TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Wednesday, 4 November 2015, 4:00 p.m.
Room 617 Wachman Hall

(refreshments and social at 3:45 p.m)

A systems approach to mathematical modelling of T-cell immunity

by Barbara Szomolay
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Abstract. The interaction between T-cell receptors (TCRs) and peptides is highly degenerate: a single TCR may recognize about one million different peptides in the context of a single MHCI molecule. On the other hand, TCR recognition is fundamentally peptide- and/or MHC-specific: the functional sensitivity, which can be viewed as experimental realisation of the TCR triggering rate, is large enough only for minute fraction of all possible ligands. TCR triggering rate and degeneracy are mathematical concepts that will be discussed in relation to McKeithan's kinetic proofreading model, which was extended to take into account the interaction between the co-receptor CD8 and MHCI molecule. In the rest of the talk I will outline an approach that uses length-matched combinatorial peptide library (CPL) scan data to search protein databases and rank peptides in order of likelihood recognition. This CPL-based database screening can, to a large extent, accurately identify the pathogen that triggered the CD8 T-cell.