# Applied and Computational Mathematics Seminar

**Title:** Multi-Tensor Decompositions for Personalized Cancer Medicine

**Speaker:** Orly Alter (University of Utah)

**Date:** Wed 15th June 2022 at 3:00PM

**Location:** (See abstract)

**Abstract:** Starting with our invention of the 'eigengene,' I will describe the formulation of physics-inspired multi-tensor generalizations of the singular value decomposition to (i) compare and integrate any data types, of any number and dimensions, and (ii) scale with data sizes. These models (iii) are interpretable in terms of known biology and batch effects and (iv) correctly predict previously unknown mechanisms. By validating a genome-wide pattern of DNA copy-number alterations in brain tumors as the best predictor of survival, our retrospective clinical trial proved that the models (v) discover accurate, precise, and actionable genotype-phenotype relationships, (vi) are relevant to populations based upon whole genomes of small cohorts, and (vii) can be validated. We discovered this, and patterns in lung, nerve, ovarian, and uterine tumors, in public data. Such alterations were recognized in cancer, yet attempts to associate them with outcome failed, demonstrating that our algorithms are uniquely suited to personalized medicine.

This seminar will take place in Science Centre South, Room S3.56

https://maths.ucd.ie/ACMSeminars/2122/