# COLLOQUIUM

**Allen Herman**
University of Regina

## Characterizing table algebras in small dimensions

Mathematics and Statistics

Friday, September 18, 2015; 3:30 - 4:30 PM; RIC 209

**Abstract:** A table algebra is a finite-dimensional associative algebra with involution $*$ whose basis $\mathbf{B}$ contains $1$, is $*$-closed, generates nonnegative real structure constants, and satisfies the following pseudo-inverse condition: for every $b \in \mathbf{B}$ there is a unique $b^* \in \mathbf{B}$ for which the coefficient of $1$ in $bb^*$ is nonzero and positive. We say the table algebra is integral if its structure constants are rational integers. Both finite groups and sets of adjacency matrices of association schemes can be viewed as integral table algebra bases by means of their standard representations. Integral table algebras have been shown to share many properties in common with groups besides an explicit character table algorithm indeed parallel versions of the Lagrange theorem, Maschke's theorem, and the Sylow theorems have recently been established for table algebras. Nevertheless integral table algebras are not as restricted as finite groups, since there are some with noncyclotomic character tables, and it was open if there could exist a noncommutative table algebra of dimension $5$. In the talk I will walk through our attempts to characterize commutative table algebra bases of rank $2$, $3$, $4$, and $5$, and give our new characterization of all noncommutative table algebras of dimension $5$. This is a preliminary report on joint work with Bangteng Xu and Mikhail Muzychuk completed during the course of my sabbatical.

University of Regina