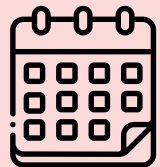# Directed Reading Program Presentations

📅 Friday, May 9th   🕐 Noon   📍 Exley 058

Elliptic Curve Cryptography: Data Encryption through Math
William Allen

Elliptic curves form the foundation of many modern cryptographic systems. In this talk, we will discuss one such cryptosystem, the Elliptic-Curve Diffie—Hellman algorithm. To understand the role of elliptic curves in this algorithm, we will first explore how the set of points on elliptic curves form a group, and then how that group structure lends itself to efficiently encrypting data.

Gamifying Affine Geometry: Parallel and Perpendicular SETs
Pierre Mathier

In the game of SET one aims to collect groups of three cards. SET is rich in mathematical complexity. In this talk we examine how our intuition of Euclidean spaces and the Axioms of Geometry allow us to connect and explore the underlying finite geometric structure of the game. We discuss the ideas of parallel and perpendicular SETs and their relation to the affine geometry AG(4,3).

Huang's Proof of the Sensitivity Conjecture and Spectral Graph Theory
Tony Deng

Spectral graph theory studies the eigenvalues of matrices associated with graphs to gain insight into their structure. It applies tools from linear algebra and intersects with other fields, such as analysis and optimization. The sensitivity conjecture, a long-standing problem in theoretical computer science, was recently resolved by Huang using a simple and elegant approach from spectral graph theory. He proved an equivalent formulation of the conjecture by analyzing the maximum degree of induced subgraphs of hypercubes. In this talk, we will present the mathematical background and outline the main ideas of the proof.

🍕 **Pizza Lunch!**