



THE UNIVERSITY OF
CHICAGO

Departments of Computer Science, Mathematics, and Statistics
SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

NIGEL BOSTON

Departments of Mathematics and Electrical and Computer Engineering
University of Wisconsin, Madison

**Novel Applications of Algebra to Engineering and
Computer Science**

THURSDAY, November 8, 2012, at 3:00 PM

112 Stevanovich Center, 5727 S. University Avenue

ABSTRACT

Over the last 50 years there have been increasingly many applications of algebraic tools to problems in communications, in particular in the fields of error-control codes and cryptography. More recently, broader applications have emerged, requiring quite sophisticated algebra—for example, the Alamouti scheme in MIMO communications is just Hamilton's quaternions in disguise and has spawned the use of PhD-level algebra to produce generalizations. Likewise, in the absence of credible alternatives, industry has been forced to adopt elliptic curve cryptography. In addition, algebra has been successfully applied to problems in signal and image processing such as face recognition, biometrics, control design, and signal design for radar.

In this talk, I shall describe some of these developments and then focus on a couple of problems I have worked on myself recently, namely the Belgian Chocolate Problem in control design, which turns out to be related to the abc theorem for polynomials, and the Four-Atom Conjecture in network information theory, which is related to some questions on finite groups. (This latter topic will be discussed further in my talk in the Group Theory Seminar, which will follow at 4:30.)

Organizers:

Lek-Heng Lim, Department of Statistics, lekheng@galton.uchicago.edu,

Ridgway Scott, Departments of Computer Science and Mathematics, ridg@cs.uchicago.edu,

Jonathan Weare, Department of Mathematics, weare@math.uchicago.edu.

SSC Seminar URL: http://www.stat.uchicago.edu/seminars/SSC_seminars.shtml

If you wish to subscribe to our email list, please visit the following website:

<https://lists.uchicago.edu/web/arc/statseminars>.