



*Ph.D. programme
in Mathematics and Computer Science*

Title: The Identification and Analysis of Genomic Transposable Elements

Speaker: John Karro

Abstract: Transposable Elements, or TEs, are mobile DNA sequences capable of inserting multiple copies of themselves into a genome. Throughout our evolutionary history the human genome has been repeatedly subjected to such insertions, to the point where upward of 45% of our genetic sequence is the remnants of TEs and other repetitive sequences. Identifying these TEs could be easily framed as a basic string-matching problem, were it not for the effect of genetic mutations: while a given TE was initially a copy of its progenitor sequence, over time the DNA sequence changed in an apparently random manner. Thus the identification problem becomes significantly more difficult, and is even further complicated by size of the input which any solution algorithm will be applied. Given the size of the higher-order genomes (e.g. $n \approx 3 \times 10^9$ for human, $n \approx 5 \times 10^{10}$ for salamander), any identification algorithm must have runtime and memory usage bounds that scale linearly with input size if the algorithm is to be of practical use. But once TEs have been identified, they provide important information on the very mutation rates that made them so hard to identify – giving us a window into genomic evolutionary history. This talk will explore how and why we are solving the identification problem. We will describe the algorithm underlying RAIDER, a new tool for the fast de novo identification of transposable elements.

Short Biography: Dr. John Karro received his Ph.D. from the University of Virginia in 1994, working in the Department of Computer Science on the development of algorithms relevant to the design of integrated circuits. Following three years of teaching at Oberlin College, Dr. Karro switched his research focus to Computational Biology, spending time as a postdoc in the Department of Molecular Biophysics at Yale University and the Department of Biology at the Pennsylvania State University. Dr. Karro is now an associate professor at Miami University in the Department of Computer Science and Software Engineering, with a joint appointment in the departments of Microbiology and Statistics. The work being presented is funded under NSF Career Award #0953215.

Course dates
05/06/2015

Time
15:30

Room
MT10– 30B