1050-11-143 **Caleb McKinley Shor*** (cshor@wnec.edu), WNEC Math Dept, Box H5156, 1215 Wilbraham Rd, Springfield, MA 01119. *Codes over $\mathbb{F}_{p^2}$ and $\mathbb{F}_p \times \mathbb{F}_p$, lattices, and theta functions.*

Let $\ell > 0$ be a square-free integer congruent to 3 mod 4 and $\mathcal{O}_K$ the ring of integers of the imaginary quadratic field $K = \mathbb{Q}(\sqrt{-\ell})$. Let p be a prime. If $p \nmid \ell$ then the ring $\mathcal{R} := \mathcal{O}_K/p\mathcal{O}_K$ is isomorphic to $\mathbb{F}_{p^2}$ or $\mathbb{F}_p \times \mathbb{F}_p$. Let C be a code over $\mathcal{R}$. Given such a code, one can create a lattice $\Lambda_\ell(C)$ over K. One can then construct the corresponding theta function of such a lattice.

In 2005, working with $p = 2$, K. S. Chua found an example of two non-equivalent codes that have the same theta function for $\ell = 7$ and different theta functions for larger values of ℓ. In this talk, motivated by Chua's example, we will consider the situation for general primes p. In particular, we will see how to represent these theta functions in terms of some basic theta series, see connections between these theta functions and weight enumerator polynomials, and consider the question of whether two non-equivalent codes can have the same theta function for some or all values of ℓ. (Received March 02, 2009)