This result is (aptly) called the Four Colour Theorem. The statement is simple but the proof is fantastically complicated. Students also looked at proving some simple algebraic theorems concerning even and odd numbers, saw and constructed various geometric proofs of the Pythagorean Theorem and followed the footsteps (pun intended) of Euler as he tried to walk the Seven Bridges of Königsberg. In the second session students were exposed to the classically counter-intuitive Monty Hall Problem. Students played the game many times in groups and recorded the results. Putting everything together gave a compelling argument for how to win the game. Finally, students worked through several seemingly different problems. Some of which they would have seen before and some of which they would not be familiar with. Furthermore the problems could not be solved exactly. Fortunately though the answers could be approximated in some way. Once students had an initial guess they were able to improve their approximation getting ever closer to the true answer. This led to a discussion of iterative methods. Iterative methods appear all around us; from calculating consecutive digits of pi to figuring out how much cream you prefer in your coffee. Sometimes an approximate solutions is all you can hope for, but finding a reliable way to improve your approximation can be just as good.

Special Guests

Geometric Analysis & Surface Theory

Pam Sargent, Ph.D. Student, Department of Mathematics, UBC

My Ph.D. research centres around geometric analysis and minimal surface theory

Mathematics of Life

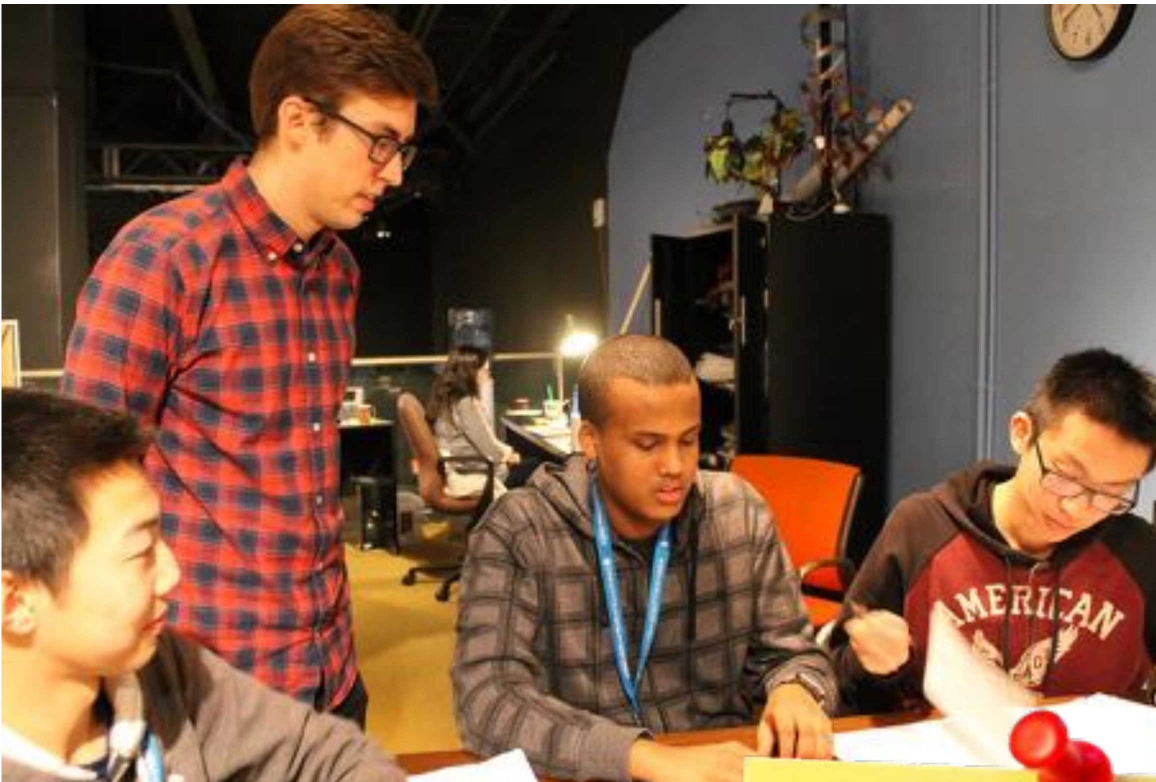
Cole Zmurchok, PhD Candidate, Institute of Applied Mathematics, Department of Mathematics, UBC

My research involves the development and study of mathematical models describing how groups of living cells move. A group of cells must coordinate chemical signalling and cellular mechanics to migrate efficiently. We formulate the relationship between signalling, mechanics, and movement using mathematical models, then we study the models by using mathematical techniques and by designing computer simulations.

Harmonic Analysis

Robert Fraser, Ph.D. Student, Department of Mathematics

My Ph.D. research focuses on a field of harmonic , UBCanalysis surrounding the Kakeya problem in geometric measure theory. This problem concerns the size of Kakeya sets- sets in space that contain a unit line segment in every direction



FSL Fellow

Matt Coles

Ph.D. Candidate

UBC Department of Mathematics

My research concerns Partial Differential Equations. These equations describe the dynamic world around us and find applications in physics, biology and engineering. Specifically, I study the Nonlinear Schrödinger Equation, which describes the behaviour of many cold particles. Actually 'solving' the equation is usually impossible so I ask questions about the qualitative behaviour of solutions such as: what happens to the particles after a long time?