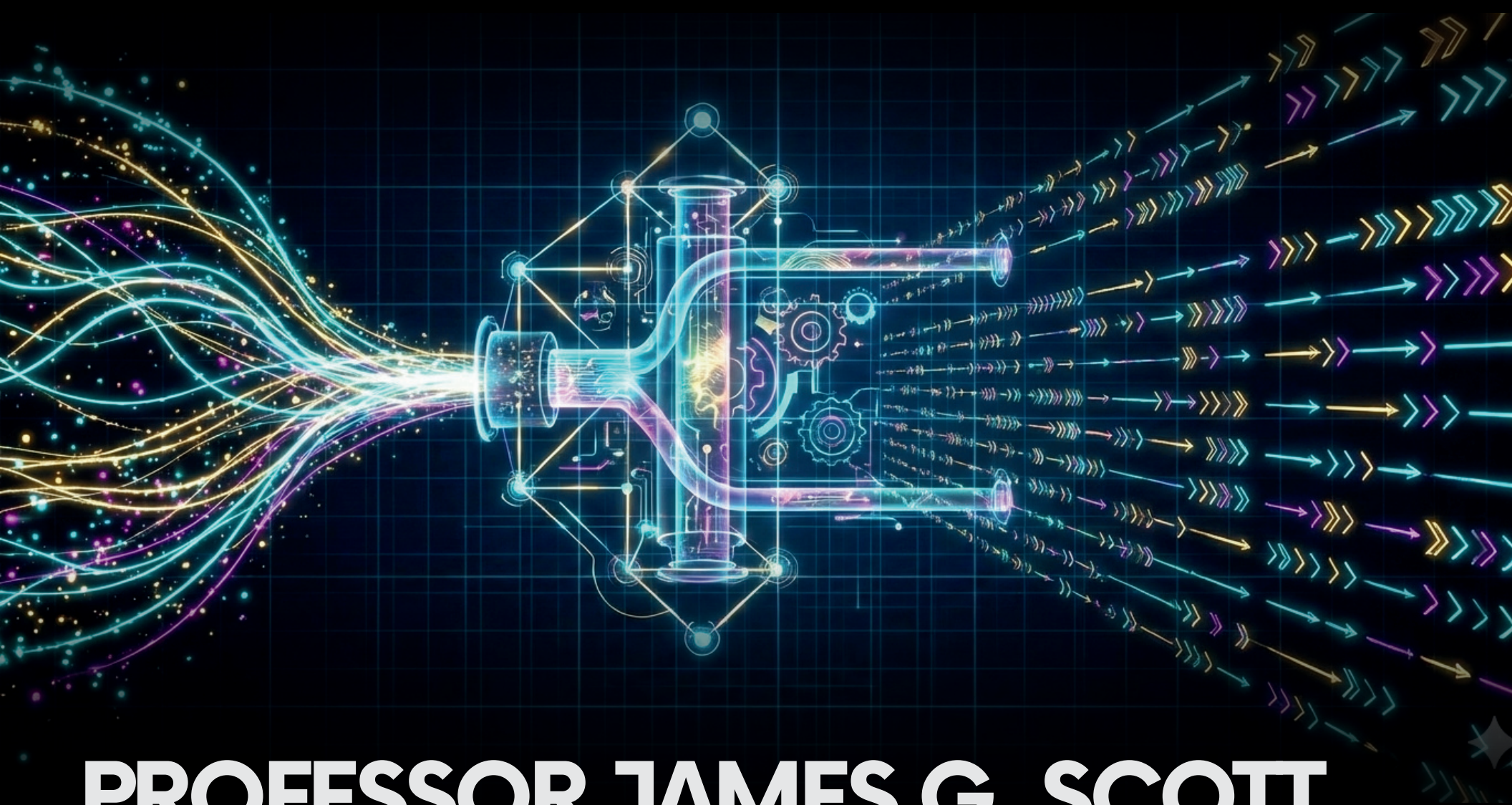


JULIAN CLANCY FRAZIER MATHEMATICS COLLOQUIUM

VECTOR FACTORIES & HYPERPLANES

HOW GEOMETRY POWERS MACHINE LEARNING



PROFESSOR JAMES G. SCOTT

14 APRIL 2026 AT 1240-1330
MAHAN AUDITORIUM

How can a computer learn to reason about language, recognize images, or make predictions from messy real-world information? Before any learning can begin, a more basic problem must be solved: how can words, pictures, and other awkward forms of data be represented in a form that mathematics can work with?

In this talk, I explore two key geometric ideas behind that translation. The first is what we might call “vector factories,” which in machine learning are called “embeddings”: methods that convert raw, unstructured inputs into vectors of numbers that can be analyzed mathematically. The second idea is hyperplanes: once data are represented as points in a high-dimensional Euclidean space, learning often amounts to drawing simple boundaries that separate different kinds of points and allow machines to classify, predict, and decide.

Machine learning is far broader than these two ideas, but a remarkable amount of it can be understood through this geometric lens. This talk offers an intuitive and visual introduction to how modern machine-learning systems are built from these simple ingredients.

